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Structural Origins of the Doonerak Anticline, Central Brooks Range, Alaska

Gregory James Hammond

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Structural origins of the Doonerak anticline, central Brooks Range, Alaska

Gregory James Hammond

Thesis submitted to the
Eberly College of Arts and Sciences
at West Virginia University

in partial fulfillment of the requirements
for the degree of

Master of Science
in
Geology

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Morgantown, West Virginia
2017

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Ellesmerian, Raman spectroscopy, RSCM, microtectonics

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Abstract

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The Doonerak anticline in the central Brooks Range, Alaska, exposes a package of Early Paleozoic metavolcanic and metasedimentary rocks overlain by Carboniferous to Triassic sedimentary rocks which have been correlated to the North Slope subsurface. The flanks of the anticline have been interpreted as portions of a single north-vergent nappe system emplaced during the Brookian orogeny. The Doonerak anticline is a key location for understanding the structure of the Brooks Range fold and thrust belt. Field mapping, microstructural analysis, Raman-spectroscopy of carbonaceous material (RSCM) paleothermometry, and detrital zircon geochronology data suggest the structure is not a tectonic window resulting from erosion of a single north-vergent nappe system. Structures in the units to the north of the anticline are south-vergent, while structures in units to the south of the anticline are north-vergent. Detrital zircon geochronology and petrographic data show that Devonian clastic units in the Endicott Mountains allochthon north of the anticline are not correlative to slates and phyllites in the Hammond assemblage south of the anticline. RSCM paleothermometry shows the southern units reached temperatures of $368 \pm 16^\circ\text{C}$ and were buried ~ 12 km while the northern units reached $313 \pm 19^\circ\text{C}$ and were buried ~ 10 km. A new model is proposed which accounts for observed structural and lithologic relationships and calculated paleotemperatures. In this model, the southern assemblage was emplaced by north-directed thrusting and northern assemblage was emplaced by south-directed motion along a later back-thrust during the predominantly north-vergent Brookian orogeny.

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Introduction

The Doonerak anticline in the central Brooks Range, Alaska, is considered one of the key locations for studying the structural style of the Brooks Range orogen. The structure has been interpreted as the result of allochthonous nappes emplaced by north-directed thrusting, which were later uplifted and eroded into the current structure. This tectonic window interpretation is primarily based on 1:250,000 reconnaissance-scale mapping and older data. Only the eastern portion of the anticline has been mapped in greater detail.

In this thesis, the areas accessible from the North Fork of the Koyukuk River, which cuts through the center of the Doonerak anticline, were studied. This work seeks to improve understanding of the structure through field mapping, petrography, and Raman-spectroscopy of carbonaceous material (RSCM) paleothermometry.

Based on two seasons of field mapping, an updated 1:63,360 scale geologic map was produced. Structural data for each lithologic assemblage were interpreted. Petrography was described and, if applicable, sense of shear was determined for 52 thin sections. RSCM paleotemperatures were calculated for 38 samples. These methods were used in conjunction with recent detrital zircon geochronology data from others to create a new interpretation of the Doonerak anticline.

In the new model presented here, the units south of the anticline were emplaced by north-directed motion during the Brookian orogeny. Subsequent back-thrusting emplaced the rocks on the northern margin of the anticline with south-directed motion. This interpretation greatly reduces the required shortening estimated by prior workers and has implications for larger-scale reconstructions of the central Brooks Range.

Background

The Brooks Range is a fold and thrust belt extending 1100 km across northern Alaska (Figure 1). It began forming during the Brookian orogeny in the Late Jurassic to Early Cretaceous with the collision of the oceanic Angayuchum terrane against the Arctic Alaska superterrane (Moore et al., 1994). Major orogenesis was mostly complete by Albian time (~100 Ma). Hanging wall units were likely emplaced above the footwall of the Doonerak anticline during this period. Therefore, this a key locality for understanding the development of the Brooks Range (Mull, 1989b). A second phase of shortening and uplift took place in the Cenozoic, uplifting and partially refolding these earlier structures into the Oligocene (O'Sullivan et al., 1998).

Figure 1. Generalized geologic map of the Brooks Range, Alaska (after Moore et al., 1994). The white polygon of the Plate 1 map area indicates the study area.

Prior work

Geologic mapping of the Wiseman Quadrangle, which includes the Doonerak anticline, began in the 1950s and resulted in 1:250,000 reconnaissance scale maps by Brosgé and Reiser (1971) and Dillon et al. (1986). Subsequent mapping was completed at the more accessible eastern end of the anticline adjacent to the Dalton Highway at the 1:63,360 scale as part of the Trans-Alaska Crustal Transect (TACT) project (Moore et al., 1997) and the 1:36360 scale by Phelps (1987) and Julian (1989). More recent work in the study area has included geochemical and geochronological sampling, but no major revisions to previous maps (Frier, 2017; Strauss et al., 2017).

Several nomenclatures have been used to classify the rocks of the Doonerak anticline and its vicinity. These are based on both lithostratigraphic and tectonostratigraphic frameworks. The 1:250,000 reconnaissance maps utilized lithostratigraphic units divided primarily based on field characteristics for mapping purposes. These included many informal map units that the authors thought equivalent or correlative, but confidence was limited by the scale of the area and paucity of fossil and geochronological data (Dillon et al., 1986). Other workers have focused on tectonic reconstructions, dividing the units into various autochthonous, parautochthonous, or allochthonous terranes (e.g. Mull, 1982; Jones et al., 1987). This creates confusion and ambiguity when comparing prior work, especially when various workers combine the original units of the 1:250,000 scale maps in different ways (e.g. Oldow et al., 1987; Till et al., 2008). As part of the TACT project, Moore et al. (1997) clarified and grouped many of the previous map units (Figure 3). This scheme was followed by Strauss et al. (2017). A modified version of this system is used in this work.

The Doonerak anticline

The Doonerak anticline (Figure 2) is an approximately 75 km long, 15 km wide, east-northeast-trending anticline in the central Brooks Range of Alaska. At the core of the anticline

are an assemblage of Early Paleozoic rocks overlain by Carboniferous to Triassic sedimentary rocks. Collectively, these units have been correlated to both the North Slope subsurface and northeastern Brooks Range. The fault system at the northern side of the anticline has been interpreted as the basal detachment fault of the Endicott Mountains allochthon. Together, these make the Doonerak area a key location for studying the structural style and evolution of the central Brooks Range (Mull et al., 1987). The structure has often been called a fenster, or tectonic window. This suggests that the units in the core of the anticline are exposed beneath an allochthonous nappe, implying tectonic transport of hundreds of kilometers (Oldow et al., 1987). As the structure is subject to interpretation, non-genetic terms will be used herein. Similarly, the term 'assemblage' is preferred to 'terrane'.

Figure 2. Generalized map of the Doonerak anticline (simplified from Dillon et al., 1986). White polygon indicates Plate 1 map area.

Figure 3 shows the interpretation of units presented by Moore et al. (1997). In this model, the Hammond assemblage units are structurally below the Endicott Mountains allochthon units. Together they are interpreted to have been thrust northward over the units internal to the anticline. They represent the 'hanging wall' units of the Doonerak anticline. The Hammond assemblage units are internally imbricated and not present on the northern flank of the anticline. The core of the anticline includes the Apoon assemblage and the Ellesmerian sequence, which are in either depositional or structural contact. The Ellesmerian sequence is also present atop the Endicott Mountains allochthon to the north of the Doonerak anticline and in the subsurface of the North Slope. These general relationships between units are an important context for further discussion of the Doonerak anticline.

Figure 3. Prior interpretation of relationships between the units of the Doonerak anticline (modified from Moore et al., 1997).

The interior of the anticline exposes the informally named Apoon assemblage (Oldow et al., 1984), which includes Early Paleozoic metasedimentary and volcanic units. These rocks are interpreted to have formed adjacent to a volcanic island arc off a continental margin (Mull, 1989a) or in the backarc basin of an island arc (Julian, 1989). Age controls of the metasedimentary units in the assemblage are based on rare occurrences of Cambrian trilobites and brachiopods, Ordovician to Silurian graptolites, Silurian conodonts, and geochronological data (Dutro et al., 1984; Repetski et al., 1987; Johnsson et al., 1992). The youngest detrital zircon sampled by Strauss et al. (2017) yielded an age of 395 ± 11 Ma. Intrusive igneous units in the anticline were dated at 520 to 380 Ma by K-Ar in Hornblende (Dutro et al., 1976; Strauss et al., 2017). The Apoon assemblage is considered equivalent to the pre-Mississippian Franklinian assemblage of the northeast Brooks Range and subsurface of the Arctic Alaska terrane, where it forms economic basement on the North Slope (Mull, 1989a). Julian and Oldow (1998) questioned this link based on the lack of pre-Brookian structures in the Apoon assemblage as are found in the northeastern Brooks Range. However, this difference has been explained as being the result of the southern limit of Devonian deformation within otherwise correlative units (Mull et al., 1987).

The Ellesmerian sequence overlies the Apoon assemblage (Figure 3). This package is composed of Mississippian to Triassic sedimentary rocks correlative to exposures in the northeastern Brooks Range and North Slope subsurface (Armstrong et al., 1976). Together the Ellesmerian sequence and Apoon assemblage form the core of the anticline. The basal contact of the Ellesmerian sequence has been described as both an unconformity (Dutro et al., 1976; Mull et al., 1987) and tectonic (Phelps, 1987). The Ellesmerian sequence is only exposed along the northern margin of the anticline and is absent to the south (Figure 3). This has been explained by the fault that emplaced the hanging walls of the anticline climbing up-section during north-directed motion (Mull et al., 1987). Others have explained the lack of the Ellesmerian sequence along the southern margin as a result of limited original depositional

extent (Dutro et al., 1976) or erosion, given an alternative structural reconstruction (Kelly and Brosgé, 1995).

The units to the north of the anticline are the Devonian to Mississippian members of the Endicott Mountains allochthon. These have been correlated to more metamorphosed and unfossiliferous rocks south of the anticline and are often considered part of a single package emplaced by north-directed motion (Oldow et al., 1987). This correlation was established by early mapping (Dillon et al., 1986) and was considered confirmed when Phelps (1987) traced the contact between the anticline core footwall and hanging wall rocks around the eastern end of the structure from the northern to southern margins. However, Phelps noted differences between the units, dividing them into northern and southern domains. Two units of the Endicott Mountains allochthon, the Hunt Fork Shale and Beaucoup Formation, were reassigned by Moore et al. (1997) into different units during their updated mapping along the eastern end of the Doonerak anticline. Based on the distinctions of Phelps (1987) and Moore et al. (1997), the previous correlation of the Endicott Mountains allochthon across the anticline remains uncertain.

In the hanging wall on the southern margin of the Doonerak anticline, between the Apoon assemblage and the supposed southern extension of the Endicott Mountains allochthon, are Ordovician to Devonian members of the Hammond assemblage. Original relationships within this group of primarily greenschist facies metasedimentary rocks is uncertain due to internal imbrication, deformation, and limited geochronological and fossil data. The Hammond assemblage has been called a terrane, believed to have been thrust at least 90 km north. It is not present on the northern limb of the anticline, which has been explained by the north-vergent thrust that emplaced both the Hammond assemblage and Endicott Mountains allochthon climbing up-section to the north (Moore et al., 1997).

Structural development

Most workers consider the hanging wall rocks to have been emplaced by northward thrusting of the Hammond assemblage and Endicott Mountains allochthon (Figure 4, A; e.g. Oldow et al., 1987). This shortening and the allochthonous character of the hanging wall is evidenced by (1) lithologic differences between the Ellesmerian units within the anticline and those to the north in the overlying allochthon and (2) the absence of a pre-Mississippian unconformity in the Endicott Mountains allochthon which exists in the North Slope subterrane and in the core of the Doonerak anticline, suggesting the allochthon was transported from a distal position (Mull et al., 1987). Balanced cross-sections based on regional reconnaissance mapping have estimated shortening to be at least 540 km (Oldow et al., 1987) and as much as 885 km (Kelly and Brosgé, 1995).

Dutro et al. (1976) proposed an autochthonous or para-autochthonous model of the hanging wall units wherein the Hammond assemblage was emplaced by north-vergent thrusting on the southern side and south-vergent thrusting emplaced the Endicott Mountains allochthon along the northern side of the anticline (Figure 4, B). The two-thrust model was proposed to address the differences in units of the hanging wall across the anticline and axial planes of minor folds suggesting vergence toward the anticline from both directions. As with other models, Dutro et al. (1976) correlate the Hunt Fork Shale and members of the Endicott Mountains allochthon across the anticline. This model reduces required shortening by an order of magnitude to approximately 50 km.

Another model invoking significantly less shortening than that of Oldow et al. (1987) was put forth by Kelly and Brosgé (1995). They suggested as little as 90 km of northward thrusting, with the Endicott Mountains Allochthon being para-autochthonous and the basal thrust being a local in extent. This model is entirely north-vergent, in comparison to the convergent model of Dutro et al. (1976). In their model, the Endicott Mountains allochthon was deposited in a Devonian to Mississippian synrift basin before being thrust northward to its current position. The

Ikpikpuk-Umiat and Meade basins are examples of comparable basins of similar age found in northern Alaska subsurface (Figure 5).

Each of these models will be revisited in the discussion of the new data presented from this work.

Figure 4. Generalized cross section interpretations of the Doonerak anticline from Dutro et al. (1976). A: north-vergent model similar to that followed by Oldow et al. (1987) and others. B: doubly-vergent model preferred by Dutro et al. (1976). D = Mt. Doonerak, NF = North Fork of the Koyukuk River.

Figure 5. Simplified map of northern Alaska (after Moore et al., 1994) showing the location of the Meade (MD) and Ikpikpuk-Umiat (IB, UB) basins. The seismic line in Figure 35 (Discussion section) is shown in red.

The fault separating the Apoon assemblage and Ellesmerian sequence from the Endicott Mountains allochthon, the Amawk thrust, was originally recognized along the creek of the same name on the northern flank of the anticline (Plate 1). In models wherein the northern and southern hanging wall units were emplaced as a single package, the Amawk thrust name has been extended to the southern margin where the Hammond and Apoon assemblages are in contact.

A variant of the single north-vergent thrust models includes a second north-vergent thrust, the Blarney Creek thrust and associated allochthon (Figure 6). This fault splays off the Amawk thrust over the anticline and is only present on the northern margin (Julian, 1987; Seidensticker and Oldow, 1998). Phelps (1987) suggests an additional splay, the Skajit thrust,

also only present in the north. These thrusts are interpreted as being north-vergent and relatively small in displacement, with limited implications for broader reconstructions.

Figure 6. Schematic cross section across the eastern Doonerak anticline showing the Blarney creek thrust below the Amawk thrust on the northern side of the structure (Seidensticker and Oldow, 1998)

The Brooks Range is an overall north-vergent fold and thrust belt. This creates a bias towards interpretations of the Doonerak structure as the result of similar motion (e.g. Mull, 1982). Ongoing work should consider, however, that these interpretations are based on regional mapping and often without direct evidence for the kinematics of most faults, and with limited knowledge of age relationships across the faults. The implications of newer data will be discussed in conjunction with the results from this work.

Understanding of the more recent history of uplift of the anticline is based on a regional deep-crustal seismic transect and fission track data. Seismic reflection data support ~15 km of total uplift of the Doonerak anticline (Fuis et al., 1995). Zircon fission track dating indicates ~8-12 km of uplift and denudation since ~70 Ma. Apatite fission track dating suggests the last ~4-6 km of uplift occurred since the late Oligocene. A period of rapid uplift occurred at 24 ± 3 Ma and has been slower since (O'Sullivan, 1998). These periods of rapid uplift and coeval deformation

in the northeast Brooks Range may be associated with shallow subduction during periods of rapid northward motion of the Kula Plate at the southern Alaska margin (Wallace and Engebretson, 1984; Blythe et al., 1996). The only published white mica $^{40}\text{Ar}/^{39}\text{Ar}$ cooling age is a sample of the Trembley Creek phyllite unit in the Hammond assemblage (Strauss et al., 2017). The sample had a cooling age of ~465 Ma and experienced partial reheating at a time younger than ~267 Ma.

Methods

Field Mapping

Field work was completed in late July and early August of both 2015 and 2016. Each season included over two weeks of mapping, with additional days moving to, from, and within the mapping areas. The 2015 field season targeted the northern margin of the structure at the contact between the Apoon assemblage, Ellesmerian sequence, and Endicott Mountains allochthon. This first season was principally for the thesis work of W. P. Frier (2017). I served as field assistant, but the 2015 data and observations were integrated with those from the 2016 season for this work. The second season targeted the southern margin of the structure, where the Apoon assemblage contacts the Hammond assemblage. Mapping areas were targeted based on areas of promising exposure shown in aerial imagery and locations of key contacts shown in the published 1:250,000 reconnaissance scale maps of Dillon et al. (1986) and Brosgé and Reiser (1971). The field area was accessed by bush plane via the town of Bettles, Alaska, which landed along the North Fork of the Koyukuk River near Fishless Creek as permitted by Gates of the Arctic National Park. In 2015, the field area was exited via airplane pickup at the same location. In 2016, an inflatable raft was used to float the river to return to Bettles.

Field work consisted of lithologic description, standard structural measurements; description of macroscopic structures, especially evidence of shear or vergence; and collecting samples. The 2016 season included collection of oriented samples for microstructural

characterization. Field measurements were plotted on stereonet using Stereonet 9.8 (Allmendinger et al., 2013; Cardozo and Allmendinger, 2013).

Field mapping was done using the unit classification of Dillon et al. (1986), with field descriptions, photos, and samples allowing for later reclassification into the updated scheme used in this work. Field data, aided by petrographic unit classification, aerial imagery, and the maps of Dillon et al. (1986), Brosgé and Reiser (1971), Julian (1987), and Phelps (1989) were used to generate an updated 1:63,360 scale (1 inch = 1 mile) geologic map of the study area.

Petrography

Petrographic thin sections were made from selected samples collected during both 2015 and 2016 field seasons. Oriented samples from the 2016 season were used to make oriented thin sections. Samples collected in 2015 were not oriented. Additional oriented thin sections were provided by J. Toro from a previous transect of the North Fork of the Koyukuk River through the 2016 field area. Non-oriented thin sections were provided by J. Strauss from field work conducted in 2014 to the east near the confluence of Amawk Creek and the North Fork of the Koyukuk River (Strauss et al., 2017).

For each thin section, mineralogy was described and the sample was photographed with a SPOT 5.0 camera and Olympus SZX10 binocular microscope with polarizing filter. On occasion, a mineral was not readily identified optically, so Raman spectroscopy was utilized for identification by comparing the spectra of the unknown mineral to the RRUFF database using CrystalSleuth software (Downs, 2006; Lafuente et al., 2015).

Microstructures were characterized using the methods of Passchier and Trouw (1996) and Vernon (2004). Crenulation, shear bands, fringed grains, veins, and folding were commonly observed. When the sample was oriented, these observations were assigned to either a primary S1 event or a secondary S2 event and vergence of one or both events was determined. This determination complemented field observations in establishing directions of structural movement.

Raman Spectroscopy

Raman spectroscopy of carbonaceous material (RSCM) is a well-established paleothermometer used for metasedimentary rocks containing carbonaceous and graphitic material (Kouketsu et al., 2014). Raman spectroscopy measures the scattering of photons interacting with the covalent bonds in a material. The degree and nature of the scattering produce unique Raman spectra that can be used to identify and characterize materials. In the case of carbonaceous material, changing peaks in the Raman spectra reflect progressive organization of defects in towards pure crystalline graphite. This progressive organization and resultant Raman spectra has been quantitatively tied to maximum temperature in both natural and synthetic carbonaceous samples. The organization of carbonaceous material towards pure crystalline graphite is dependent primarily on temperature, rather than pressure, and is irreversible--therefore the degree of organization represents the maximum paleotemperature (Beyssac et al., 2002).

Several methods of peak identification and formulas tied to paleotemperature have been proposed, with Beyssac et al. (2002) being the most widely used. Their method is applicable from 330-650°C, with an accuracy $\pm 50^\circ\text{C}$ and the potential to distinguish between samples different by 10-15°C. This method was used in this study in combination with the method of Lahfid et al. (2010), which has a stated applicability from $\sim 200^\circ\text{C}$ to $\sim 330^\circ\text{C}$. Together these methods are useful from $\sim 200^\circ\text{C}$ to 650°C and offer the ability to determine absolute maximum paleotemperature and distinguish between samples across the study area. Additional discussion of the RSCM method and procedures followed can be found in Appendix 1.

Thin sections from the 2015 and 2016 field areas and J. Toro were prepared as standard 30 μm , non-polished, uncovered thin sections. The thin sections provided by J. Strauss included a glass cover slip, inhibiting their direct use for RSCM. Billets were available for all thin sections and were used for RSCM when thin sections could not be. Several samples from which thin sections were not made were used for RSCM by cutting a piece of the sample perpendicular to

foliation and mounting on a glass slide. Samples were chosen after a review under an optical microscope based on both carbonaceous material content (Figure 7) and for a representative distribution across the study area.

Raman spectroscopy was conducted at WVU Shared Research Facilities, which has an instrument similar to those used in published RSCM studies (Figure 8). The instrument is a Renishaw InVia Raman Microscope with 532 nm green laser, 1800 l/mm grating, and 50x objective. RSCM studies use lasers of wavelength between 514 and 531 nm (e.g. Beyssac et al., 2002; Rahl et al., 2005; Lahfid et al., 2010). Each spectral acquisition was typically 30 seconds across the 1000 to 1800 cm^{-1} range. Prior to each session, the instrument is calibrated to the 521 cm^{-1} peak of a silicon standard. Data was exported from the instrument WiRE 2 software (Renishaw Ltd., Gloucester, UK) and processed with IgorPro 6.34 software (WaveMetrics Inc., Lake Oswego, Oregon).

Figure 7. Photomicrographs of carbonaceous material in sample 16DF24, plane polarized light, optical microscope (left) and 18DF15, reflected light, Raman spectroscopy instrument microscope (right). Note scale change.

Figure 8. Raman spectroscopy instrument at WVU Shared Research Facilities.

Results: Mapping

Field mapping

Field work was focused on the northern and southern margins of the Doonerak anticline in areas accessible from the North Fork of the Koyukuk River. Field work was limited by rough terrain, heavy vegetation, and areas of limited outcrop exposure (Figure 9). This often impeded the direct observation of unit contacts and certainty of whether the contact was depositional or structural. Mapping coverage can be seen by the extent of structural measurement symbols on Plate 1.

Field observations and samples were combined with digital elevation (DEM) data, satellite imagery, and previous maps to generate the 1:63,360 scale map of Plate 1. A smaller, simplified version of this map is shown in Figure 11.

Figure 9. View of the southern margin of the Doonerak anticline looking southwest from the Redstar Mountain vicinity along the approximate contact of the Apoon assemblage to the right and the Hammond assemblage to the left. This view represents typical outcrop exposure and terrain. Distance between vantage point and high peak at center is ~13 km.

Map units

Prior to making the final map included in this work, appropriate classification of map units was required. The nomenclature of Moore et al. (1997) was modified as dictated by new data into the scheme used here. The study area was divided into four assemblages, each with two to five component mapped units: the Apoon assemblage, Hammond assemblage, Endicott Mountains allochthon, and Ellesmerian sequence. A comparison of the grouping used here and that of selected prior works is shown in Table 1. Descriptions for each map unit are shown in Figure 10 and Plate 1.

This work		Strauss et al. (2017)	Moore et al. (1997)	Phelps (1987)	Dillon et al. (1986)	Oldow (1987)	Till et al. (1988)
<i>Assemblage</i>	<i>Map Units</i>	<i>Assemblage</i>	<i>Assemblage.</i>	<i>Assemblage</i>	<i>Map Units</i>	<i>Assemblage</i>	<i>Assemblage</i>
Ellesmerian sequence	MPel, Mek	Ellesmerian sequence	Ellesmerian sequence	Blarney Creek assemblage	TCs	Lisburne grp, Kayak/ Kekiktuk	-
Endicott Mountains allochthon	Dhf, MDkn, Dsg	Endicott Mountains Allochthon	Endicott Mountains terrane/ allochthon	northern Endicott Mountains assemblage	Dhf, Dbc (N), Dbb (N), Dw (N)	Endicott group (N)	Endicott allochthon
Hammond assemblage	Dv, Ddr, Dgw, Ddm, Dtc	Hammond subterrane	Hammond terrane	southern Endicott Mountains assemblage	Dhf (S), Dbb (S), Dc, Dsc, Dcw, Pzw, Df	Endicott group (S) & Skajit allochthon	Central belt
Apoon assemblage	EOvi, EOve, EOac	Apoon assemblage	North Slope terrane	Apoon assemblage	OEiv, SCb, Dm	Apoon assemblage	Doonerak duplex

Table 1. Equivalent nomenclature for units in the Doonerak anticline area in this work and selected publications. The notation (N) or (S) refers to the northern or southern portion of units or assemblages mapped across the Doonerak anticline in the cited publication but were split in this work.

Apoon Assemblage:

The Apoon assemblage includes metasedimentary, metavolcaniclastic, and volcanic units. The metasedimentary units were mapped as a single unit by Dillon et al. (1986), while Strauss et al. (2017) divided them into coarser and phyllitic units. This work was more focused on the relationships of the hanging wall units of the anticline, rather than within the Apoon assemblage itself, therefore I did not differentiate these units. The Apoon assemblage is composed of black phyllite and metasiltstone with quartzite, metagraywacke, brown dolomite, minor limestone, and red, purple, and green phyllite. The volcanic units are intrusive and extrusive basaltic to andesitic (Frier, 2017) rocks which are often mixed with local tuffaceous and phyllitic metasedimentary rocks. The extrusive volcanic unit includes pillow basalts.

Hammond assemblage:

The relationships of the formations within the Hammond assemblage are not well established. This work modifies the designations of Moore et al. (1997) based on their mapping along the Dalton Highway. Their map from the TACT project extends to west of the Hammond River at the eastern end of the Doonerak anticline, overlapping the 1:250,000 map of Dillon et al. (1986), facilitating correlation with the study area. Much of the Hammond assemblage in my study area was originally mapped by Dillon et al. (1986) as either the Beaucoup Formation or Hunt Fork Shale. Moore et al. (1997) advised against the usage of the Beaucoup Formation designation, as it appeared to combine members of the Hammond assemblage that should be separate. Similarly, the updated units have apparent distinctions from the Hunt Fork Shale as it has been mapped south of the anticline. The units of Moore et al. (1997) that appear to correlate to the study area are the Trembley Creek phyllite, Dusty Mountain phyllite, Dietrich River phyllite, and an unnamed metagraywacke and metaconglomerate unit which was described as 'nearly concordant' with Nutirwik Creek metavolcaniclastic rocks. The prominent Skajit Limestone was not observed during this work, although it was mapped just south of the Plate 1 map area by Dillon et al. (1986) and documented there by J. Toro (unpublished field notes, 2015).

The Trembley Creek phyllite (Dtc) was readily correlated west from the TACT map, as it appears to be broadly equivalent to the Paleozoic wacke map (Pzw) unit of Dillon et al. (1986). Moore et al. (1997) consider it Devonian or older, with a maximum age of Late Ordovician (~450 Ma) constrained by a $^{40}\text{Ar}/^{39}\text{Ar}$ detrital white mica age. Strauss et al. (2017) found the youngest detrital zircon age to be 480 ± 9 Ma.

The Dusty Mountain phyllite (Ddm) appears to correlate to a chloritic siliciclastic unit (Dsc) of the Dillon et al. (1986) based on location and lithologic character. On the TACT map, it is mapped 15 to 20 km south of its position in the study area, so its correlation is least certain.

The unit is Devonian, with Middle or Late Devonian conodonts at the base (Johnsson et al., 1992).

The Dietrich River phyllite (Ddr) includes much of the black phyllitic units originally mapped as part of the Beaucoup Formation by Dillon et al. (1986) and is mapped south of the Trembley Creek phyllite on the TACT map, a relationship that is similar to the study area. Moore et al. (1997) consider it Middle(?) and Late Devonian.

The unnamed metagraywacke and metaconglomerate unit (Dgw) appears to be related to the original uncertain designation of chloritic and carbonate rocks (Dc?; Dillon et al., 1986). Both this unit and Nutirwik Creek metavolcaniclastic rocks are mapped south of the Dietrich River phyllite on the TACT map, in similar relative position to the study area. Moore et al. (1997) call it Late Devonian or older. The 'nearly concordant' Nutirwik Creek volcaniclastic unit is Late Devonian its upper part (Moore et al., 1997).

Endicott Mountains allochthon:

The Endicott Mountains allochthon in the study area includes the Hunt Fork Shale, Noatak Sandstone, and Kanayut Conglomerate. The Kayak Shale and Lisburne Group of the Ellesmerian sequence have been mapped to the north of the study area atop the Kanayut Conglomerate of the Endicott Mountains allochthon (Kelly, 1988). The Beaucoup Formation was mapped by Dillon et al. (1986) below the Hunt Fork Shale at the base of the hanging wall rocks north of the anticline. However, the rocks originally mapped as Beaucoup appear instead to correlate to the Sillyasheen Mountain graywacke, which has been mapped to the west. Rocks of the Endicott Mountains allochthon have been correlated to the south side of the Doonerak anticline in the Hammond assemblage by prior workers, but recent detrital zircon data show that this correlation is incorrect despite of superficial similarities of the rocks.

Ellesmerian sequence:

Exposures of the Ellesmerian sequence in the study area are dominated by the Lisburne Group limestone, which forms prominent dip-slopes and ridges. Beneath the Lisburne are the Kayak Shale and Kekiktuk Conglomerate. With an approximate total thickness of 300 m, the Kayak and Kekiktuk were mapped together. Above the Lisburne are the Karen Creek sandstone, Shublik Formation, and Sadlerochit Group (Moore et al., 1997), although these were not found in our mapping. Their absence is attributed to result from erosion along the North Fork of the Koyukuk River or removal during thrust emplacement of the structurally higher Endicott Mountains allochthon.

Map-scale faults

Published maps include a variety of map-scale faults which were followed in this work (Figure 11; Plate 1). The faults can be grouped into the Amawk thrust and potential splays (e.g. Julian, 1987) below the Endicott Mountains allochthon on the northern flank of the Doonerak anticline, the contact between the Hammond and Apoon assemblage and internal thrust imbrication on the southern flank, and the northwest-southeast trending fault within the Apoon assemblage that juxtaposes the clastic and volcanic members of the assemblage (Dillon et al., 1986). Late-stage high angle normal faults were documented in the eastern portion of the Doonerak anticline by Phelps et al. (1987), although were not directly observed in the study area apart from equivocal interpretation of secondary foliation fabrics and joints.

The Amawk thrust is a ubiquitous feature in maps of the northern margin of the Doonerak anticline. This fault is often shown as continuing to the southern margin of the anticline and forming the basal detachment for northward emplacement of the Endicott Mountains allochthon (Figure 4, A). Although that interpretation is questioned in this work, the Amawk thrust usage is retained herein, strictly on the northern margin where it was originally

located (Mull, 1982). The Blarney Creek and Skajit thrust names are not retained due to limited prior use.

The southern fault contact between the Apoon and Hammond assemblage is unnamed. Internal thrusts between members of the Hammond assemblage are inferred at the base of the Trembley Creek phyllite, which Moore et al. (1997) calls Devonian or older, whereas the other mapped members are dominantly Middle to Late Devonian. Uncertainty of original relationships remains and its internal structure and/or stratigraphy may be more complicated than mapped.

A left-lateral, north-south trending strike-slip fault is interpreted along the North Fork of the Koyukuk River that was not mapped by prior workers (Dillon et al., 1986). Movement of 2 to 3 km is believed to have occurred during or after uplift of the anticline. This interpretation explains the offset of units across the interpreted fault and the counter-clockwise change in strike of the Endicott Mountains allochthon west of Ernie Creek.

Figure 10. Map unit legend for Figure 11 and Plate 1.

Figure 11. Simplified, scaled version of the study area map. See previous figure for map unit descriptions. See Plate 1 for complete data and references.

Results: Structure

Field measurements

Field measurements were categorized into bedding (S0), primary foliation (S1), secondary foliation (S2), outcrop-scale hinges, and lineations. Lineations mapped are either crenulation or S0/S1 intersection and are plotted collectively, as these have comparable structural implications. In the Apoon and Hammond assemblages, metamorphic fabrics obscure bedding, so only foliations are mapped.

Primary foliation in the Apoon assemblage clusters towards sub-horizontal, with significant scatter. Poles to foliation trend along a sub-vertical great circle, indicating the foliations are folded along an east-west trending axis (260/11W; Figure 12). Although scattered, outcrop-scale hinge axes also trend east-west. These are interpreted as resulting from north-south compression.

Figure 12. Equal area lower hemisphere stereonet for the Apoon assemblage showing S1, best fit great circle and pole to S1 (260/11W, large black dot), and hinge axes.

Primary foliation in the Hammond assemblage indicates a predominant south-east dipping trend (Figure 13). The pole to the best-fit great circle to S1 is near the mean vector for outcrop-scale fold hinges. This indicates some S1 measurements are folded by the same north-south compression that produced the east-west trending hinge axes. The predominant southward dip of S1 measurements suggests north-directed motion of the assemblage, which is also apparent in overturned outcrop-scale folds in the study area (Figure 14). Hinge data are more consistent than the same data in the Apoon assemblage, suggesting more consistent structural history. The slight eastward plunge in both the pole to the best fit great circle to S1 and mean vector for outcrop-scale hinges is evidence of subsequent tilting, which may be related to uneven uplift of the anticline.

Figure 13. Equal area lower hemisphere stereonets for the Hammond assemblage showing S1, best fit great circle and pole to S1 (081/26 E, large black dot), hinge axes, and hinge axes mean vector (083/24E, large red dot).

Figure 14. Outcrop of Trembley Creek phyllite showing an overturned fold. Photo looking west. Axial plane dips south, indicating north-directed motion. Field book is 20 cm tall. Location: 67.689553 N, 151.062599 W.

Secondary foliations were not commonly documented in the study area. Only within the Hammond assemblage are they sufficient in number to plot meaningfully on a stereonet (Figure 15). S2 measurements are mostly north-dipping. The second-phase measurements mapped at the eastern end of the anticline within the southern hanging wall by Phelps (1987) show similar clusters of north-dipping foliations. These are interpreted as resulting from late stage uplift of the anticline.

Hammond Assemblage

• S_2

Figure 15. Equal area lower hemisphere stereonet for the Hammond assemblages showing S_2 and best fit great circle and pole to S_2 (278/06W, large black dot).

The Endicott Mountains allochthon displayed both bedding and primary foliation (Figure 16). Although scattered, the mean vectors corroborate the observations made at multiple individual outcrops, where bedding/cleavage intersection was visible (Figures 17, 18, 19). The mean vector for poles to S0 is nearly vertical. The mean vector for poles to S1 dips slightly northwest. The difference in angle ($\sim 13^\circ$) between these measurements indicates that cleavage is steeper than bedding with south-vergent motion of the allochthon. There is a possibility that the cleavage is not axial planar and may not be a definitive indicator of vergence; such a fabric could form in the back limb of a fault-bend fold.

Figure 16. Equal area lower hemisphere stereonet for the Endicott Mountains allochthon showing measurements and mean vectors (large dots) of bedding (097/84E) and S1 cleavage (127/72SE).

Figure 17. Outcrop of Hunt Fork Shale showing gently south-dipping bedding (red) and north dipping cleavage (yellow). Pencil is 15 cm long. Location: 67.909392, N 150.902027 W.

Figure 18. Outcrop of Hunt Fork Shale showing steep to slightly overturned bedding (red) and gently north-dipping cleavage (yellow). Fold hinge strikes east-northeast. Hammer is 35 cm long. Location: 67.938938 N, 150.777433 W.

Figure 19. Outcrop of Hunt Fork Shale showing gently southwest-dipping bedding (red) and northwest dipping cleavage (yellow). Hammer is 35 cm long. Location: 67.919216 N, 150.905023 W.

Field measurements in the Ellesmerian sequence were limited to bedding (Figure 20). Foliations do not develop as readily in the predominantly carbonate units mapped in this group and generally less expected in the younger, lower grade rocks. S0 measurements cluster around a northwest-dipping trend, which is consistent with observed outcrops on the northern margin of the anticline. Field indications of vergence in the Ellesmerian sequence include cleavage-bedding intersection and outcrop-scale thrusting. Although measurements of S1 were not well documented in field notes, north-dipping cleavage was observed in field photos of the Kayak Shale (Figures 21, 22). South-directed thrusting was seen in outcrops of Lisburne limestone (Figures 23, 24, 25). These structural observations support south-directed emplacement of the Ellesmerian sequence, and south directed motion of the overlying Amawk thrust.

Figure 20. Equal area lower hemisphere stereonet for the Ellesmerian sequence showing bedding, S1 cleavage, and mean vector (135/62SE, large dot).

Figure 21. Outcrop of Kayak Shale showing irregular steeply north-dipping cleavage (yellow) and bedding (red). Large outcrop in center of photo is approximately 30 m. Location: 67.906413 N, 150.794628 W.

Figure 22. Outcrop of Kayak Shale showing tight chevron folding with axial-planar cleavage dipping gently to the north. Visible outcrop is approximately 1.5 m tall. Location: 67.887604 N, 150.932944 W.

Figure 23. Outcrop of Lisburne limestone showing north-dipping thrust faults indicating southward-vergence. Location: 67.906413 N, 150.794628 W.

Figure 24. Outcrop of Lisburne limestone showing north-dipping thrust faults indicating southward-vergence. Location: 67.907933 N, 150.778226 W.

Figure 25. Outcrop of Lisburne limestone and shale showing north-dipping thrust faults indicating southward-vergence. Visible outcrop is 8 m tall. Location: 67.926367 N, 150.714194 W.

The south-directed vergence indicators observed in the study area are counter to some observations reported previously. Mull (1982) noted south-dipping cleavage, indicating north-directed motion, in the Shublik Formation and Sadlerochit Group (Figure 26). These units are above the Lisburne Group limestone in the Ellesmerian sequence and were not found in the study area, but have been mapped to the east.

Figure 26. Outcrop photo of the Sadlerochit Group from Mull (1982) showing 15-25° south-dipping cleavage in bedding dipping 15° north, suggesting north-directed vergence. The exact photo location is unknown, but Mull notes that slaty cleavage was observed at multiple locations in the Shublik Formation and Sadlerochit Group.

Results: Petrography

A total of 52 thin sections from the greater study area were described for mineralogy, microstructure, and, if oriented, potential indications of vergence. Locations of samples with thin sections are shown on Figure 27. All sample descriptions and photomicrographs in both plane and cross polarized light are included in Appendix 3. This work aided in the description of map units as well as the determination of boundaries and correlative relationships while producing the 1:63,360 scale map (Plate 1).

Samples displayed prehnite-pumpellyite to lower greenschist facies mineral assemblages (Blatt et al., 2006) in agreement with previous descriptions of the map units (e.g. Moore et al., 1997). Metamorphic muscovite, chlorite, and occasional biotite were ubiquitous throughout the metasedimentary samples. Microstructures of corresponding grade, such as domainal cleavage and shear bands, were observed in most non-calcareous samples. Highly calcareous samples often lacked microstructures. The mineral assemblages observed are appropriate for the maximum paleotemperature range as determined by RSCM paleothermometry.

Sense of shear was determined for 11 samples. From these, 6 indications of primary (S1) vergence and 9 indications of secondary (S2) vergence were determined (Figure 28). All of the oriented samples available were collected along the southern margin of the Doonerak anticline in the Apoon and Hammond assemblages.

Primary indicators, such as rotated clasts (Figure 29) and asymmetric micro-folds (Figure 30), are all top-to-the-north. This suggests the main deformation event was north-vergent. This agrees with all previous structural models, for which the southern hanging wall units were emplaced from south to north (Dutro et al., 1976; Kelly and Brosgé 1995; Oldow et al., 1987).

Figure 27. Simplified, scaled version of the study area map showing locations of thin sectioned samples, detrital zircon geochronology samples, and RSCM paleotemperature results. See Plate 2 for complete data and references. Dashed dark gray line is the location of the RSCM transect plotted on Figure 32.

Figure 28. Map of the southern portion of Plate 1 map area showing sense of shear determined from oriented thin section microstructures. Sense of shear associated with S1 events are all top to the north; S2 events are of mixed sense of shear.

Figure 29. Photomicrograph (XPL) of a rotated clast in sample 16DF09 showing sinistral sense of shear.

Figure 30. Photomicrograph (PPL) of an asymmetric fold in sample 16DF19 indicating sinistral sense of shear.

Secondary indicators, such as crenulation bands, show mixed sense of shear. As all lower-strain microstructures were classified as secondary, it may be some of these actually result from primary events and were not overprinted by later fabrics. The mixed sense of shear in secondary fabrics is likely a combined result of this deliberately conservative misclassification and later uplift of the Doonerak anticline (e.g. O'Sullivan et al., 1997), which resulted in faulting and other fabrics directed away from the crest of the anticline (Phelps et al., 1987). For some samples, particularly the fine-grained samples, primary indicators were not visible and only secondary or low-strain fabrics were observed.

Results: RSCM paleothermometry

Raman spectroscopy of carbonaceous material (RSCM) was attempted on 54 samples. Of these, 38 yielded a sufficient quantity and quality of carbonaceous material spectra for paleotemperature calculation. Unsuccessful attempts were either due to initial misidentification of opaque minerals or when the sample was known to be sparse in carbonaceous material but attempted based on geographic distribution. Representative example raw Raman spectra for four acquisitions shown in Figure 31. The change in peak character with increasing paleotemperature is apparent. RSCM paleotemperature results are listed in Table 2; complete parameters for each spectral acquisition used in the average paleotemperature calculation for all samples are in Appendix 4.

Figure 31. Representative raw Raman spectra over the acquisition range 1000-1800 cm⁻¹ for individual acquisitions from four samples showing the change in peak character with increasing paleotemperature. Average calculated RSCM paleotemperature of all acquisitions for examples shown with 2 σ -error. Vertical scale arbitrary.

Calculated RSCM paleotemperatures ranged from $277\pm 16^{\circ}\text{C}$ to $408\pm 23^{\circ}\text{C}$. The average RSCM paleotemperature for all samples was $350\pm 31^{\circ}\text{C}$. This is in line with the prehnite-pumpellyite to lower greenschist facies mineral assemblages observed, which form at this temperature range and expected burial depths. It is also in agreement with maximum conodont alteration index (CAI) values of 5 to 6 from around the Doonerak anticline (Plate 2; Johnsson et al., 1992). These CAI values correspond to temperatures of 325 to 475°C for 10^7 to 10^8 years of heating (Rejebian et al., 1987). Approximately 120 to 220 km west of the Doonerak anticline at a similar position within the Central belt/Hammond assemblage, Patrick (1995) found maximum paleotemperatures of 325 to 425°C at 5 to 9 kbar using two-feldspar solvus thermometry on orthogneiss.

To understand the implications of RSCM paleotemperature, results were plotted along a north-south line transecting the study area (Figure 27). Offset by the strike-slip fault along the North Fork of the Koyukuk River is interpreted as having occurred after maximum paleotemperatures were reached. To correct for this, results were shifted to their position prior to strike-slip motion before being projected onto the north-south transect line in order to best represent their relationships at the time of maximum paleotemperature. Average RSCM paleotemperature results are shown with 1σ -error bars on Figure 32, colored by map assemblage. Results from three samples provided by O'Brien and Miller (2017) are also shown.

A distinct paleotemperature increase occurs between northern 11.5 km of the transect and the units to the south (dashed gray line, Figure 32). This suggests the warmer Apoon and Hammond group rocks were more deeply buried than the cooler northern group rocks. The northern group, which includes the Endicott Mountains allochthon, Ellesmerian sequence, and northernmost Apoon assemblage, has an average maximum paleotemperature of $313\pm 19^{\circ}\text{C}$. The southern group, which includes most of the Apoon assemblage and the Hammond assemblage, has an average maximum paleotemperature of $368\pm 16^{\circ}\text{C}$. Beyssac et al. (2002) suggests the RSCM method is accurate to $\pm 50^{\circ}\text{C}$, but able to distinguish between samples

different by 10-15°C. Therefore the difference in paleotemperatures between the groups is significant, despite the absolute temperature error of the method otherwise suggesting the groups are nearly indistinguishable.

Given a standard geothermal gradient of 25°C/km, the northern group was buried approximately 12.5 km and the southern group approximately 14.7 km. Fuis et al. (1995) suggested the Doonerak anticline has been uplifted as much as ~15 km based on seismic imaging, in agreement with these results. The ~2.2 km difference in burial between the two groups indicates a structural contact exists between them.

Sample ID	Map Unit	T (°C)	1 σ (°C)	# spots	Method	Latitude (N)	Longitude (W)
16DF02	EOac	359	15	10	Beyssac	67.715520	150.943149
16DF05	EOac	353	18	12	Beyssac	67.726527	150.934213
16DF06	EOac	359	17	11	Beyssac	67.728021	150.936263
16DF10	Dtc	349	7	13	Beyssac	67.732214	150.881674
16DF11	Dtc	368	12	13	Beyssac	67.724269	150.883287
16DF12	Ddr	365	18	11	Beyssac	67.719700	150.849249
16DF14	Ddr	357	14	10	Beyssac	67.690712	150.885746
16DF15	Ddr	357	14	11	Beyssac	67.680416	150.929359
16DF19	Ddr	358	11	11	Beyssac	67.675959	151.108447
16DF20	Dtc	391	20	13	Beyssac	67.672213	151.108320
16DF21	Dtc	391	19	11	Beyssac	67.669599	151.112092
16DF22	Ddr	366	15	11	Beyssac	67.687022	151.101397
16DF24	Dtc	364	10	9	Beyssac	67.692711	151.091771
16DF27	Ddr	383	19	12	Beyssac	67.689200	150.972217
16DF29	Ddm	360	17	11	Beyssac	67.646595	151.121902
16DF30	Ddr	372	12	12	Beyssac	67.653614	151.149556
16DF38	Dgw	362	18	13	Beyssac	67.639789	150.966109
16DF39	Ddr	371	29	13	Beyssac	67.627249	151.057004
02DF15	EOac	356	28	9	Beyssac	67.871000	150.812000
10DF15	EOac	321	18	18	Lahfid	67.881000	150.798000
18DF15	EOac	340	19	15	Lahfid	67.903000	150.797000
23DF15	Dek	325	21	9	Lahfid	67.908000	150.752000
26DF15	Dhf	277	16	5	Lahfid	67.933000	150.778000
27DF15	Dhf	347	30	12	Lahfid	67.935000	150.778000
28DF15	Dsg	298	16	10	Lahfid	67.915000	150.852000
31DF15	EOac	348	11	14	Beyssac	67.839790	150.938540
39DF15	Dhf	321	37	12	Lahfid	67.918000	150.881000
41DF15	MDkn	318	25	14	Lahfid	67.919000	150.930000
43DF15	Dsg	296	32	10	Lahfid	67.890000	150.936000
44DF15	Dsg	310	31	8	Lahfid	67.890000	150.936000
46DF15	Dsg	297	24	9	Lahfid	67.885000	150.895000
15JT01	EOac	374	16	10	Beyssac	67.745164	150.946694
15JT02	Dtc	408	23	9	Beyssac	67.698167	151.005063
15JT04	Ddr	360	14	12	Beyssac	67.642283	151.020798
J1409-74.1	Dek	316	23	10	Lahfid	67.930500	150.470833
J1417	Dek	299	35	12	Lahfid	67.935778	150.439417
J1424	EOac	364	8	10	Beyssac	67.868694	150.307306
J1427	EOac	353	17	11	Beyssac	67.850833	150.260639
Doonerak*	EOac	372	5 (2 σ)	-	Beyssac	67.817470	150.857510
EMA1*	Ddr	360	5 (2 σ)	-	Beyssac	67.684020	151.031360
EMA2*	Ddr	414	14 (2 σ)	-	Beyssac	67.570750	151.029210
Skagit*	south of map	474	11 (2 σ)	-	Beyssac	67.485440	150.931440

Table 2. All RSCM paleothermometry results from the Doonerak anticline area. Map units correspond to Plate 1. Method refers to the peak fitting procedures and paleotemperature equation used after either Beyssac et al. (2002) or Lahfid et al. (2010). See Appendix 4 for detailed results. Asterisk (*) denotes data provided by O'Brien and Miller (2017).

Figure 32. Graph of RSCM maximum paleotemperature results from the Doonerak anticline area plotted along a north-south transect across the Doonerak anticline (location shown on Figure 27). Data collected as part of this study shown with 1σ error bars. Data provided by O'Brien and Miller (2017) shown with 2σ error bars. Dashed gray line denotes the temperature shift at 11.5 km discussed in the text.

Discussion

Direction of emplacement

The Hammond assemblage is interpreted as having been transported from an original southern position by all prior workers (e.g. Dutro et al., 1976; Oldow et al., 1987). The predominant south-dipping primary foliation, kinematic indicators related to S1, and outcrop-scale overturned folds documented in this work support the exiting interpretations.

The Endicott Mountains allochthon has been interpreted as being emplaced from the south along a single primary thrust spanning the anticline (e.g. Oldow et al., 1987). This is the expected direction of transport in a north-directed fold and thrust belt and supported by cleavage observed on the northern margin by Mull (1982), albeit in the Ellesmerian sequence. However, clear south-vergent structures observed in the Ellesmerian sequence and bedding/cleavage intersection both directly observed and calculated on stereonet in both the Endicott Mountains allochthon and Ellesmerian sequence support south-directed motion of the hanging wall units along the Amawk thrust.

If the interpretations of this work are correct and the structures within the Hammond assemblage are north-vergent and the motion of the structures within the Endicott Mountains allochthon along the Amawk thrust are south-vergent, there are two possible explanations: (1) If the units are correlative across the anticline as interpreted by others (e.g. Oldow et al., 1987), having been emplaced atop the Apoon assemblage and Ellesmerian sequence together, later events pushing them toward the center of the current anticline could have imparted the observed fabrics. (2) If the units are not actually correlative, they are likely from separate original positions to the south and north, respectively, and were emplaced independently.

Correlation of assemblages

Many units of the Endicott Mountains allochthon and Hammond assemblage appear similar to each other in the field. This is reasonable, given similar low-grade metamorphic

histories and common Devonian to Mississippian age deposition. Overall, the Hammond assemblage is more calcareous and chloritic, whereas the Endicott Mountains allochthon has more coarse clastics and potentially non-marine sediments. However, these differences could reflect facies variations within a single package.

Detrital zircon geochronology has been completed on several samples in the Doonerak anticline and on correlative units to the west. Representative detrital zircon geochronology probability density plots are shown in Figure 33 from published work by Frier (2017) and Strauss et al. (2017). Their work was conducted primarily along the northern portion of the Doonerak anticline. These results were compared to data from the southern portion of the anticline along the North Fork of the Koyukuk River (Robinson et al., 2017) and along the John River to the west (E.L. Miller, personal communication, 2017). Locations of detrital zircon geochronology samples within the study area are shown on Plate 2.

Apoon assemblage samples are dominated by a single pre-Caledonian orogen peak around 480 to 520 Ma (Figure 33 F, H). A single dominant age is consistent with deposition off an active arc system, as interpreted by prior workers (Strauss et al., 2017).

The Hammond assemblage displays a wide range of peaks, with several Timanian orogen-age (~635 Ma), Grenville orogen-age (~1 Ga), and older peaks (Figure 33 I). This character is seen in the Trembley Creek phyllite sample (Strauss et al., 2017) and samples collected by Robinson et al. (2017) in the Dietrich River phyllite and other Hammond assemblage units. One exception in the data from Robinson et al. (2017) is a sample from approximately 1 km south of the mapped Hammond-Apoon assemblage contact which displays a single peak similar to Apoon samples. This may suggest a possible closer relationship between the Apoon and Hammond assemblages than previously known, but this is speculative without additional data.

Samples from the Endicott Mountains allochthon do not show the variety of older peaks typically seen in Hammond assemblage (Figure 33 C, D, E, G). The Hunt Fork Shale has a pair

of Caledonian-aged peaks (~360 and ~420 Ma) in samples from the Doonerak anticline area and elsewhere. Samples of Sillyasheen Mountain graywacke (Frier, 2017) may have a single peak within this same Caledonian age range. These peaks are younger than the peaks seen in Apoon assemblage samples.

Dillon et al. (1986) correlated the Devonian Hunt Fork Shale and Beaucoup Formation across the Doonerak anticline as members of the Hammond assemblage and Endicott Mountains allochthon. The detrital zircon signatures presented here indicate that these units are not correlative. This means they have a different sedimentary provenance and were likely deposited in a different basin or at a different time. Given the evidence of south and north directed motion in the Hammond assemblage and Endicott Mountains allochthon, respectively, the different-basin interpretation is preferred herein.

Data from the Ellesmerian sequence is consistent with deposition after the Endicott Mountains allochthon in the same basin. Caledonian-aged peaks are dominant, with younger ages not present in the older Hunt Fork Shale and Sillyasheen Mountain graywacke (Figure 33 A, B).

Figure 33. Stacked detrital zircon geochronology probability density plots from samples of Frier (2017) and accumulated plots from multiple samples from Strauss et al. (2017). Modified from Frier (2017). Color bars represent potential Laurentian source domains.

Basal Ellesmerian sequence contact

The basal contact of the Ellesmerian sequence and Apoon assemblage has been interpreted as both a depositional unconformity (Mull et al., 1987) and tectonic in nature (Phelps, 1987). In this work, evidence of south-directed motion was observed within the Ellesmerian sequence. This indicates the contact in the study area was tectonic. It is possible the amount of transport was small and results from larger-magnitude motion of the overlying Endicott Mountains allochthon. If the contact was depositional and modest tectonic displacement occurred along only parts of the contact, both previous interpretations may be locally correct. Moderate, uneven transport of the Ellesmerian sequence may also explain the apparent absence of the sequence to the west of the North Fork of the Koyukuk River.

Burial history

Zircon fission track data (Table 3; Figure 34) shows the area around the Doonerak anticline cooled below $\sim 210^{\circ}\text{C}$ during the Early Cretaceous through early Paleocene (Blythe et al., 1996). The range in zircon fission track ages is interpreted to be the result of slow uplift and fault juxtaposition of units after cooling below 210°C . This implies that the maximum paleotemperatures determined by the RSCM method in this study were attained before zircon fission track closure during the main phase of the Brookian orogeny in the Early Cretaceous. Blythe et al. (1996) concluded peak temperatures in the area occurred as early as ~ 185 Ma during the earliest phases of the orogeny. Apatite fission track data (Table 3; Figure 34) indicate the area passed through the $\sim 60^{\circ}\text{C}$ closure temperature in the Oligocene and earliest Miocene (Blythe et al., 1996; O'Sullivan et al., 1997).

Blythe et al. (1996) noted the observed paleotemperatures are greater than expected for the known thickness of sedimentary cover. They suggest this was result of structural thickening, rather than overburden having been thicker than realized or a much higher past geothermal gradient, although their work did not include paleobarometry. Combined RSCM

paleothermometry and Si-in-phengite paleobarometry work by O'Brien and Miller (2017) ~20 km to the west along strike from the Doonerak anticline along the John River offers insight into these possibilities. They found maximum paleotemperatures of ~375°C at paleopressures of 2 to 3 kbar. For an assumed density of 2700 kg/m³, these pressures correspond to ~7.6 to ~11.4 km burial and geothermal gradient of 46 to 31°C/km. This is in contrast to the ~15 km burial expected for a normal geothermal gradient of 25°C/km. Fold and thrust belts are generally expected to be cooler than average continental crust (Spear, 1995). One explanation which explains the difference between the expected geothermal gradient and the range determined by thermobarometry is the possibility that peak temperatures and peak pressures were not achieved at the same time.

Sample	Long. (W)	Lat. (N)	Elev. (m)	Lithology	Unit	Strat. Age	FT Age	1 σ
<i>Blythe et al. (1996) zircon fission track</i>								
8-87	150.00	67.91	1160	fol. conglomerate	Mk	Miss.	65.6	3.8
10-87	149.79	67.96	705	conglomerate	Dhf	Dev.	70.1	7.1
12-89	149.72	67.75	475	schist	Obpm	Ord.	70.3	3.5
18-89	150.10	67.86	1310	arkose	Mkt	Miss.	112.4	7.6
21-89	149.72	67.97	725	volcanic schist	Df	Dev.	102.6	5.4
<i>Blythe et al. (1996) apatite fission track</i>								
21-89	149.72	67.97	725	volcanic schist	Df	Dev.	29.4	1.6
17-89	149.67	67.78	1430	gabbro	Dg	Dev.	48.3	8.7
<i>O'Sullivan et al. (1997) apatite fission track</i>								
90POS30A	150.08	67.40	427	Qtz-mica schist	Unnamed	Ord.?	71.5	9.4
90POS29A	149.78	67.97	670	Sandstone	Hunt Fork Sh.	Dev.	23.6	1.9
90POS28A	150.65	67.03	1220	Sandstone	Beaucoup Fm.	Dev.	88.4	5.5
89TM299A	149.97	67.91	1200	Metasandstone	Unnamed	Dev.?	22.0	2.0
90TM491A	150.24	67.93	882	Volcanic	Apoon Volc.	Ord.?	33.9	8.0
90TM492A	150.71	67.93	570	Sandstone	Karen Creek	Tri.	24.0	2.6
90TM494A	150.12	67.93	1452	Sandstone	Kekiktuk Fm.	Miss.	31.5	7.2
90TM495B	149.91	67.96	768	Sandstone	Kekiktuk Fm.	Miss.	31.8	17.0

Table 3. Apatite and zircon fission track data from Blythe et al. (1996) and O'Sullivan et al. (1997) shown in Figure 34.

Figure 34. Published apatite and zircon fission track ages in the vicinity of the Doonerak anticline (Blythe et al., 1996; O'Sullivan et al., 1997). Generalized geologic map of the Doonerak anticline simplified from Dillon et al. (1986).

Devonian basins

Kelly and Brosgé (1995) suggest the Endicott Mountains allochthon was deposited in a synrift basin, similar to the Ikpikpuk-Umiat and Meade basins found in the northern Alaska subsurface (Figure 35). Their model correlates units across the anticline and assumes entirely north-directed emplacement, both of which have been brought into question. Despite these differences, the idea of a relatively small, nearby basin as a source for hanging wall units of the Doonerak anticline has merits.

The Inigok #1 well (Figure 35) reached total depth in rocks classified as Devonian and pre-Devonian 'argillite' basement, based on original well reports (Haywood, 1983; A.O.G.C.C., 2008). Mickey et al. (2006) classified foraminifera in the deepest identifiable samples as early to middle Mississippian. Atop the Devonian to early Mississippian units were the Mississippian

Lisburne Group and younger rocks. This relationship is observed in the Endicott Mountains allochthon to the north of the Doonerak anticline (Dillon et al., 1986). Thrust faulting of such a basin could emplace the Devonian to early Mississippian units above the Lisburne Group, similar to the relationship observed on the northern margin of the Doonerak anticline.

Figure 35. Seismic cross section and interpretation of a line extending from the northern foothills of the central Brooks Range to the Arctic Ocean (simplified from Cole et al., 1997; location shown on Figure 5). The southern terminus of the line is located approximately 150 km northwest of the Doonerak anticline. The line shows deposition in the Ikpiuk-Umiat basin, a small synrift basin. The Inigok #1 well reached rocks classified as Devonian rocks and pre-Devonian 'argillite' basement in the original well reports (Haywood, 1983; A.O.G.C.C., 2008). Mickey et al. (2006) classified the deepest samples with identifiable foraminifera as early to middle Mississippian.

South-directed motion

South-directed motion has been interpreted elsewhere in the Brooks Range at various scales. Mull (1977) observed outcrops-scale south-vergent folds during reconnaissance mapping of the Survey Pass quadrangle, west of the Doonerak area in the southern flank of the Brooks Range. These were best developed in the Skajit Limestone, part of the Hammond assemblage. Dutro et al. (1976) point to small folds and thrusts along the northern flank at the eastern end of the Doonerak anticline as evidence of south-directed motion. Larger-scale southward motion is shown in back-thrusts in Cretaceous to Tertiary units in the foreland basin of the Brooks Range in reconstructions by Oldow et al. (1987; Figure 36). This prior work indicates the south-directed motion interpreted in the Ellesmerian sequence and Endicott Mountains allochthon in the study area is not entirely anomalous.

Figure 36. Portion of the balanced cross section of Oldow et al. (1987) showing a back-thrust in Cretaceous to Tertiary basin fill in the foreland basin north of the Doonerak anticline.

Previous structural models

Three primary models of the Doonerak anticline structural evolution have been presented by prior workers. All were constructed based on reconnaissance scale mapping and without the aid of the analytical data such as is presented here. Ideas from each were considered while constructing the new interpretation presented in this work. The locations of each previous cross section and the new model are shown in Figure 37.

Figure 37. Locations of cross sections by Oldow et al. (1987), Kelly and Brosgé (1995), and the new model presented in this work (Figure 41). The location of the Dutro et al. (1976) cross section is not specified but is in the vicinity of that of Kelly and Brosgé (1995). Generalized geologic map of the Doonerak anticline simplified from Dillon et al. (1986).

Oldow et al. (1987) constructed a balanced cross section through Atigun Pass, where the Dalton Highway crosses through the Brooks Range at the eastern end of the Doonerak anticline (Figure 38). Their model provides for the structural thickening needed to produce the observed paleotemperatures and pressures. It also correlates units across the anticline and is entirely north-vergent, which does not reflect conclusions of this work.

Figure 38. Cross section interpretation of the Doonerak anticline by Oldow et al. (1987). Dashed lines added for burial visualization. Endicott Mountains allochthon units shown to the south of the Doonerak anticline are equivalent to the Hammond assemblage.

Dutro et al. (1976) produced two schematic cross sections. The preferred interpretation included south-directed motion on the northern flank of the anticline and north-directed motion on the southern flank (Figure 39). This is consistent with conclusions from my work. The south-directed motion they interpret, however, occurs before the north-directed thrusting as seen by the offset in the south-directed thrust faults. This is inconsistent with the hypothesis that the

south-directed motion is a back-thrust, which typically form later than the thrusting oriented in the dominant direction. Their model, as all others, correlates units across the anticline.

Figure 39. Cross section interpretation of the Doonerak anticline by Dutro et al. (1976). Pre-Hunt Fork Devonian and Hunt Fork Shale south of the Doonerak anticline equivalent to the Hammond assemblage. Note vertical exaggeration.

The cross section of Kelly and Brosgé (1995; Figure 40) is entirely north-directed and correlates units across the anticline. The advantage of their model is suggesting that the Endicott Mountains allochthon units were deposited in a local synrift basin, significantly reducing the required shortening required by other models. They also correlate the units across the anticline. Their model does not invoke sufficient structural burial to generate the observed paleotemperatures and pressures.

Figure 40. Cross section interpretation of the Doonerak anticline by Kelly and Brosgé (1995). Limited structural burial in the area of the Doonerak anticline is apparent.

Proposed model

The model proposed in this work combines the imbrication and structural burial of Oldow et al. (1987), the north- and south-directed motion of Dutro et al. (1976), and the Endicott Mountains allochthon depositional setting of Kelly and Brosgé (1995). The hypothesis presented best explains the observations presented in this work, including paleotemperatures, units which do not correlate across the anticline, and evidence of south-directed motion on the northern margin of the Doonerak anticline. The new model suggests the Doonerak anticline resulted from the following series of events:

1. Accretion of an Early Paleozoic arc system (Apoon assemblage) to northern Alaska during the Caledonian orogeny (Strauss et al., 2017; Frier, 2017).
2. Ordovician to Devonian deposition of the Hammond assemblage in a basin to the south of the Apoon assemblage.
3. Formation of an Umiat-Ikpikpuk style rift basin in the Devonian and deposition of the Endicott Mountains allochthon units to the north of the Doonerak area followed by deposition of the Ellesmerian sequence atop both the Endicott Mountains allochthon units and the Apoon assemblage.

4. North-directed thrusting and imbrication of the Hammond assemblage during the Early Cretaceous Brookian orogeny.
5. Approximately 12 km of burial establishes observed maximum paleotemperatures in the Hammond and Apoon assemblages (Figure 41 A).
6. Partial erosion of the overlying nappes of the Hammond assemblage.
7. Back-thrusting during continued north-directed propagation of the Brooks Range fold and thrust belt emplaced the Endicott Mountains allochthon units atop the overlying Ellesmerian sequence and onto the Apoon assemblage. The location of detachment and distance the Endicott Mountains allochthon was transported is unknown. Approximately 10 km of burial established maximum temperatures in the Endicott Mountains allochthon and Ellesmerian sequence at this stage (Figure 41 B)
8. Cenozoic uplift and erosion into the current structure documented by apatite and zircon fission track thermochronology (Blythe et al., 1996; O'Sullivan et al., 1997). Normal faulting directed away from the center of the anticline (Phelps et al., 1987) and secondary low-strain fabrics developed during this uplift.

Uncertainties of this model could be constrained by more detailed mapping both between the study area and the TACT study area closer to the Dalton Highway (Moore et al., 1997) to better establish correlation between units and along the northern margin to the west of the study area to look for evidence of vergence, as this area has only been studied at the reconnaissance scale (Dillon et al., 1986). Detrital zircon geochronology of additional samples would constrain the interpreted character of each assemblage and confirm that no correlation across the structure exists. If south-vergence and non-correlation of units is established over a broader area, new balanced cross sections of cross sections more regional in scale may elucidate broader implications of these results.

Figure 41. Schematic cross sections of the interpretation presented in this work. A: At the time of maximum burial. Imbrication of Hammond assemblage thrust north over the Apoon assemblage resulted in approximately 15 km burial. B: During south-directed back-thrusting of the Endicott Mountains allochthon and Ellesmerian sequence. Burial approximately 12 km at this time resulted in the lower paleotemperatures observed in these units.

Conclusions

Prior work interpreted the Doonerak anticline as a tectonic window resulting from erosion of a north-directed nappe of the Endicott Mountains allochthon. Data presented in this work does not support the previous interpretations. Based on field mapping, petrography, RSCM paleothermometry, and detrital zircon geochronology, this work concludes the following:

- The Endicott Mountains allochthon does not correlate to the Hammond assemblage to the south of the anticline. Detrital zircon geochronology data for the Endicott Mountains allochthon is dominated by one or two Caledonian-aged peaks. The Hammond assemblage lacks Caledonian peaks, instead having several older peaks. This suggests the two groups were deposited in separate basins.
- Structural data indicate the Hammond assemblage is north-vergent, consistent with previous interpretations. The Ellesmerian sequence and Endicott Mountains allochthon show south-vergent structures, indicating the motion of the Amawk thrust was to the south. This is in contrast to prior interpretations wherein the both groups were north-vergent.
- Maximum temperatures determined by RSCM paleothermometry show the Endicott Mountains allochthon, Ellesmerian sequence, and northernmost Apoon assemblage average $313 \pm 19^\circ\text{C}$, indicating burial of approximately 10 km. The Hammond assemblage and the majority of the Apoon assemblage reached $368 \pm 16^\circ\text{C}$, indicating burial of approximately 12 km.

These conclusions are best explained by a new model wherein the Doonerak anticline results from two separate packages of rocks being emplaced from separate original basins to the south and north. The Hammond assemblage was deposited to the south and thrust northward over the Apoon assemblage during the Brookian orogeny. Later south-directed back-thrusting emplaced the Endicott Mountains allochthon and Ellesmerian sequence from a

Devonian synrift basin to the north. The model presented here greatly reduces the required shortening invoked in prior interpretations and suggests that the broader interpretations of the structural evolution of the area may need to be revisited.

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Appendix 1. Expanded discussion of the RSCM method

Background

Raman scattering is the inelastic scattering of photons by interaction with covalent bonds in a material (Rull, 2012). Inelastic scattering is of a different wavelength than the incident photons, as compared to Rayleigh (elastic) scattering, which is of the same wavelength as the incident photons. When a monochromatic light (e.g. filtered laser) is used, the original wavelength can be filtered out from the scattered photons and the Raman frequency, or shift, can be detected (Figure A1). A given material has a set of Raman frequencies unique to its molecular structure, allowing for the identification of materials based on its Raman spectrum (Woodward, 1967; Lafuente et al., 2015). Raman spectra are reported as wavenumbers ($\Delta\omega$) in units of cm^{-1} . Wavenumber is calculated from the incident wavelength (λ_0) and the Raman shift wavelength (λ_1) by the formula:

$$\Delta\omega = (1/\lambda_0) - (1/\lambda_1)$$

Figure A1. Schematic diagram of Raman scattering (Thermo Fisher Scientific, 2008).

The original identification of the Raman spectra of graphite included two peaks representing disorganized carbonaceous material and crystalline graphite (Tuinstra and Koenig, 1970). Subsequent study in the materials and earth sciences led to the potential use of the Raman spectra of carbonaceous materials as a gauge of metamorphic grade (Yui et al., 1996). A total of five primary peaks have been recognized in the spectra of carbonaceous material reflecting varying crystallinity (Beyssac et al., 2002; Kouketsu et al., 2014). These five peaks are G peak (1580 cm^{-1}), representing crystalline graphite, and four defect peaks: D1 (1350 cm^{-1}), D2 (1620 cm^{-1}), D3 (1510 cm^{-1}), and D4 (1245 cm^{-1}) (Figure A2). An additional peak group called 2D or G' may occur around 2700 cm^{-1} (Figure A3; Beyssac and Lazzeri, 2012), but is not used for any of the several temperature calibrations discussed below. Component peaks of the measured Raman spectra are isolated using peak fitting procedures specified by the authors of the methods employed.

Figure A2. Raw Raman spectra (thick gray line), component peaks (dashed lines), and summed component peaks (solid black line) for lower grade carbonaceous material (a) and higher grade carbonaceous material (b). Lower grade carbonaceous material exhibits two additional defect peaks not present in the spectra of more well-organized carbonaceous material (modified from Beyssac and Lazzeri, 2012).

Figure A3. Progressive evolution of the Raman spectra of natural samples of carbonaceous material from the western Alps (Beyssac and Lazzeri, 2012). The Raman spectra shown include both the peaks used for the RSCM paleothermometer methods ($\sim 1100\text{--}1700\text{ cm}^{-1}$) and the higher-wavenumber peaks ($\sim 2500\text{--}3300\text{ cm}^{-1}$) not used in the discussed methods.

Methods

Beyssac et al. (2002) introduced the use of the Raman spectra of carbonaceous material (RSCM) as a geothermometer useful from 330-650°C, with accuracy $\pm 50^\circ\text{C}$. Additional methods that were not used in my study have been introduced by others (Table A1). In this work, the Beyssac et al. (2002) and Lahfid et al. (2010) methods were combined to achieve an applicable range of ~200-650°C.

Two other methods were considered, but not ultimately used in this work. The method of Rahl et al. (2005) has a stated useful range of 100-700°C. Their method involves a polynomial function based on data fit in 3D-space and was found to be most accurate in the same range as the simpler method of Beyssac et al. (2002) in a review by Kouketsu et al. (2014).

Kouketsu et al. (2014) introduced a method useful from 150-400°C. This covers most of the expected temperatures in the study area, but the method is based on single full-width at half maximum (FWHM) values, rather than peak height or area ratios of the aforementioned methods. This makes the method more sensitive to experimental and instrument variation.

Study	Range °C	Error °C	Formula	R ² value
Beyssac et al. 2002	330-650	± 50	$T(^{\circ}\text{C}) = -445 \cdot R2 + 641$	0.96
Rahl et al. 2005	100-700	± 50	$T(^{\circ}\text{C}) = 737.3 + 320.9 \cdot R1 - 1067 \cdot R2 - 80.638 \cdot R1^2$	0.94
Lahfid et al. 2010	200-330		$T(^{\circ}\text{C}) = (RA1 - 0.3758) / 0.0008$	0.97
Lahfid et al. 2010	200-330		$T(^{\circ}\text{C}) = (RA2 - 0.27) / 0.0045$	0.95
Kouketsu et al. 2014	200-400	± 30	Eq. 1: $T(^{\circ}\text{C}) = -2.15 \cdot D1_{\text{FWHM}} + 478$	0.970
Kouketsu et al. 2014	150-200	± 50	Eq. 2: $T(^{\circ}\text{C}) = -6.78 \cdot D2_{\text{FWHM}} + 535$	0.968

Table A1. Stated applicable range, error, and formulas for published paleothermometers using Raman spectroscopy of carbonaceous material. Beyssac et al. (2002) uses the R2 parameter shown in Figure A4. Lahfid et al. (2010) uses the RA1 and RA2 parameters shown in Figure A4. Kouketsu et al. (2014) use full-width at half-maximum (FWHM) values. Lahfid et al. (2010) does not state an error range associated with the method, although it is assumed to be comparable to the other methods as all are limited by the errors associated with the other paleothermometers they are correlated to, such as CAI and illite crystallinity.

$$R2 = \frac{D1}{G + D1 + D2_A}$$

$$RA1 = \frac{D1 + D4}{D1 + D2 + D3 + D4 + G} \quad RA2 = \frac{D1 + D4}{D2 + D3 + G}$$

Figure A4. Formulas for the R2, RA1, and RA2 parameters used to calculate maximum paleotemperature with the methods of Beyssac et al. (2002) and Lahfid et al. (2010). All utilize peak areas for the component peaks.

Peak Fitting

Peak fitting procedures vary between RSCM paleothermometry methods (see discussion in Kouketsu et al., 2014). The method of Beyssac et al. (2002) uses Voigt peaks (Figure A5), a commonly used function in spectroscopy (e.g. Armstrong, 1967). This function has difficulties with the more complex Raman spectra of lower-grade carbonaceous material, an issue treated differently between methods. Kouketsu et al. (2014) follows a particular peak fitting procedure wherein peak locations are fixed in lower-grade samples and at the lowest grades a Lorentzian peak is substituted for one of the Voigt peaks. Lahfid et al. (2010) uses all Lorentzian peaks (Figure A6), which has the advantage of arriving at unique solutions without fixing peak locations or other manual procedures that may introduce bias. Rahl et al. (2005) does not specify a preferred peak type, potentially introducing significant variation to results (Lünsdorf et al., 2013). Regardless of method, peak fitting done in this study was completed with IgorPro 6.34 software (WaveMetrics Inc., Lake Oswego, Oregon).

During this study, all of the above methods were attempted while processing RSCM data. The results from Kouketsu, et al. (2014) were inconsistent both due to variation in FWHM values due to device/experimental parameters and difficulty in following the particular peak fitting procedures mandated by the method. The results of Rahl et al. (2005) were often inconsistent, but when they were consistent offered no clear advantage over other methods.

The methods Beyssac et al. (2002) and Lahfid et al. (2010) were found to be easily followed and yielded consistent results since they rely on ratios of peak areas.

Figure A5. Sample 16DF10 fit using the procedure of Beyssac et al. (2002). Top: residual after fitting. Middle: sum of component peaks (blue line), raw Raman spectra (red), and linear baseline (green). Bottom: component Voigt peaks (Gaussian-Lorentzian sum).

Figure A6. Sample J1409-74.1 fit using the procedure of Lahfid et al. (2010). Top: residual after fitting. Middle: sum of component peaks (blue line), raw Raman spectra (red), and linear baseline (green). Bottom: component Lorentzian peaks.

Sample Preparation

Pasteris (1989) suggested polishing of thin sections could introduce structural defects to graphite. To avoid this, it was recommended only graphitic material beneath a transparent grain be used for analysis. This would protect the material from being altered by polishing. This concern has been accepted *prima facie* and repeated by subsequent authors working with samples of various grades of carbonaceous material (e.g. Rahl et al., 2005). Additional ambiguity has been introduced by authors discussing the concern in greater detail (e.g. Beyssac and Lazzeri, 2012; Beyssac et al., 2002) who suggest steps ranging from sawing to polishing may introduce defects. These authors cite Pasteris (1989), whose work only addressed the

polishing of graphite in thin sections with 1 μm diamond paste. Although this polishing effect is more problematic for 'pristine' graphite (Beyssac and Lazzeri, 2012) than the more amorphous carbonaceous material expected from this study area, potential sample alteration was a concern.

Lünsdorf (2016) completed a stepwise analysis of potential mechanical alteration to samples during thin section preparation and polishing. The analysis began with P400 abrasive paper (35 μm average particle diameter) and progressed to 0.05 μm alumina slurry, acquiring the Raman spectra of mapped spots on the thin section between each step. It was found only the final 1 μm diamond paste and finer polishing affected the Raman spectra of a suite of samples from shale to blueschist-facies metapelite. This range includes the grades of carbonaceous material in the study area.

Thin sections used for RSCM in this study were ground to final 30 μm thickness with an 18 μm abrasive, well coarser than the polishing stages found to alter Raman spectra by Lünsdorf (2016). To directly test for any alteration from sample preparation on my samples, I acquired spectra for a single sample of black phyllite from its thin section, billet, and a portion of crushed sample mounted on a glass slide. No distinguishable difference between the preparation methods was found.

Identification of Carbonaceous Material

A potential concern of using Raman spectroscopy as a paleothermometer is misidentification of an opaque mineral during optical mineralogy and processing the resultant Raman spectra of that mineral as if it were carbonaceous material. This concern was not borne out in this work. Non-carbonaceous material was often accidentally sampled during Raman spectroscopy, but the character of the Raman spectra of these other minerals was easily differentiated. Figure A7 shows the Raman spectra of various materials, including titanite/leucoxene and siderite. These were the most common opaque minerals observed in the

samples that could be confused with carbonaceous material. While pyrite was commonly observed, its cubic shape made it readily identifiable.

Figure A7. Raman spectra of selected materials compared to carbonaceous material across the spectra range utilized in the RSCM method. The vertical 'counts' scale is arbitrary and depends on signal strength for each sample run.

Other Uses of Raman Spectroscopy

Raman spectroscopy is widely used to identify minerals. Lafuente et al. (2015) assert 80% of minerals can be identified by their Raman spectra. In addition to its use in the RSCM paleothermometer method, unknown minerals were identified in this work. The spectra of the unknown minerals were compared to known spectra in the RRUFF database using CrystalSleuth software (Downs, 2006; Lafuente et al., 2015). Examples of use are shown in Figures A8 and A9.

Figure A8. Top: Photomicrograph of an unknown opaque mineral (circled) in sample 16DF20, 6.3x, PPL. Bottom: Raman spectra of the unknown mineral and the Raman spectra of titanite in the RRUFF database as matched by CrystalSleuth software (Downs, 2006; Lafuente et al., 2015).

Figure A9. Top: Photomicrograph of a feldspar grain (circled) in sample 15JT08, 6.3x, XPL. Bottom: Raman spectra of the the feldspar and the Raman spectra of albite in the RRUFF database as matched by CrystalSleuth software (Downs, 2006; Lafuente et al., 2015).

Appendix 2. Table of all samples

Table of all samples collected in the map area by West Virginia University workers. See Plate 1 map key or Figure 10 for map unit descriptions.

<i>Sample ID</i>	<i>Station</i>	<i>Map Unit</i>	<i>Thin section</i>	<i>Latitude (N)</i>	<i>Longitude (W)</i>
Collected by W.P. Frier (2015)					
01DF15	PF002	€Ove	x	67.87400	150.82024
02DF15	PF004	€Oac		67.87126	150.81210
03DF15	PF006	€Oac	x	67.86970	150.80526
04DF15	PF011	€Oac	x	67.86203	150.78720
05DF15	PF012	€Oac	x	67.86187	150.78703
06DF15	PF014	€Ove	x	67.86791	150.81652
07DF15	PF015	€Oac	x	67.87386	150.83585
08DF15	PF017	€Ove	x	67.88047	150.83175
09DF15	PF019	€Oac	x	67.88040	150.82290
10DF15	PF021	€Oac	x	67.88050	150.79842
11DF15	PF026	€Oac	x	67.87477	150.78118
12DF15	PF027	€Oac	x	67.87493	150.77756
13DF15	PF035	€Ove	x	67.88961	150.80643
14DF15	PF037	€Ove		67.89037	150.80766
15DF15	PF037	€Ove		67.89037	150.80766
16DF15	PF039	€Ove		67.89297	150.80222
17DF15	PF040	€Ove		67.89366	150.80202
18DF15	PF043	€Ove		67.90293	150.79733
19DF15	PF044	MPel		67.90404	150.79625
20DF15	PF052	€Ove	x	67.89337	150.79298
21DF15	PF054	€Ove	x	67.89119	150.79447
22DF15	PF061	Dek	x	67.90948	150.75606
23DF15	PF062	Dek	x	67.90790	150.75217
24DF15	PF070	€Ove	x	67.91151	150.70187
25DF15	PF072	€Ove		67.90753	150.69146
26DF15	PF075	Dhf	x	67.93312	150.77828
27DF15	PF076	Dhf		67.93502	150.77821
28DF15	PF084	Dsg	x	67.91529	150.85195
29DF15	PF085	Dsg	x	67.91370	150.85324
30DF15	PF092	€Oac		67.83905	150.93083
31DF15	PF093	€Oac		67.83979	150.93854
32DF15	PF104	€Ovi		67.84524	150.84678
33DF15	PF107	€Ovi	x	67.84036	150.84014
34DF15	PF108	€Ovi	x	67.83988	150.83893
35DF15	PF114	€Oac		67.81130	150.84244
36DF15	PF115	€Oac	x	67.81172	150.83903
37DF15	PF116	€Oac		67.81115	150.83646
38DF15	PF119	€Ovi	x	67.81318	150.83291

<i>Sample ID</i>	<i>Station</i>	<i>Map Unit</i>	<i>Thin section</i>	<i>Latitude (N)</i>	<i>Longitude (W)</i>
Collected by W.P. Frier (2015)					
39DF15	PF124	Dhf		67.91765	150.88088
40DF15	PF128	Dhf	x	67.91922	150.90502
41DF15	PF133	MDkn		67.91866	150.92976
42DF15	PF159	Dsg	x	67.89067	150.93101
43DF15	PF160	Dsg	x	67.88953	150.93579
44DF15	PF160	Dsg	x	67.88953	150.93579
45DF15	PF166	Dsg	x	67.88995	150.91526
46DF15	PF173	Dsg	x	67.88461	150.89492
47DF15	PF175	Dsg	x	67.87932	150.89575
Collected by J. Toro (2015)					
15JT01	WP009	€Oac		67.72612	150.98203
15JT02	WP012	Dtc	x	67.69950	151.00842
15JT03	WP024	Ddr		67.67674	151.08247
15JT04	WP027	Ddr	x	67.64362	151.02414
Collected by G. Hammond (2016)					
16DF01	DF004	€Oac		67.71795	150.94389
16DF02	DF005	€Oac		67.71552	150.94315
16DF03	DF006	€Oac		67.71356	150.94163
16DF04	DF008	Dtc		67.71086	150.94922
16DF05	DF015	€Oac	x	67.72653	150.93421
16DF06	DF016	€Oac		67.72802	150.93626
16DF07	DF023	Dtc		67.72480	150.90628
16DF08	DF025	Dtc	x	67.72530	150.88661
16DF09	DF028	Dtc	x	67.72677	150.86780
16DF10	DF034	Dtc		67.73221	150.88167
16DF11	DF035	Dtc	x	67.72427	150.88329
16DF12	DF041	Ddr		67.71970	150.84925
16DF13	DF042	Ddm	x	67.71482	150.83953
16DF14	DF054	Ddr		67.69071	150.88575
16DF15	DF056	Ddr		67.68042	150.92936
16DF16	DF060	Dtc	x	67.69229	151.04731
16DF17	DF061	Dtc	x	67.69000	151.05996
16DF18	DF061	Dtc		67.69000	151.05996
16DF19	DF068	Ddr	x	67.67596	151.10845
16DF20	DF069	Dtc	x	67.67221	151.10832
16DF21	DF070	Dtc		67.66960	151.11209
16DF22	DF080	Ddr		67.68702	151.10140
16DF23	DF081	Dtc		67.69271	151.09177
16DF24	DF081	Dtc	x	67.69271	151.09177
16DF25	DF081	Dtc		67.69271	151.09177
16DF26	DF089	Dtc		67.68809	150.99839
16DF27	DF092	Ddr		67.68920	150.97222
16DF28	DF098	Ddm	x	67.67932	150.99896

<i>Sample ID</i>	<i>Station</i>	<i>Map Unit</i>	<i>Thin section</i>	<i>Latitude (N)</i>	<i>Longitude (W)</i>
Collected by G. Hammond (2016)					
16DF29	DF107	Ddm	x	67.64660	151.12190
16DF30	DF115	Ddr	x	67.65361	151.14956
16DF31	DF117	Ddm	x	67.64636	151.13129
16DF32	DF120	Ddm	x	67.63363	151.18286
16DF33	DF122	Ddm	x	67.66986	151.01748
16DF34	DF124	Dgw	x	67.64102	150.94802
16DF35	DF125	Dgw	x	67.64283	150.93686
16DF36	DF125	Dgw		67.64283	150.93686
16DF37	DF125	Dgw		67.64283	150.93686
16DF38	DF123	Dgw		67.63979	150.96611
16DF39	DF129	Ddr		67.62725	151.05700

Appendix 3: Thin section descriptions

Structural nomenclature is that of Passchier and Trouw (1996) and Vernon (2004).

Selected terms are defined as follows:

- P (or M) and Q domains: phyllosilicate- (or mica-) and quartz-rich domains that result from metamorphic differentiation; roughly synonymous “cleavage domains” and “microlithons”, respectively.
- C'-type shear band: a narrow zone with stair-stepping offset within a cleavage domain indicating sense of shear.

Figure A10. Left: Cleavage (P/M) domains and microlithons (Q domains). Right: C'-type shear bands. Reproduced from Passchier and Trouw (2005).

Units listed correspond to map units on Plate 1; see map legend or Figure 10 for descriptions.

All sample entries include a symbol indicating whether the sample is oriented, and if it is, which way is approximately north. The symbol orientation and that of the photomicrographs is flipped about both the x- and y- axis, resulting in no change in sense of shear (dextral or sinistral) as noted in microstructure descriptions. S1 sense of shear is determined from rotated clasts and asymmetric micro-folds. S2 sense of shear is based on lower-strain deformation such as C'-type shear bands and crenulation. For several fine-grained samples only S2 was visible.

Grains called ilmenite, titanite, and/or leucoxene were identified by optical properties out of practicality. In reality, these grains likely contain a mixture of titanium- and iron-bearing minerals and their alteration products. This is illustrated by Figure A11, which shows Raman spectra matching titanite collected from a grain that otherwise appeared to be leucoxene. For the purposes of this work, detailed differentiation is not required as all such grains are believed to be detrital, rather than indicative of metamorphic conditions.

Figure A11. An opaque grain otherwise identified as leucoxene in sample 16DF20 (below) compared to the known spectra of titanite (above) from the RRUFF database using CrystalSleuth software (Downs, 2006; Lafuente, et al., 2015).

Sample	Page	Sample	Page
16DF05	89	43DF15	119
16DF08	90	44DF15	120
16DF09	91	45DF15	121
16DF11	92	46DF15	122
16DF13	93	47DF15	123
16DF16	94	15JT02	124
16DF17	95	15JT04	125
16DF19	96	15JT06	126
16DF20	97	15JT07	127
16DF24	98	J1409-0.6	128
16DF28B	99	J1402-14.2	129
16DF29	100	J1409-17.1	130
16DF30	101	J1409-74.1	131
16DF31B	102	J1409-WPF	132
16DF32	103	J1415	133
16DF33	104	J1415-WPF	134
16DF34B	105	J1417	135
16DF35	107	J1417-WPF	136
05DF15	108	J1418	137
07DF15	109	J1419	138
10DF15	111	J1424	139
22DF15	112	J1426	140
23DF15	113	J1427	141
26DF15	114	J1428	142
28DF15	115	J1430	143
29DF15	116	Karill	144
40DF15	117	Pva2	145
42DF15	118		

Table A2. Table of contents for thin sections described in this appendix.

Sample ID: **16DF05**
Unit: **€Oac**
Lat, Long: **67.72653, -150.93421**
Assemblage: **Apoon**
Additional analysis: **RSCM (this study)**

Lithology: **black phyllite**
Description: **very fine grained with porphyroclasts to 0.5 mm; quartz, white mica, carbonaceous material with scattered hematite, siderite, and leucoxene; rare very fine detrital garnet**
Structure: **spaced gradational cleavage; well-developed P and Q domains; porphyroclasts show both sinistral and dextral sense of shear with sinistral dominant; C'-type shear bands show dextral shear**
Sense of shear: **S1 top to north; S2 top to south**

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF08**
Unit: Dtc
Lat, Long: 67.72530, -150.88661
Assemblage: Hammond

Lithology: phyllite
Description: white mica and quartz with rare very fine zircons; trace calcite in vein
Structure: smooth, spaced to zonal parallel anastomosing cleavage; well-developed P and Q domains; C'-type shear band shows sinistral sense of shear
Sense of shear: S1 ambiguous, possibly top to north; S2 top to south

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF09**
Unit: Dtc
Lat, Long: 67.72677, -150.86780
Assemblage: Hammond

Lithology: phyllite
Description: quartz, white mica, carbonaceous material, trace leucoxene, rare zircon
Structure: gradational Q and P domains; parallel to anastomosing smooth cleavage in M domains; C'-type shear bands; sinistral shear in coarser grains
Sense of shear: S1 top to north

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF11**
Unit: Dtc
Lat, Long 67.72427, -150.88329
Assemblage: Hammond
Additional analysis: RSCM (this study)

**non-
oriented**

Lithology: black phyllite
Description: white mica, very fine quartz, trace leucoxene, rare biotite, pyrite, and zircon
Structure: gradational to zonal continuous cleavage with strong C'-type shear bands showing sinistral shear

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF13**
Unit: Ddm
Lat, Long: 67.71482, -150.83953
Assemblage: Hammond

Lithology: phyllite
Description: very fine grained quartz, siltstone clasts, and white mica; trace chlorite and rare biotite; trace calcite typically mantling rotated quartz clasts
Structure: parallel gradational cleavage in many thin P and Q domains; cleavage primarily disjunctive but micas in Q domains show nascent crenulation; C'-type shear bands show sinistral sense of shear; deformed siltstone clasts show dextral sense of shear.
Sense of shear: S1 top to north; S2 top to south

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF16**
Unit: Dtc
Lat, Long 67.69229, -151.04731
Assemblage: Hammond

Lithology: meta- calcareous sandstone
Description: very fine quartz and calcite with abundant leucoxene and chlorite;
common siderite; rare biotite; overall highly altered
Structure: dextral sense of shear in rough C'-type shear bands obscured by
alteration
Sense of shear: S2 top to north

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF17**
Unit: Dtc
Lat, Long: 67.69000, -151.05996
Assemblage: Hammond

Lithology: meta- calcareous sandstone
Description: very fine to medium quartz in a highly altered mix of calcite, leucoxene, chlorite, and biotite; trace pyrite, hematite, and albite
Structure: obscured by alteration
Sense of shear: indeterminate

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF19**
Unit: Ddr
Lat, Long 67.67596, -151.10845
Assemblage: Hammond
Additional analysis: RSCM (this study)

Lithology: black phyllite
Description: quartz, white mica, and carbonaceous material; rare detrital garnet; possible pyroxene
Structure: gradational P and Q domains forming parallel, zonal cleavage; dextral shear in C'-type shear bands in P domains and asymmetric folds within thin Q domains
Sense of shear: S2 top to north

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF20**
Unit: Dtc
Lat, Long 67.67221, -151.10832
Assemblage: Hammond
Additional analysis: RSCM (this study)

**non-
oriented**

Lithology: meta-graywacke
Description: medium to very fine quartz, white mica, and calcite in altered sample;
common carbonaceous material, leucoxene, albite, and quartzite clasts;
trace hematite and biotite; rare chlorite and zircon; very rare altered
possible mafic grains
Structure: subtle sinistral sense of shear in altered, poorly developed C'-type shear
bands and rotated clasts

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF24**
Unit: Dtc
Lat, Long 67.69271, -151.09177
Assemblage: Hammond
Additional analysis: RSCM (this study)

Lithology: meta-graywacke
Description: fine to medium quartz and quartzite grains up to 1 mm with abundant calcite; carbonaceous material and fine white mica in P domains; scattered detrital white mica, albite, titanite/leucoxene; rare pyrite, biotite, zircon, and chlorite; several calcite grains appear to be replacing rounded rotated porphyroclasts
Structure: continuous fine domainal cleavage; porphyroclasts show sinistral sense of shear
Sense of shear: S1 top to north

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF28B**
Unit: Ddm
Lat, Long: 67.67932, -150.99896
Assemblage: Hammond

Lithology: sandy phyllite
Description: fine to very fine quartz with white mica and calcite, carbonaceous material, biotite, and chlorite; rare pyrite
Structure: spaced wiggly cleavage; asymmetric folds, offset veins, and M domain shear show mixed sense of shear with sinistral shear dominant
Sense of shear: S2 top to south

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF29**
Unit: Ddm
Lat, Long: 67.64660, -151.12190
Assemblage: Hammond
Additional analysis: RSCM (this study)

Lithology: dark gray phyllite
Description: quartz and white mica; trace leucoxene; rare pyrite and chlorite; very rare detrital garnet and zircon
Structure: continuous crenulation; discrete C'-type shear bands showing sinistral sense of shear
Sense of shear: S2 top to south

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF30**
Unit: Ddr
Lat, Long 67.65361, -151.14956
Assemblage: Hammond
Additional analysis: RSCM (this study)

Lithology: black phyllite
Description: fine quartz predominant with white mica and carbonaceous material in cleavage domains; trace pyrite and hematite; rare biotite
Structure: spaced M domains with finer continuous cleavage within Q domains; C'-type shear bands showing dextral shear; possible sinistral sense of shear in rotated quartz grains.
Sense of shear: indeterminate

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF31B**
Unit: Ddm
Lat, Long: 67.64636, -151.13129
Assemblage: Hammond

**non-
oriented**

Lithology: mud-clast phyllite
Description: fine to very fine quartz with scattered white mica, carbonaceous material, hematite, and chlorite; rare biotite, siderite, and zircons
Structure: spaced anastomosing irregular cleavage and sheared asymmetric folds

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF32**
Unit: Ddm
Lat, Long: 67.63363, -151.18286
Assemblage: Hammond

**non-
oriented**

Lithology: sandy slate
Description: very fine quartz, white mica, chlorite, leucoxene; rare zircon and biotite;
few clasts appear to be altered mafics
Structure: subtle gradational zonal cleavage

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF33**
Unit: Ddm
Lat, Long: 67.66986, -151.01748
Assemblage: Hammond

Lithology: sandy phyllite
Description: quartz with scattered quartzite grains, white mica; trace leucoxene, rare hematite, biotite, and chlorite; possible detrital garnet
Structure: gradational spaced cleavage with sinistral shear in C'-type shear bands; rotation of clasts indicates dextral sense of shear.
Sense of shear: S1 top to north, S2 top to south

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF34B**
Unit: Dgw
Lat, Long: 67.64102, -150.94802
Assemblage: Hammond

**non-
oriented**

Lithology: meta- pebbly graywacke
Description: fine to very fine quartz with several coarser quartzite grains as porphyroclasts; common white mica and chlorite; rare biotite, carbonaceous material, hematite, leucoxene, biotite, and calcite
Structure: zonal rough to wiggly gradational to discrete cleavage; rotated porphyroclasts

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample continued: **16DF34B**

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **16DF35**
Unit: Dgw
Lat, Long: 67.64283, -150.93686
Assemblage: Hammond

Lithology: meta-graywacke
Description: very fine to medium quartz with white mica and chlorite; scattered carbonaceous material and calcite; trace albite, siderite, hematite, leucoxene, biotite, and altered volcanic grains
Structure: parallel to anastomosing zonal gradational cleavage; altered rotated grains and sparse crenulation show dextral sense of shear
Sense of shear: S1 top to north

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **05DF15**
Unit: **€Oac**
Lat, Long: **67.86187, -150.78703**
Assemblage: **Apoon**
Additional analysis: **U-Pb zircon geochronology (Frier 2017)**

**non-
oriented**

Lithology: **meta-graywacke**
Description: **heavily altered sample; very fine to medium quartz with siltstone clasts, calcite, white mica, quartzite grains, albite, altered volcanic/mafic grains, chlorite, and leucoxene; trace carbonaceous material and hematite; rare detrital garnet**
Structure: **rough gradational cleavage obscured by alteration**

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **07DF15**
Unit: **€Oac**
Lat, Long: **67.87386, -150.83585**
Assemblage: **Apoon**

**non-
oriented**

Lithology: meta- conglomeratic graywacke
Description: fine to coarse quartz with abundant calcite as alteration products and veins; common quartzite and altered volcanic clasts, white mica, albite, and carbonaceous material; trace leucoxene
Structure: rough to wiggly anastomosing gradational cleavage with discontinuous shear bands in P domains; heavily altered with no clear sense of shear

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample continued **07DF15**

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **10DF15**
Unit: **€Oac**
Lat, Long: **67.88050, -150.79842**
Assemblage: **Apoon**
Additional analysis: **RSCM (this study)**

**non-
oriented**

Lithology: **black phyllite**
Description: **very fine quartz, white mica, carbonaceous material, and leucoxene divided into pebble sized zones carbonaceous material-poor zones possibly representing deformed siltstone clasts and darker carbonaceous material-rich zones; calcite occurs as cement within initially bladed quartz-lined veins**
Structure: **anastomosing spaced to zonal cleavage with finer continuous cleavage in Q domains; P domains have discontinuous crenulation and some development of C'-type shear bands**

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **22DF15**
Unit: Dek
Lat, Long 67.90948, -150.75606
Assemblage: Ellesmerian

**non-
oriented**

Lithology: meta-sandstone
Description: medium quartz to 1mm predominant, grades to very fine; common white mica and carbonaceous material; trace quartzite, biotite, chlorite, and calcite; rare leucoxene; very rare possible pyroxene
Structure: smooth parallel to anastomosing gradational zonal to continuous cleavage

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **23DF15**
Unit: Dek
Lat, Long 67.90790, -150.75217
Assemblage: Ellesmerian
Additional analysis: U-Pb zircon geochronology (Frier 2017),
RSCM (this study)

**non-
oriented**

Lithology: meta- sandy mud-clast conglomerate
Description: deformed siltstone clasts to pebble size with monocrystalline quartz and
quartzite grains to 1mm; grain size distribution made ambiguous by
deformed quartz veins within sample; common white mica; trace
carbonaceous material; rare biotite, hematite, and leucoxene
Structure: rough to wiggly spaced discrete cleavage; abundant deformed veins

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **26DF15**
Unit: Dhf
Lat, Long 67.93312, -150.77828
Assemblage: Endicott Mountains
Additional analysis: U-Pb zircon geochronology (Frier 2017),
RSCM (this study)

**non-
oriented**

Lithology: meta-graywacke
Description: fine to medium quartz with abundant microcrystalline quartz as altered volcanic grains; abundant calcite and white mica; common hematite; scattered siderite; rare zircon and albite
Structure: rough to wiggly continuous domainal cleavage

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **28DF15**
Unit: Dsg
Lat, Long 67.91529, -150.85195
Assemblage: Endicott Mountains
Additional analysis: RSCM (this study)

**non-
oriented**

Lithology: pebbly phyllite
Description: stretched siltstone pebbles with fine to coarse quartz and quartzite grains; common altered volcanic grains, carbonaceous material, and calcite; scattered siderite, biotite, and leucoxene.
Structure: spaced rough to wiggly discrete cleavage between elongate deformed pebbles; common veins

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **29DF15**
Unit: Dsg
Lat, Long: 67.91370, -150.85324
Assemblage: Endicott Mountains

**non-
oriented**

Lithology: pebbly phyllite
Description: stretched siltstone pebbles with fine to coarse quartz and quartzite grains; grain size distribution obscured by altered veins; common altered volcanic grains and white mica; scattered siderite, hematite, carbonaceous material; rare chlorite and leucoxene
Structure: spaced rough to wiggly discrete cleavage between elongate deformed pebbles; common veins

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **40DF15**
Unit: Dhf
Lat, Long 67.91922, -150.90502
Assemblage: Endicott Mountains

**non-
oriented**

Lithology: meta-graywacke
Description: fine to medium quartz and siltstone clasts; scattered white mica and carbonaceous material; trace leucoxene; rare biotite, albite, and chlorite
Structure: rough to wiggly, discontinuous discrete domainal cleavage

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **42DF15**
Unit: Dsg
Lat, Long 67.89067, -150.93101
Assemblage: Endicott Mountains

**non-
oriented**

Lithology: meta-graywacke
Description: highly altered; quartz and microcrystalline quartz as altered volcanics; abundant calcite; common siderite and leucoxene; trace carbonaceous material; rare white mica and biotite
Structure: rough spaced discontinuous gradational cleavage; fabric obscured by alteration

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **43DF15**
Unit: Dsg
Lat, Long 67.88953, -150.93579
Assemblage: Endicott Mountains
Additional analysis: U-Pb zircon geochronology (Frier 2017),
RSCM (this study)

**non-
oriented**

Lithology: phyllitic sandstone
Description: medium to fine grained quartz and siltstone grains with coarse deformed
siltstone clasts between white mica- and carbonaceous material-rich P
domains; trace leucoxene and chlorite; trace biotite and zircon
Structure: continuous spaced parallel to anastomosing discrete disjunctive cleavage

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **44DF15**
Unit: Dsg
Lat, Long 67.88953, -150.93579
Assemblage: Endicott Mountains
Additional analysis: RSCM (this study)

**non-
oriented**

Lithology: mud-clast phyllite
Description: deformed siltstone clasts predominant with abundant quartz and quartzite; common white mica and carbonaceous material; scattered siderite; rare biotite and leucoxene
Structure: spaced smooth to rough parallel to anastomosing disjunctive cleavage; abundant quartz-filled veins

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **45DF15**
Unit: Dsg
Lat, Long 67.88953, -150.93579
Assemblage: Endicott Mountains

**non-
oriented**

Lithology: meta-graywacke
Description: fine grained quartz with siltstone grains and altered muddy fines;
abundant white mica; common carbonaceous material; scattered siderite;
rare biotite, leucoxene, and calcite
Structure: poorly developed rough to wiggly spaced gradational cleavage

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **46DF15**
Unit: Dsg
Lat, Long 67.88461, -150.89492
Assemblage: Endicott Mountains
Additional analysis: RSCM (this study)

**non-
oriented**

Lithology: meta-graywacke
Description: fine grained quartz with siltstone grains and altered muddy fines;
abundant white mica; common carbonaceous material; scattered siderite;
rare biotite, leucoxene, calcite, altered volcanics, and chlorite
Structure: poorly developed rough to wiggly spaced gradational cleavage

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **47DF15**
Unit: Dsg
Lat, Long: 67.87932, -150.89575
Assemblage: Endicott Mountains

**non-
oriented**

Lithology: meta-volcaniclastic sandstone
Description: highly altered; medium to very fine quartz; common calcite, altered volcanics, albite, white mica, and hematite; scattered carbonaceous material; trace leucoxene and detrital white mica; rare biotite, zircon, and chlorite
Structure: nascent rough gradational cleavage obscured by alteration

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **15JT02**
Unit: Dtc
Lat, Long 67.69817, -151.00506
Assemblage: Hammond
Additional analysis: RSCM (this study)

Lithology: calcareous sandstone
Description: very fine to medium quartz and calcite; scattered carbonaceous material and pyrite; rare hematite; appears mostly recrystallized
Structure: spaced poorly developed cleavage in carbonaceous material; appears to follow bedding

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **15JT04**
Unit: Ddr
Lat, Long 67.64228, -151.02080
Assemblage: Hammond
Additional analysis: RSCM (this study)

Lithology: black phyllite
Description: very fine quartz with altered very fine matrix of abundant carbonaceous material, white mica, and chlorite; trace biotite and hematite
Structure: gradational irregular cleavage following bedding with messy C'-type shear bands in poorly developed crenulation; C'-type bands show sinistral sense of shear
Sense of shear: S2 top to south

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **15JT06**
Unit: outside map area
Lat, Long 67.46085, -150.86025
Assemblage: Hammond

Lithology: mica schist
Description: quartz, white mica, and metamorphic albite; rare zircon; fine possible carbonaceous material in P domains
Structure: continuous cleavage; well-developed C-type shear bands

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **15JT07**
Unit: outside map area
Lat, Long 67.45883, -150.83429
Assemblage: Hammond

Lithology: chlorite-mica schist
Description: quartz with abundant chlorite and white mica; common calcite; scattered hematite and possible carbonaceous material; trace leucoxene
Structure: well-developed continuous cleavage; scattered C-type shear bands show dextral sense of shear
Sense of shear: S2 top to west

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1409-0.6**
Unit: Dek
Lat, Long 67.93050, -150.47083
Assemblage: Ellesmerian
Additional analysis: U-Pb zircon geochronology, Lu-HF isotope analysis (Strauss, et al. 2017)

Lithology: meta-sandstone
Description: medium to coarse quartz and siltstone clasts; abundant quartzite grains; common white mica and carbonaceous material; rare biotite, leucoxene, albite, and calcite
Structure: rough to wiggly spaced anastomosing cleavage

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1409-14.2**
Unit: Dek
Lat, Long 67.93050, -150.47083
Assemblage: Ellesmerian

Lithology: sandy mud-clast meta-conglomerate
Description: medium to coarse quartz and quartzite sand with siltstone and volcanic clasts to pebble size; common white mica; scattered chlorite, hematite, and calcite
Structure: very irregular wiggly nascent cleavage in P domains; abundant quartz filled veins

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1409-17.1**
Unit: Dek
Lat, Long 67.93050, -150.47083
Assemblage: Ellesmerian

Lithology: meta-graywacke

Description: medium to very fine quartz, siltstone clasts, altered volcanic lithics, and quartzite; abundant white mica and carbonaceous material; rare pyrite, hematite, biotite, and zircon

Structure: wiggly anastomosing spaced cleavage with a more white mica-rich zone having zonal to continuous cleavage

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1409-74.1**
Unit: Dek
Lat, Long 67.93050, -150.47083
Assemblage: Ellesmerian
Additional analysis: RSCM (this study)

Lithology: black slate
Description: very fine quartz with abundant carbonaceous material and mica; common hematite and leucoxene; rare possible biotite
Structure: gradational zonal rough to locally continuous cleavage

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1409-WPF**
Unit: Dek
Lat, Long 67.93050, -150.47083
Assemblage: Ellesmerian

Lithology: siltstone
Description: very fine grained, <0.1 mm predominant; quartz; common hematite and chlorite; scattered white mica; trace pyrite, siderite, and biotite
Structure: scattered nascent rough irregular cleavage following bedding

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1415**
Unit: Dsg
Lat, Long 67.93886, -150.42783
Assemblage: Endicott Mountains

Lithology: meta-graywacke
Description: medium to fine quartz and siltstone grains; abundant hematite, carbonaceous material, and white mica; scattered chlorite
Structure: spaced irregular wiggly to rough gradational cleavage in P domains; one large quartz vein across thin section and scattered smaller veins in diffuse zones of stretching

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1415-WPF**
Unit: Dsg
Lat, Long 67.93886, -150.42783
Assemblage: Endicott Mountains
Additional analysis: U-Pb zircon geochronology (Frier 2017)

Lithology: sandy mud-clast meta-conglomerate
Description: elongate pebble sized clasts of siltstone with medium to fine quartz;
common hematite, siderite, and white mica; scattered carbonaceous
material and calcite; rare biotite and zircon
Structure: rough discrete spaced cleavage anastomosing around elongate siltstone
pebbles; one large and several fine quartz filled veins

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1417**
Unit: Dek
Lat, Long 67.93578, -150.43942
Assemblage: Ellesmerian
Additional analysis: RSCM (this study)

Lithology: slate
Description: very fine quartz in altered matrix of white mica, carbonaceous material, and chlorite; scattered hematite; rare biotite and pyrite
Structure: gradational zonal parallel to anastomosing cleavage parallel to bedding; nascent crenulation perpendicular to bedding

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1417-WPF**
Unit: Dek
Lat, Long 67.93578, -150.43942
Assemblage: Ellesmerian

Lithology: slate
Description: very fine quartz in altered matrix of white mica, carbonaceous material, calcite and chlorite; scattered hematite; rare biotite and pyrite
Structure: gradational zonal parallel to anastomosing cleavage parallel to bedding; nascent crenulation perpendicular to bedding

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1418**
Unit: **€Oac**
Lat, Long: **67.92789, -150.40461**
Assemblage: **Apoon**
Additional analysis: **U-Pb zircon geochronology, Lu-HF isotope analysis (Strauss, et al. 2017)**

Lithology: **meta-volcaniclastic sandstone**
Description: **fine to coarse grained; quartz, altered volcanics, albite, calcite, and quartzite; common white mica and chlorite; trace leucoxene and carbonaceous material**
Structure: **rough spaced gradational cleavage**

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1419**
Unit: **€Oac**
Lat, Long: **67.92789, -150.40461**
Assemblage: **Apoon**
Additional analysis: **U-Pb zircon geochronology, Lu-HF isotope analysis (Strauss, et al. 2017)**

Lithology: **calcareous slate**
Description: **very fine grained calcite and quartz; common carbonaceous material, hematite, and white mica; trace albite**
Structure: **rough gradational zonal cleavage**

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1424**
Unit: €Oac
Lat, Long 67.86869, -150.30731
Assemblage: Apoon
Additional analysis: U-Pb zircon geochronology, Lu-HF isotope analysis (Strauss, et al. 2017); RSCM (this study)

Lithology: meta-volcaniclastic sandstone
Description: abundant opaque medium lithics (ilmenite?) and altered volcanics in altered matrix of quartz, calcite, white mica, and hematite; scattered siderite and carbonaceous material
Structure: poorly developed cleavage parallel to bedding; one C'-type shear zone in a P domain along sample edge; one vein with quartz following calcite

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1426**
Unit: Dtc
Lat, Long 67.84933, -150.26047
Assemblage: Hammond
Additional analysis: $^{40}\text{Ar}/^{39}\text{Ar}$ geochronology (Strauss, et al. 2017)

Lithology: volcanoclastic phyllite
Description: medium to fine quartz and altered volcanics in calcite and very fine quartz; abundant metamorphic and detrital white mica; common carbonaceous material; trace quartzite; rare biotite, albite, chlorite, and zircon
Structure: zonal to continuous parallel to anastomosing cleavage

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1427**
Unit: **€Oac**
Lat, Long: **67.85083, -150.26064**
Assemblage: **Apoon**
Additional analysis: **U-Pb zircon geochronology, Lu-HF isotope analysis (Strauss, et al. 2017); RSCM (this study)**

Lithology: **meta-graywacke**
Description: **medium to fine quartz, altered volcanics, and calcite; abundant siltstone grains, albite, and white mica; scattered chlorite and carbonaceous material; trace biotite and leucoxene; rare pyrite**
Structure: **wiggly anastomosing zonal discrete cleavage with nascent shear bands**

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1428**
Unit: €Oac
Lat, Long: 67.85531, -150.26817
Assemblage: Apoon

Lithology: meta-graywacke
Description: fine to very fine quartz, altered volcanics, and calcite; abundant siltstone grains, albite, and white mica; scattered chlorite and carbonaceous material; trace biotite and leucoxene; rare pyrite
Structure: wiggly anastomosing zonal discrete cleavage

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **J1430**
Unit: €Oac
Lat, Long 67.89342, -150.38528
Assemblage: Apoon

Lithology: calcareous slate
Description: very fine quartz and calcite; common carbonaceous material, chlorite, and white mica; scattered albite; trace leucoxene; rare biotite
Structure: rough to wiggly gradational spaced cleavage parallel to bedding

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **Karill**
Unit: **€Oac**
Lat, Long: **67.92789, -150.40728**
Assemblage: **Apoon**

Lithology: **calcareous phyllite**
Description: **fine quartz and calcite; abundant siderite; common hematite, carbonaceous material, and albite; scattered white mica and chlorite; rare pyrite and biotite**
Structure: **continuous to gradational zonal parallel to anastomosing cleavage**

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Sample ID: **Pva2**
Unit: **€Oac**
Lat, Long: 67.88889, -150.38417
Assemblage: Apoon
Additional analysis: RSCM (this study)

Lithology: meta-volcaniclastic sandstone
Description: coarse to fine altered volcanics, quartz, albite, quartzite, calcite, and chlorite; scattered white mica and leucoxene; trace biotite; rare detrital garnet
Structure: irregular rough to wiggly spaced cleavage

Photomicrographs of thin section, 10x/FOV 15 mm, PPL (left), XPL (right).

Appendix 4: All RSCM results

This appendix contains all results for each sample analyzed with the RSCM paleotemperature methods presented in this work. All generated parameters are shown for each individual spectral acquisition processed with IgorPro 6.34 software (WaveMetrics Inc., Lake Oswego, Oregon) as well as the relevant R2 or RA1/RA2 parameters as required for the paleotemperature calculations of Beyssac et al. (2002) or Lahfid et al. (2010), respectively (Figure A12, Table A3). When using the Lahfid et al. (2010) method, the average result of the RA1 and RA2 equations was used as the final paleotemperature; all are presented in applicable tables.

Results are presented in the order of Table A5. Sample numbers are in the upper left cell. Average temperature (°C) and standard deviation (1-σ) are in the upper right cells with the method used for calculation. Notation above the “Peak” cell refers to the file name suffix. In addition to the included results, RSCM was unsuccessfully attempted on samples listed in Table A4.

$$R2 = \frac{D1}{G + D1 + D2_A}$$

$$RA1 = \frac{D1 + D4}{D1 + D2 + D3 + D4 + G} \quad RA2 = \frac{D1 + D4}{D2 + D3 + G}$$

Figure A12. Formulas for the R2, RA1, and RA2 parameters used to calculate maximum paleotemperature with the methods of Beyssac et al. (2002) and Lahfid et al. (2010). All utilize peak areas of the component peaks.

Study	Range °C	Formula	R ² value
Beyssac et al. 2002	330-650	T(°C) = -445*R2 + 641	0.96
Lahfid et al. 2010	200-330	T(°C) = (RA1 - 0.3758) / 0.0008	0.97
Lahfid et al. 2010	200-330	T(°C) = (RA2 - 0.27) / 0.0045	0.95

Table A3. Stated applicable range and formulas for the RSCM paleothermometers of Beyssac et al. (2002) and Lahfid et al. (2010) used in this work. R2, RA1, and RA2 parameters are shown in Figure A10.

16DF03	16DF04	16DF07	16DF13	16DF16	16DF28B
16DF31B	16DF32	16DF33	16DF34B	16DF35	07DF15
15DF15	22DF15	30DF15	40DF15	47DF15	Pva2

Table A4. List of samples on which RSCM was attempted unsuccessfully.

Sample ID	Map Unit	T (°C)	1 σ (°C)	# spots	Method	Latitude (N)	Longitude (W)
16DF02	EOac	359	15	10	Beyssac	67.715520	150.943149
16DF05	EOac	353	18	12	Beyssac	67.726527	150.934213
16DF06	EOac	359	17	11	Beyssac	67.728021	150.936263
16DF10	Dtc	349	7	13	Beyssac	67.732214	150.881674
16DF11	Dtc	368	12	13	Beyssac	67.724269	150.883287
16DF12	Ddr	365	18	11	Beyssac	67.719700	150.849249
16DF14	Ddr	357	14	10	Beyssac	67.690712	150.885746
16DF15	Ddr	357	14	11	Beyssac	67.680416	150.929359
16DF19	Ddr	358	11	11	Beyssac	67.675959	151.108447
16DF20	Dtc	391	20	13	Beyssac	67.672213	151.108320
16DF21	Dtc	391	19	11	Beyssac	67.669599	151.112092
16DF22	Ddr	366	15	11	Beyssac	67.687022	151.101397
16DF24	Dtc	364	10	9	Beyssac	67.692711	151.091771
16DF27	Ddr	383	19	12	Beyssac	67.689200	150.972217
16DF29	Ddm	360	17	11	Beyssac	67.646595	151.121902
16DF30	Ddr	372	12	12	Beyssac	67.653614	151.149556
16DF38	Dgw	362	18	13	Beyssac	67.639789	150.966109
16DF39	Ddr	371	29	13	Beyssac	67.627249	151.057004
02DF15	EOac	356	28	9	Beyssac	67.871000	150.812000
10DF15	EOac	321	18	18	Lahfid	67.881000	150.798000
18DF15	EOac	340	19	15	Lahfid	67.903000	150.797000
23DF15	Dek	325	21	9	Lahfid	67.908000	150.752000
26DF15	Dhf	277	16	5	Lahfid	67.933000	150.778000
27DF15	Dhf	347	30	12	Lahfid	67.935000	150.778000
28DF15	Dsg	298	16	10	Lahfid	67.915000	150.852000
31DF15	EOac	348	11	14	Beyssac	67.839790	150.938540
39DF15	Dhf	321	37	12	Lahfid	67.918000	150.881000
41DF15	MDkn	318	25	14	Lahfid	67.919000	150.930000
43DF15	Dsg	296	32	10	Lahfid	67.890000	150.936000
44DF15	Dsg	310	31	8	Lahfid	67.890000	150.936000
46DF15	Dsg	297	24	9	Lahfid	67.885000	150.895000
15JT01	EOac	374	16	10	Beyssac	67.745164	150.946694
15JT02	Dtc	408	23	9	Beyssac	67.698167	151.005063
15JT04	Ddr	360	14	12	Beyssac	67.642283	151.020798
J1409-74.1	Dek	316	23	10	Lahfid	67.930500	150.470833
J1417	Dek	299	35	12	Lahfid	67.935778	150.439417
J1424	EOac	364	8	10	Beyssac	67.868694	150.307306
J1427	EOac	353	17	11	Beyssac	67.850833	150.260639

Table A5. All of my RSCM paleothermometry results from the Doonerak area. Map units correspond to Plate 1. Method refers to the peak fitting procedures and paleotemperature equation used after either Beyssac et al. (2002) or Lahfid et al. (2010). Results from each sample follow in the same order as the table.

16DF02				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		359.2	15.1
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	17507	1883380	67.7	1.252	0.584	381.1
G	1587	13983	1253290	57.0			
D2	1617	3874	88563.3	-0.6			
01							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	17024	1630130	60.5	1.338	0.626	362.6
G	1585	12728	803007	35.8			
D2	1616	5512	172159	0.0			
02							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	16820	1523110	55.0	1.228	0.625	362.7
G	1585	13701	791392	18.2			
D2	1617	4256	120806	0.1			
03							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	7513	675879	56.8	1.523	0.684	336.7
G	1593	4933	242702	14.3			
D2	1622	2438	69962.7	0.1			
04							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1346	15179	1525240	63.6	1.198	0.589	379.0
G	1581	12669	957167	43.1			
D2	1613	3527	108576	0.0			
05							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	2521	210356	53.0	0.614	0.628	361.7
G	1595	4106	111923	-17.5			
D2	1623	617	12815.7	-0.3			
07							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1346	32647	3060490	58.8	1.533	0.649	352.2
G	1582	21298	1362240	33.5			
D2	1613	9147	292637	0.0			
08							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	12995	1209090	59.2	1.648	0.676	340.0
G	1592	7884	445652	29.6			
D2	1620	5241	132839	-2.3			
09							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	30584	2976560	62.0	1.498	0.660	347.2
G	1587	20421	1319600	27.0			
D2	1617	7700	212884	1.8			
010							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	27389	2555480	59.4	1.378	0.612	368.8

G	1582	19872	1356860	40.6			
D2	1613	8463	265124	0.0			

16DF05				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		353.1	18.4
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1355	1115	72860.3	26.2	1.243	0.586	380.1
G	1595	897	44483.5	0.0			
D2	1624	326	6927.89	0.0			
05-b8							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	835	64152.5	36.8	1.442	0.660	347.3
G	1596	579	27295.1	6.7			
D2	1624	302	5767.05	-0.3			
05-b9							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	1015	79703.6	41.1	1.488	0.657	348.6
G	1589	682	27903.1	11.0			
D2	1619	486	13687.9	-0.2			
05-c1							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	1146	90724.4	45.6	1.659	0.679	338.6
G	1595	691	34374.5	11.9			
D2	1623	331	8428.38	0.1			
05-c2							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	2768	306612	68.4	1.178	0.622	364.3
G	1589	2351	163511	36.3			
D2	1620	899	23022.7	-0.1			
05-c3							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	1267	118723	59.0	1.509	0.688	334.8
G	1593	840	37745.3	3.1			
D2	1622	4815	16092.4	-12.3			
05-c4							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	1577	147592	58.2	1.374	0.613	368.3
G	1592	1148	82026.8	42.3			
D2	1621	476	11199	0.0			
05-c5							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1346	792	73097.7	50.6	1.357	0.663	346.1
G	1597	583	32450.6	0.1			
D2	1621	372	4760.36	2.0			
05-c7							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	1200	102863	51.1	1.847	0.735	313.8
G	1595	650	21747	7.5			

D2	1621	556	15266	-0.1			
05-c8							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	1511	122457	46.4	1.476	0.617	366.6
G	1594	1024	67248	41.1			
D2	1622	379	8860.07	0.0			
05-c11							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	2170	177149	49.7	1.541	0.617	366.2
G	1592	1408	97480	38.8			
D2	1621	522	12279.6	0.0			
05-a							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	5374	554512	65.7	1.394	0.627	362.0
G	1587	3856	292388	41.7			
D2	1618	1317	37406.6	-0.5			

16DF06				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		358.8	17.3
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	14839	1214430	50.0	1.772	0.694	332.2
G	1592	8373	412391	19.7			
D2	1621	4012	122984	0.1			
01							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	23981	1916500	47.2	1.475	0.620	365.3
G	1591	16254	1049050	33.4			
D2	1621	5095	127965	0.0			
02							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	22538	1884840	53.0	1.576	0.661	346.9
G	1591	14296	813739	24.8			
D2	1621	5304	153112	-0.1			
03							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	16368	1343040	51.0	1.596	0.655	349.4
G	1593	10253	590880	29.4			
D2	1621	4061	115435	-0.1			
04							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	22123	1915510	51.7	1.698	0.699	330.1
G	1591	13029	655387	14.5			
D2	1621	5817	171264	-0.1			
05							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	6759	585562	51.6	0.289	0.626	362.6
G	1596	23356	325546	-27.7			
D2	1624	1210	24719.7	0.0			

07							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	19845	1636160	51.6	1.204	0.606	371.2
G	1587	16488	1146270	40.9			
D2	1619	3413	-83808	0.0			
08							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	22188	1871810	51.0	1.225	0.616	367.0
G	1585	18109	988786	14.0			
D2	1618	5831	179333	-0.3			
09							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	23396	2032880	52.7	1.213	0.628	361.6
G	1582	19280	1019080	7.3			
D2	1616	5716	186133	0.0			
010							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	28335	2379720	53.4	1.215	0.586	380.2
G	1584	23329	1483570	33.2			
D2	1617	6545	196636	0.0			
011							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	21861	1798090	51.0	1.218	0.584	380.9
G	1586	17943	1130150	38.9			
D2	1618	4897	148346	0.0			

16DF10				Method:	Beyssac et al. 2002		
					avg T	std dev	
				Avg each run	348.6	6.7	
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	22803	2012990	56.2	1.715	0.677	339.5
G	1589	13295	833637	18.0			
D2	1621	3759	124742	10.2			
0							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1345	15649	1589890	64.7	1.443	0.638	356.9
G	1577	10843	683479	29.0			
D2	1608	5292	217383	-0.1			
01							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	18279	1628770	56.7	1.641	0.654	350.1
G	1586	11137	731865	34.2			
D2	1616	8089	130715	-8.7			
02							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1344	19685	1780970	57.6	1.506	0.647	352.9
G	1576	13070	734412	24.7			
D2	1609	5625	235271	15.4			
03							

Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1344	24180	2108490	55.5	1.437	0.635	358.3
G	1575	16832	943162	25.9			
D2	1608	7206	267659	5.7			
04							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	11430	939256	52.3	1.768	0.670	342.7
G	1595	6464	400086	27.5			
D2	1623	2270	61857.5	5.7			
05							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1346	27474	2478580	57.4	1.747	0.678	339.4
G	1583	15728	941546	25.5			
D2	1614	6614	236751	1.5			
07							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1345	23122	2012750	55.4	1.607	0.655	349.4
G	1580	14390	856848	25.7			
D2	1613	5642	202212	5.4			
08							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1344	21472	1928980	57.2	1.543	0.655	349.7
G	1578	13912	819280	25.9			
D2	1610	5558	198693	8.6			
09							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1345	23055	2074060	57.3	1.649	0.671	342.2
G	1582	13985	808214	18.4			
D2	1614	5513	206834	10.5			
10							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1346	18055	1822790	64.3	1.471	0.638	357.0
G	1583	12275	815429	33.0			
D2	1613	4747	217991	27.6			
11							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1345	24708	2232040	57.5	1.615	0.650	351.6
G	1581	15300	989597	26.3			
D2	1613	5469	210036	16.0			
12							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1346	24603	2218230	57.4	1.709	0.671	342.6
G	1583	14399	879202	25.8			
D2	1614	5868	210307	4.9			

16DF11				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		367.9	12.4
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	5048	399377	50.3	1.391	0.572	386.3
G	1587	3628	260542	43.0			
D2	1619	1182	37937.7	1.4			
11-1							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	1962	141562	43.6	1.197	0.571	386.8
G	1588	1639	93119	31.2			
D2	1620	549	13106.6	0.1			
11-2							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	6006	471036	48.2	1.455	0.621	364.5
G	1584	4129	245846	24.2			
D2	1618	1175	41083.2	18.0			
11-3							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	1783	126754	43.7	1.414	0.597	375.4
G	1589	1261	75240.2	34.9			
D2	1620	399	10355.5	0.0			
11-4							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	4000	259028	34.5	1.680	0.626	362.6
G	1588	2381	135009	27.4			
D2	1621	791	19938.2	0.0			
11-5							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	5252	395353	47.6	1.639	0.614	367.8
G	1587	3204	227808	34.0			
D2	1620	800	20756.2	-0.2			
11-6							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	3965	303122	48.1	1.718	0.642	355.3
G	1589	2307	148695	39.2			
D2	1618	733	20302.2	-0.1			
11-7							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	1276	91662.2	35.0	1.349	0.606	371.5
G	1587	946	54165.7	28.0			
D2	1620	280	5543.82	-0.3			
11-8							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	1055	70085	39.6	1.569	0.625	362.8
G	1591	673	35711.6	19.1			
D2	1622	213	6327.56	0.1			
11-9							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	1519	124564	50.8	1.369	0.604	372.2

G	1590	1110	71200.4	37.7			
D2	1621	411	10426	0.2			
11-13							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	3980	320902	50.9	1.341	0.589	379.1
G	1584	2968	197800	37.4			
D2	1617	919	26483.8	0.0			
11-14							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	4921	362544	46.5	1.614	0.647	353.3
G	1587	3049	168278	26.1			
D2	1619	1063	29955.5	-0.9			
11-15							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	3953	272750	43.6	1.792	0.664	345.7
G	1588	2206	110435	24.5			
D2	1620	1302	27832.4	-4.9			

16DF12				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		364.9	18.2
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	8459	512967	28.3	1.722	0.656	349.3
G	1590	4912	206309	11.3			
D2	1620	2181	63190	-0.2			
12							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	7959	620196	49.5	1.455	0.556	393.4
G	1590	5470	473432	51.4			
D2	1620	977	20848.3	0.5			
13							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	5865	435986	41.8	1.471	0.635	358.5
G	1587	3986	210219	10.6			
D2	1619	1149	40685.2	0.0			
14							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	5294	339829	34.5	1.263	0.567	388.9
G	1586	4192	226492	27.9			
D2	1618	1211	33432.7	0.1			
15							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	#####	705895	-47.6	#####	0.620	364.9
G	1587	20970	397063	-21.1			
D2	1621	1373	34711.2	0.0			
17							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	7870	540452	43.2	1.746	0.662	346.5
G	1589	4507	218022	-0.1			

D2	1620	1607	58163.6	16.7			
18							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	5865	386941	34.9	1.548	0.651	351.2
G	1587	3788	151290	9.5			
D2	1618	1709	55834.8	-0.2			
19							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	6771	445881	35.3	1.499	0.632	359.7
G	1588	4518	198127	13.4			
D2	1619	1873	61328.5	-0.1			
110							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1353	439	24568.2	23.4	1.354	0.575	385.2
G	1590	324	14482.2	1.0			
D2	1623	2756	3695.66	-14.4			
111							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	5962	442653	43.5	1.378	0.602	373.2
G	1588	4325	261168	29.0			
D2	1620	1205	31827.2	0.0			
112							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	8399	531511	39.5	1.424	0.604	372.2
G	1588	5896	309973	12.9			
D2	1620	1515	38335.6	0.0			
16							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	1451610	221799	-47.0	#####	0.687	335.4
G	1617	503	22485.1	20.1			
D2	1587	1463	78642.6	0.0			

16DF14				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		356.6	13.6
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	3992	91844.4	-26.9	4.286	0.603	372.8
G	1602	931	57097.4	-0.2			
D2	1622	131	3470.35	16.8			
1							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	16149	1372220	54.0	0.221	0.647	352.9
G	1593	73050	690741	-31.3			
D2	1622	2447	56346.4	-0.3			
02							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	3453	241370	30.3	1.459	0.612	368.5
G	1597	2366	147670	3.5			
D2	1624	382	5100.85	0.4			

11							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	9355	746774	48.3	1.732	0.668	343.9
G	1594	5401	318180	17.9			
D2	1624	1790	53665.6	9.6			
12							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	5321	308329	8.3	1.400	0.584	380.9
G	1594	3801	198585	0.0			
D2	1624	1008	20686.2	-0.1			
14							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	5996	368675	14.0	1.658	0.638	357.2
G	1594	3617	174281	0.1			
D2	1624	1236	35179.4	6.1			
15							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	3350	267067	48.7	1.630	0.668	343.8
G	1595	2055	125196	7.9			
D2	1623	390	7602.75	0.0			
16							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	9700	808653	50.4	1.591	0.635	358.5
G	1594	6096	420137	30.4			
D2	1621	1567	44883.7	1.4			
17							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	11492	981190	46.3	1.017	0.667	344.0
G	1597	11305	448731	-9.2			
D2	1625	1885	40122	-1.6			
19							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	13496	1068180	42.0	1.226	0.668	343.7
G	1597	11011	502543	-6.2			
D2	1625	1500	28030.9	-0.1			

16DF15				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		356.5	14.0
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	18135	1455800	49.5	1.685	0.679	338.9
G	1590	10761	553129	20.1			
D2	1620	4455	135797	-0.3			
02							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	22798	1799040	49.0	1.619	0.633	359.2
G	1590	14078	920298	32.0			
D2	1620	4443	121577	-0.1			
03							

Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	13357	1373660	65.4	1.474	0.688	334.8
G	1590	9064	522329	17.5			
D2	1618	5338	100396	-9.0			
05							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	10209	710995	44.3	2.229	0.585	380.8
G	1591	4580	293160	-0.2			
D2	1610	2914	211676	24.3			
06							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	18275	1325100	46.1	1.688	0.649	352.0
G	1590	10825	615980	22.7			
D2	1621	3605	99376.6	0.0			
07							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	5857	317496	0.0	1.632	0.627	361.9
G	1594	3588	172934	0.0			
D2	1624	907	15791.7	6.2			
09							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	7328	485289	36.1	1.664	0.666	344.7
G	1589	4403	197672	9.0			
D2	1621	1632	45992	-0.2			
010							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	4660	356687	48.7	1.538	0.603	372.5
G	1590	3029	201681	42.3			
D2	1619	1082	32785.9	0.2			
011							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	20270	1656040	51.1	1.541	0.654	350.1
G	1589	13154	773523	19.1			
D2	1621	3781	103638	-0.1			
04							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	19361	2182440	71.8	1.187	0.618	365.8
G	1587	16310	1221420	32.6			
D2	1618	3551	125356	-1.5			
01							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	3632	249788	43.4	1.568	0.630	360.8
G	1591	2316	122794	33.6			
D2	1619	899	24103.9	0.9			

16DF19				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		357.8	11.0
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	1034	90418.9	54.9	1.375	0.645	353.9
G	1596	752	46128.8	11.4			
D2	1624	207	3576.53	0.0			
19-4							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	3958	349522	56.1	1.297	0.582	382.1
G	1588	3052	225777	41.6			
D2	1619	1035	25517.3	-0.1			
19-5							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	981	87690.3	52.3	1.433	0.629	361.0
G	1593	685	43861.7	34.7			
D2	1621	350	7832.7	0.0			
19-6							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	3711	360489	61.3	1.477	0.638	357.2
G	1590	2513	173701	43.4			
D2	1619	1110	31070.2	0.1			
19-7							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	1413	131611	58.1	1.401	0.615	367.2
G	1592	1008	71898.9	44.3			
D2	1621	382	10409.2	-0.3			
19-8							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	4287	395389	58.3	1.564	0.654	350.0
G	1588	2741	176709	28.9			
D2	1619	1645	32485.9	-5.7			
19-9							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	2586	239856	58.6	1.379	0.641	356.0
G	1592	1875	113706	32.7			
D2	1622	853	20885.5	0.0			
19-10							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	1997	161873	51.0	1.885	0.679	339.1
G	1590	1059	50651.7	18.2			
D2	1618	705	26038	0.8			
19-11							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	1382	114100	44.5	1.404	0.624	363.4
G	1590	985	59644.3	28.5			
D2	1621	381	9170.56	0.0			
19-12							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	3131	268432	54.0	1.600	0.643	354.8

G	1591	1957	130270	24.0			
D2	1622	702	18652.2	7.6			
19-13							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1346	4209	389718	58.9	1.544	0.651	351.3
G	1582	2726	159664	16.9			
D2	1615	1166	49199.5	22.2			

16DF20				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		390.6	20.4
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	3296	222898	39.6	1.517	0.631	360.4
G	1589	2173	111574	14.2			
D2	1621	822	19033.5	-1.1			
bl1							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	4407	292192	41.8	1.268	0.585	380.6
G	1584	3475	176078	26.0			
D2	1618	1147	31078	-0.2			
bl2							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	6902	545130	49.7	1.083	0.537	402.2
G	1581	6374	425893	32.4			
D2	1617	1557	44947.2	0.0			
bl4							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	6902	545130	49.7	1.083	0.537	402.2
G	1581	6374	425893	32.4			
D2	1617	1557	44947.2	0.0			
bl5							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	3894	234575	37.8	1.391	0.587	379.8
G	1585	2799	148363	29.4			
D2	1619	716	16632.7	0.0			
bl6							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	5252	369187	44.6	0.999	0.540	400.7
G	1581	5258	275654	27.8			
D2	1616	1313	38841.3	0.6			
bl8							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	3875	201934	26.6	1.063	0.523	408.2
G	1584	3646	162646	28.2			
D2	1617	797	21469	0.0			
bl9							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	4271	269645	40.1	1.257	0.581	382.3
G	1584	3398	167660	24.0			

D2	1618	980	26466.7	0.0			
bl10							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	5203	317812	38.7	1.014	0.524	407.9
G	1583	5131	260126	27.6			
D2	1616	1077	28714.5	0.0			
bl11							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	5945	379144	40.2	1.337	0.590	378.5
G	1584	4446	227747	27.9			
D2	1616	1152	35905.1	-0.2			
bl12							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	3829	237326	38.7	1.158	0.565	389.7
G	1584	3306	157134	27.5			
D2	1615	848	25800.7	-1.2			
b2							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	4668	403093	54.8	1.419	0.640	356.3
G	1590	3290	190832	26.9			
D2	1619	1331	36213.6	0.0			
TS0							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	19728	1057290	34.0	0.749	0.475	429.5
G	1583	26328	1076570	25.9			
D2	1621	3699	91061.1	7.6			

16DF21				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		390.8	19.4
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	16022	1138090	42.9	1.174	0.566	389.0
G	1581	13645	761170	33.3			
D2	1614	3550	110433	0.0			
02							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	18189	1173210	33.0	1.043	0.522	408.5
G	1576	17439	914537	28.0			
D2	1609	4292	157864	0.0			
04							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	25946	1632290	31.0	1.537	0.612	368.7
G	1583	16877	926002	25.6			
D2	1616	4446	108752	-0.2			
05							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1345	11457	822294	40.0	1.230	0.570	387.5
G	1578	9313	560351	26.9			
D2	1613	2161	60855	-0.1			

07							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	12342	769147	35.9	1.102	0.551	395.6
G	1583	11198	528685	25.8			
D2	1616	3321	97128.4	0.0			
08							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	13990	941377	41.5	1.377	0.635	358.3
G	1583	10163	421669	2.4			
D2	1616	4115	118925	0.5			
09							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	5424	296484	18.8	0.932	0.479	428.0
G	1579	5820	265729	22.2			
D2	1612	1785	57161.9	-0.1			
010							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	32518	2025050	39.1	1.359	0.583	381.7
G	1584	23935	1290430	31.8			
D2	1619	6116	159284	0.0			
011							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	23180	1365660	37.0	1.315	0.573	386.2
G	1583	17632	892147	28.1			
D2	1616	4533	126880	-0.2			
012							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	16856	1142050	42.7	0.946	0.521	409.3
G	1579	17824	918072	29.0			
D2	1613	4747	133259	0.1			
017							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	7261	437180	33.4	1.339	0.572	386.5
G	1585	5421	284506	31.6			
D2	1618	1345	42789.5	2.6			

16DF22				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		366.2	14.7
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	20574	1291030	28.4	1.595	0.649	352.3
G	1588	12899	591004	11.0			
D2	1622	4497	108232	0.1			
01							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	16241	-882781	-16.6	4.024	0.632	359.8
G	1613	4036	-118584	-0.1			
D2	1586	3911170	-395488	21.2			
04							

Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	8865	488021	17.8	1.543	0.638	357.0
G	1588	5744	233201	0.0			
D2	1622	1917	43483.7	0.0			
05							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	11594	601370	4.6	1.343	0.595	376.4
G	1586	8635	334133	4.1			
D2	1618	2895	76050.2	-0.1			
07							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	38225	2612550	37.9	1.589	0.634	358.7
G	1586	24057	1339790	22.1			
D2	1620	6815	165303	0.0			
08							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	16144	937122	19.0	1.418	0.620	365.3
G	1586	11384	462689	0.0			
D2	1620	4137	112561	0.0			
09							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	21893	1561550	40.0	1.638	0.636	357.9
G	1587	13368	798222	25.7			
D2	1621	3750	95086.1	0.1			
010							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	17063	1113390	35.6	1.541	0.633	359.2
G	1587	11071	536175	20.8			
D2	1619	3720	108360	0.0			
012							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	20449	1440090	39.7	1.230	0.567	388.5
G	1584	16627	1015290	32.4			
D2	1619	3571	82368.4	-0.1			
013							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	21145	1483180	38.7	1.684	0.641	355.6
G	1588	12553	726851	28.2			
D2	1621	3961	102278	0.0			
06							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	13135	646382	-0.1	3.317	0.548	397.1
G	1619	3960	82844.1	3.1			
D2	1585	11181	450135	0.5			

16DF24				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		364.1	10.5
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1346	6169	460566	47.5	1.557	0.606	371.2
G	1579	3963	263494	35.8			
D2	1615	1025	35586.9	4.3			
24-0							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	922	54116.5	33.3	1.497	0.610	369.7
G	1588	616	28574	14.6			
D2	1622	284	6062.14	0.8			
24-14							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1344	6272	461936	46.9	1.580	0.630	360.5
G	1576	3971	224259	27.7			
D2	1611	1247	46761	5.6			
24-1							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	664	39691.1	32.4	0.265	0.609	370.0
G	1589	2504	19382.3	-17.7			
D2	1619	319	6100.16	0.2			
24-18							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	4061	249614	36.9	1.869	0.629	361.2
G	1587	2172	122459	33.5			
D2	1620	781	24910	20.2			
24-20							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	3349	192487	30.7	1.985	0.652	350.9
G	1587	1687	89006.3	26.7			
D2	1621	562	13734.6	0.7			
24-22							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	4764	322571	42.3	1.558	0.587	379.9
G	1580	3057	203074	39.8			
D2	1613	717	24155	-0.3			
24-23							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	1565	97211	33.0	1.729	0.616	367.0
G	1584	905	40132.2	20.3			
D2	1610	450	20535	-0.1			
24-24							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	4835	320247	40.3	1.887	0.661	346.7
G	1585	2562	139895	24.6			
D2	1619	873	24031.4	0.4			

16DF27				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		382.9	18.9
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	5530	304293	15.8	1.497	0.549	396.5
G	1589	3693	176192	14.1			
D2	1622	1601	73372.7	29.2			
01							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	4599	256999	21.6	1.718	0.562	390.8
G	1588	2677	111765	0.1			
D2	1620	1488	88406.3	36.9			
05							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	17918	1646060	58.3	0.018	0.600	374.1
G	1585	998769	1253330	-40.1			
D2	1616	4809	-154730	-20.4			
07							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	13608	1156110	54.1	1.072	0.537	402.2
G	1585	12695	918861	44.0			
D2	1618	2999	79029.8	-0.1			
06							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	12382	985312	50.7	1.161	0.596	375.9
G	1585	10663	598703	35.7			
D2	1617	2781	69903.5	0.5			
08							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	15812	1275390	42.9	1.635	0.686	335.9
G	1593	9674	503070	7.2			
D2	1623	2749	81674.6	-0.2			
010							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	4645	404639	55.4	1.121	0.521	409.1
G	1588	4144	353415	54.0			
D2	1620	775	18284.3	0.0			
012							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	12420	553414	-4.1	1.432	0.562	390.7
G	1587	8671	360569	-0.2			
D2	1621	2922	70067.9	0.4			
013							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	23824	2048900	54.7	1.184	0.562	390.8
G	1585	20118	1446580	45.4			
D2	1616	5383	148849	0.0			
016							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	2992	187433	22.9	1.275	0.601	373.6

G	1590	2346	105224	-1.6			
D2	1624	801	19272.1	-2.9			
12							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	12331	986473	49.8	0.443	0.602	373.3
G	1581	27805	564053	-17.6			
D2	1615	3139	89084.4	0.2			
13							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	5774	281438	0.4	1.322	0.582	382.2
G	1592	4366	164919	3.4			
D2	1621	1713	37585.2	-0.7			

16DF29				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		360.0	16.8
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	4149	420593	59.3	1.427	0.645	353.9
G	1591	2908	190785	38.0			
D2	1617	1403	40478.7	0.0			
0							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	1653	138298	52.5	1.517	0.623	363.6
G	1592	1089	74653.1	43.5			
D2	1620	320	8864.16	0.0			
1							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	1142	91948.8	50.7	1.467	0.617	366.5
G	1589	778	46494.3	38.0			
D2	1617	322	10623.6	0.0			
2							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	2866	230938	51.1	1.548	0.633	359.3
G	1590	1851	121996	32.8			
D2	1622	462	11881.6	0.8			
3							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	2237	125430	35.5	0.930	0.651	351.2
G	1584	2405	86459.3	1.4			
D2	1619	896	-19276	0.1			
11							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	1409	104048	45.6	1.620	0.669	343.3
G	1594	870	45154.9	0.0			
D2	1623	589	6349.07	-5.3			
13							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	2687	212453	50.2	1.496	0.637	357.8
G	1590	1797	107575	28.4			

D2	1621	542	13750.4	-0.3			
14							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	1643	130792	49.8	1.494	0.703	328.3
G	1590	1100	66923.5	30.4			
D2	1620	457	-11562	0.0			
15							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	821	66156.8	45.7	1.103	0.557	393.2
G	1588	744	46320.8	35.3			
D2	1621	245	6331.45	0.1			
19							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	1775	144936	51.9	1.337	0.607	370.9
G	1591	1327	82332.1	31.8			
D2	1622	516	11487.6	0.1			
20							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	1769	182586	64.5	1.115	0.605	371.6
G	1590	1586	106648	33.2			
D2	1621	641	12351.9	-0.3			

16DF30				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		371.5	11.7
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	2785	178367	40.6	1.098	0.576	384.8
G	1587	2537	104944	17.8			
D2	1619	1121	26501.8	0.3			
3							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	3829	296587	49.1	1.170	0.573	385.9
G	1586	3273	193941	35.5			
D2	1620	1281	26866.9	0.0			
4							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	2547	178569	44.5	1.353	0.610	369.6
G	1589	1882	94532.3	23.4			
D2	1620	837	19684.5	-2.1			
5							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	2474	151526	38.8	1.369	0.623	363.7
G	1588	1807	72664	4.6			
D2	1621	862	18997.4	1.1			
8							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1353	755	41344.9	34.8	1.115	0.566	389.3
G	1588	677	24132.9	13.4			
D2	1619	369	7621.43	0.0			

10							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	1602	87337.8	34.6	1.210	0.579	383.3
G	1587	1324	51472.8	14.4			
D2	1620	576	11991.5	0.3			
14							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	1478	109452	38.6	1.265	0.613	368.3
G	1591	1168	59452.3	10.7			
D2	1623	506	9705.75	0.2			
16							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	679	50309.5	47.1	1.852	0.645	353.9
G	1593	367	22105.5	26.9			
D2	1620	239	5551.81	11.6			
17							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	1089	71022.1	25.1	1.633	0.635	358.5
G	1591	667	34152.4	13.8			
D2	1621	279	6686.19	0.0			
19							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	2284	180963	50.3	1.282	0.609	369.9
G	1587	1781	100599	30.6			
D2	1620	636	15461.8	-1.3			
20							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	3118	240709	48.9	1.521	0.629	360.9
G	1591	2049	126724	31.3			
D2	1621	589	14994.9	0.6			
21							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	4088	296710	45.8	1.382	0.608	370.3
G	1586	2957	164267	23.0			
D2	1620	1157	26695.8	0.3			

16DF38				Method:	Beyssac et al. 2002		
					avg T	std dev	
				Avg each run	361.7	18.3	
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	9505	661973	37.1	1.343	0.571	387.0
G	1590	7080	448209	33.5			
D2	1621	2035	49464.7	0.2			
0							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	9537	667551	38.2	1.321	0.556	393.4
G	1589	7219	476732	41.4			
D2	1619	2095	55544.7	0.0			
01							

Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	8848	641190	42.5	1.752	0.636	358.1
G	1586	5051	287022	35.9			
D2	1614	2159	80488.1	0.3			
03							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	3808	286502	45.5	1.590	0.631	360.2
G	1592	2394	152499	30.8			
D2	1620	596	15081	-0.3			
04							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	5531	398009	41.0	1.538	0.631	360.0
G	1591	3596	209308	21.5			
D2	1623	970	23008.3	0.2			
05							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	7746	545803	40.3	1.596	0.627	362.0
G	1590	4855	288246	28.5			
D2	1622	1486	36352.8	-0.1			
06							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	4503	324662	42.5	1.430	0.614	367.8
G	1589	3149	182645	26.6			
D2	1622	888	21496.5	-0.2			
07							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	5806	427217	44.2	1.442	0.608	370.7
G	1590	4027	253004	32.3			
D2	1623	995	23009.8	0.0			
07							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	5825	428767	44.4	1.474	0.627	362.0
G	1590	3951	223465	28.8			
D2	1622	1155	31709.5	0.1			
08							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	7308	599728	50.6	1.701	0.657	348.4
G	1590	4297	251707	27.0			
D2	1620	1666	60710.6	23.0			
09							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	11094	763334	40.2	1.551	0.631	360.1
G	1589	7153	395205	21.0			
D2	1622	2159	50810.7	0.1			
011							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	7720	658566	53.5	1.664	0.728	316.9
G	1589	4639	298585	38.6			
D2	1617	1604	-52941	-0.2			
012							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)

D1	1352	4383	269211	25.8	1.599	0.641	355.9
G	1591	2740	131421	6.3			
D2	1623	696	19515.8	2.9			

16DF39				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		371.3	29.3
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	16118	1115050	31.8	1.264	0.593	377.3
G	1585	12747	636421	0.4			
D2	1619	4206	129921	10.2			
00							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	14482	1047840	36.1	1.251	0.609	370.2
G	1585	11574	509901	0.0			
D2	1618	4983	163892	-0.1			
0							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1354	2846	209250	41.8	0.000	0.474	430.2
G	1588	#####	201164	-45.3			
D2	1618	946	31267.5	20.8			
001							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	2429	154373	24.6	1.235	0.536	402.3
G	1589	1967	115347	34.5			
D2	1620	620	18118.5	-0.1			
002							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	9081	636710	38.9	1.143	0.525	407.3
G	1585	7946	477328	36.9			
D2	1616	2574	98413.1	6.4			
003							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	3432	271006	50.0	1.551	0.668	343.7
G	1589	2212	119028	6.7			
D2	1620	586	15609.3	-0.5			
004							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	8972	711378	49.8	1.515	0.611	369.0
G	1589	5923	415098	39.7			
D2	1620	1565	37461.7	-0.4			
005							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	16169	1343140	52.6	1.318	0.597	375.4
G	1585	12264	844327	33.3			
D2	1618	2457	63271.1	0.0			
006							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1343	21943	2409790	69.7	1.704	0.664	345.4

G	1579	12880	995709	44.7			
D2	1606	5206	222233	0.1			
007							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1343	23250	2590720	70.7	1.602	0.705	327.2
G	1587	14517	1010330	17.1			
D2	1616	1834	72859.5	21.4			
008							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	12136	937250	49.0	1.313	0.592	377.7
G	1586	9246	574525	36.4			
D2	1617	2446	72245	0.1			
009							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	4783	372859	49.5	1.740	0.677	339.7
G	1590	2749	160795	25.5			
D2	1620	768	17027.5	7.0			
011							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	5208	189581	-11.6	2.342	0.628	361.5
G	1589	2224	92222.5	-1.5			
D2	1620	697	20014.2	2.7			

02DF15				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		356.2	27.9
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	4513	472881	65.8	1.348	0.731	315.9
G	1605	3347	161880	0.4			
D2	1621	461	12449.9	13.6			
01							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1344	2676	212481	49.4	1.487	0.636	358.1
G	1585	1800	99204.2	-0.2			
D2	1617	691	22518.2	20.5			
03							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	35522	2882150	41.1	1.638	0.569	387.8
G	1591	21686	1476910	41.9			
D2	1612	18640	706855	3.8			
05							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	23317	1786280	43.6	1.842	0.611	369.0
G	1587	12660	813724	40.1			
D2	1612	9121	322322	-1.4			
07							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1346	24459	2284080	55.1	16.390	0.708	326.1
G	1616	1492	28182.4	0.9			

D2	1597	16056	915401	-0.4			
08							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	13728	1124480	47.0	1.733	0.595	376.3
G	1589	7924	557294	44.2			
D2	1613	5858	208855	-0.1			
09							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	5459	358639	18.4	1.614	0.559	392.4
G	1582	3382	194695	26.2			
D2	1610	2440	88680.1	-0.4			
011							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	9299	784622	48.1	1.617	0.648	352.5
G	1596	5751	357056	27.7			
D2	1619	2238	68557.4	-0.7			
012							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	35304	3099950	53.6	1.415	0.704	327.8
G	1599	24944	1277580	-3.9			
D2	1619	1812	26255.8	-0.4			

10DF15	Method:	Lahfid et al. (2010)		RA1		RA2	
				avg T	std dev	avg T	std dev
		Avg each run		320.0	15.5	322.1	20.5
		Avg RA1,RA2		T (°C)	321.0	std dev	18.0
2					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.657	1.915	351.4
D4	1253	2759	1097890	253.4			
D1	1346	28381	3269570	73.3			
D3	1541	2652	429968	103.2			
G	1598	24090	1366830	36.1			
D2	1617	13688	483816	22.5			
3					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.632	1.720	320.6
D4	1314	2208	348741	100.6			
D1	1349	8346	808985	61.7			
D3	1564	1041	97147.4	59.4			
G	1600	7668	381408	31.7			
D2	1619	6492	194663	19.1			
4					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.617	1.611	301.5
D4	1348	9845	1017220	65.8			
D1	1316	2245	472797	134.0			
D3	1549	1171	183638	99.8			
G	1600	9771	548662	35.7			
D2	1619	5954	192476	20.6			
7					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.615	1.600	299.5

D4	1352	7977	728437	58.1			
D1	1327	5147	777526	96.2			
D3	1563	1157	141706	78.0			
G	1600	10848	565708	33.2			
D2	1619	7472	233755	19.9			
8					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.629	1.698	317.0
D4	1354	6187	451460	46.5			
D1	1324	3853	365741	60.4			
D3	1593	5023	172621	21.9			
G	1620	6377	148059	14.8			
D2	1606	6008	160527	17.0			
0					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.636	1.749	325.5
D4	1351	8844	793450	57.1			
D1	1322	3481	453526	82.9			
D3	1580	2285	111223	31.0			
G	1601	8830	362947	26.2			
D2	1618	7748	238920	19.6			
1					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.631	1.713	319.5
D4	1351	9847	865942	56.0			
D1	1323	4020	511428	81.0			
D3	1587	3801	212531	35.6			
G	1603	9138	365338	25.5			
D2	1619	7558	226171	19.1			
12					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.645	1.813	336.0
D4	1338	8372	1464200	111.3			
D1	1348	9590	820504	54.5			
D3	1577	4573	342274	47.6			
G	1600	14101	609893	27.5			
D2	1618	10022	307680	19.5			
11					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.633	1.728	322.0
D4	1346	16539	2087620	80.4			
D1	1262	1965	820762	265.9			
D3	1540	2268	398286	111.8			
G	1599	15055	965665	40.8			
D2	1617	8845	319129	23.0			
3					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.647	1.833	339.0
D4	1294	723	97192.6	85.6			
D1	1346	9263	1047200	72.0			
D3	1573	1199	102537	54.5			
G	1619	6560	186663	18.1			
D2	1600	7399	335270	28.8			
31					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.638	1.759	327.2
D4	1263	7922	3822480	307.2			
D1	1345	57087	6971250	77.7			

D3	1527	9115	1837200	128.3			
G	1595	47717	3174640	42.4			
D2	1614	27100	1124320	26.4			
32					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.650	1.858	342.9
D4	1299	6759	3124610	294.3			
D1	1345	41817	4768900	72.6			
D3	1536	6606	1137550	109.6			
G	1595	34788	2263440	41.4			
D2	1615	20869	847137	25.8			
204					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.626	1.674	312.8
D4	1291	608	225841	236.5			
D1	1347	4971	571430	73.2			
D3	1522	515	114169	141.3			
G	1618	2418	83174.9	21.9			
D2	1600	4486	278825	39.6			
202					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.623	1.656	309.5
D4	1321	857	128033	95.1			
D1	1351	2408	222560	58.8			
D3	1560	248	20820.8	53.4			
G	1620	1882	57453.5	19.4			
D2	1600	2594	133490	32.8			
205					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.612	1.577	295.3
D4	1357	4175	251775	38.4			
D1	1330	4359	365316	53.3			
D3	1590	3311	108861	20.9			
G	1618	4442	123283	17.7			
D2	1604	5653	159081	17.9			
208					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.634	1.733	322.9
D4	1331	1817	173269	60.7			
D1	1356	2040	138261	43.1			
D3	1591	1562	60210	-24.5			
G	1605	2303	71084.3	19.7			
D2	1620	1861	48461.2	16.6			
2010					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.633	1.726	321.7
D4	1325	1642	141434	54.8			
D1	1354	2410	163195	43.1			
D3	1593	2135	73691.9	-22.0			
G	1608	2430	61525.9	16.1			
D2	1621	1959	41274.7	13.4			
2011					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.613	1.583	296.3
D4	1327	1587	125622	50.4			
D1	1354	2588	167121	41.1			
D3	1589	1429	45321.8	20.2			
G	1619	2584	66034.4	16.3			

D2	1604	2580	73565.4	18.2			
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18DF15	Method:	Lahfid et al. (2010)		RA1		RA2	
				avg T	std dev	avg T	std dev
		Avg each run		335.7	16.3	343.3	22.2
		Avg RA1,RA2		T (°C)	339.5	std dev	19.2
0					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.660	1.945	355.8
D4	1289	6613	3152790	303.5			
D1	1345	34037	4008790	75.0			
D3	1527	4844	941661	123.8			
G	1593	27374	1877050	43.7			
D2	1612	19860	863446	27.7			
01					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.650	1.858	343.0
D4	1295	7318	3009660	261.8			
D1	1342	34516	4242690	78.3			
D3	1522	4817	861739	113.9			
G	1587	29309	2082220	45.2			
D2	1608	20752	958360	29.4			
02					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.646	1.821	337.1
D4	1290	9908	4058270	260.8			
D1	1344	57229	6140460	68.3			
D3	1525	6723	1240740	117.5			
G	1592	45324	3038890	42.7			
D2	1612	32047	1321230	26.2			
03					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.645	1.816	336.4
D4	1299	5797	2367160	260.0			
D1	1343	43444	4291530	62.9			
D3	1529	3966	689139	110.6			
G	1587	27308	1925900	44.9			
D2	1609	22753	1051230	29.4			
04					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.661	1.948	356.2
D4	1275	6032	2699200	284.9			
D1	1347	35417	3710230	66.7			
D3	1526	3815	731094	122.0			
G	1598	29862	1878570	40.0			
D2	1616	17998	680591	24.1			
05					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.625	1.665	311.2
D4	1222	1931	579239	191.0			
D1	1342	14033	2142510	97.2			
D3	1526	2139	416013	123.8			
G	1599	14379	882386	39.1			
D2	1616	8758	336248	24.4			
06					RA1	RA2	T (°C)

Peak	Location	Amplitude	Area	FWHM	0.643	1.802	334.2
D4	1260	4731	2012530	270.8			
D1	1341	25101	3612950	91.6			
D3	1516	4102	844125	131.0			
G	1588	20307	1482870	46.5			
D2	1608	16494	794440	30.7			
07					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.647	1.834	339.2
D4	1270	12158	5227930	273.7			
D1	1345	64050	7628670	75.8			
D3	1525	8787	1793140	129.9			
G	1596	58587	3793420	41.2			
D2	1614	35882	1422100	25.2			
08					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.653	1.885	347.0
D4	1259	1399	594581	270.6			
D1	1346	8718	996481	72.8			
D3	1535	1022	200957	125.2			
G	1600	8012	472210	37.5			
D2	1617	4685	170755	23.2			
09					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.655	1.900	349.2
D4	1267	4821	2099580	277.3			
D1	1346	29032	3148320	69.0			
D3	1528	3218	645637	127.7			
G	1599	25707	1579300	39.1			
D2	1617	14669	537086	23.3			
010					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.651	1.864	343.8
D4	1260	3739	1712410	291.6			
D1	1347	20917	2604910	79.3			
D3	1526	2786	562080	128.4			
G	1599	20612	1304540	40.3			
D2	1617	11711	449139	24.4			
1					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.648	1.837	339.6
D4	1260	1979	819505	263.6			
D1	1346	13188	1611120	77.8			
D3	1531	1613	295364	116.6			
G	1599	12091	752166	39.6			
D2	1617	7331	275675	23.9			
11					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.635	1.739	324.0
D4	1238	3106	1215500	249.1			
D1	1339	21836	3755680	109.5			
D3	1517	3856	760087	125.5			
G	1585	17919	1319830	46.9			
D2	1605	15106	777918	32.8			
12					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.614	1.590	297.7
D4	1246	4955	1708120	219.5			

D1	1340	33210	5081540	97.4			
D3	1589	27224	1887120	44.1			
G	1515	5401	1112340	131.1			
D2	1608	27764	1269970	29.1			
13					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.632	1.719	320.6
D4	1267	3051	903521	188.5			
D1	1344	25516	3639550	90.8			
D3	1545	3503	531257	96.6			
G	1596	23936	1417720	37.7			
D2	1614	17656	693482	25.0			

23DF15	Method:	Lahfid et al. (2010)		RA1		RA2	
				avg T	std dev	avg T	std dev
		Avg each run		323.4	17.6	326.6	23.7
		Avg RA1,RA2		T (°C)	325.0	std dev	20.6
02					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.638	1.761	327.5
D4	1282	378	65798.9	110.8			
D1	1348	5535	521661	60.0			
D3	1585	1664	102019	39.0			
G	1602	3594	138434	24.5			
D2	1619	2904	93113.8	20.4			
03					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.659	1.931	353.8
D4	1298	776	266791	218.9			
D1	1349	7263	707138	62.0			
D3	1573	1129	114368	64.5			
G	1601	5516	275458	31.8			
D2	1619	3569	114556	20.4			
05					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.644	1.810	335.3
D4	1284	1043	455077	277.8			
D1	1346	12309	1315750	68.1			
D3	1561	1585	211690	85.0			
G	1600	10288	537872	33.3			
D2	1618	6787	229039	21.5			
06					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.636	1.748	325.4
D4	1259	217	65853.7	193.3			
D1	1347	5025	500118	63.4			
D3	1585	1573	112693	45.6			
G	1603	3371	135404	25.6			
D2	1619	2404	75623.8	20.0			
07					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.639	1.772	329.3
D4	1322	844	230712	174.1			
D1	1347	6183	607260	62.5			
D3	1570	909	94951.2	66.5			

G	1600	5255	261394	31.7			
D2	1619	3655	116599	20.3			
08					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.623	1.653	309.0
D4	1333	712	150984	135.0			
D1	1348	4648	435783	59.7			
D3	1583	1432	116500	51.8			
G	1603	3676	167696	29.0			
D2	1620	2371	70819.2	19.0			
03					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.615	1.596	298.7
D4	1268	1347	477048	225.5			
D1	1346	13138	1417430	68.7			
D3	1527	1444	330010	145.5			
G	1599	10521	648128	39.2			
D2	1618	5928	208879	22.4			
010					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.622	1.648	308.2
D4	1292	343	42198.7	78.2			
D1	1348	5214	498133	60.8			
D3	1581	1322	89889.3	43.3			
G	1601	3517	147313	26.7			
D2	1618	2832	90646.6	20.4			
011					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.630	1.704	318.0
D4	1273	1292	494906	243.9			
D1	1346	13073	1456050	70.9			
D3	1543	1460	248282	108.3			
G	1600	11409	629830	35.1			
D2	1617	7670	266700	22.1			

26DF15	Method:	Lahfid et al. (2010)		RA1		RA2	
				avg T	std dev	avg T	std dev
		Avg each run		280.1	15.2	273.6	17.2
		Avg RA1,RA2		T (°C)	276.8	std dev	16.2
3					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.597	1.483	276.9
D4	1247	1371	440510	204.5			
D1	1347	11818	1719310	92.6			
D3	1531	2119	461964	138.8			
G	1599	11110	717248	41.1			
D2	1617	7131	276983	24.7			
31					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.619	1.623	303.8
D4	1267	673	81521.6	77.1			
D1	1342	12010	1840520	97.6			
D3	1581	5497	433253	50.2			
G	1602	11514	478004	26.4			
D2	1618	8778	272693	19.8			

33					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.603	1.520	284.3
D4	1285	1621	186573	73.3			
D1	1345	14866	2001730	85.7			
D3	1583	8546	555115	41.4			
G	1602	14900	578103	24.7			
D2	1618	10522	306138	18.5			
38					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.587	1.419	263.5
D4	1352	1928	134136	44.3			
D1	1326	1525	158571	66.2			
D3	1589	1287	55126.4	27.3			
G	1604	2559	83250.6	20.7			
D2	1618	2157	67874.8	20.0			
32					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.593	1.459	272.0
D4	1324	7311	887486	77.3			
D1	1357	7662	713051	59.2			
D3	1587	7612	389740	32.6			
G	1605	13034	446888	21.8			
D3	1619	9516	260050	17.4			

27DF15	Method:	Lahfid et al. (2010)		RA1		RA2	
				avg T	std dev	avg T	std dev
		Avg each run		341.2	24.9	352.2	34.6
		Avg RA1,RA2		T (°C)	346.7	std dev	29.8
012					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.655	1.895	348.5
D4	1248	3433	1441280	267.3			
D1	1345	28514	3566140	79.6			
D3	1538	3512	628889	114.0			
G	1597	24227	1468580	38.6			
D2	1616	14833	544751	23.4			
0					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.660	1.945	355.9
D4	1247	5270	2289210	276.5			
D1	1344	47577	5283730	70.7			
D3	1530	4921	872083	112.8			
G	1594	33419	2110110	40.2			
D2	1614	22924	910615	25.3			
01					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.645	1.820	337.0
D4	1229	4189	1512470	229.8			
D1	1342	41295	5486400	84.6			
D3	1594	34583	2047540	37.7			
G	1612	24541	952315	24.7			
D2	1541	5206	846121	103.5			
02					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.642	1.790	332.2

D4	1229	2450	788542	204.9			
D1	1344	22902	2971290	82.6			
D3	1539	2752	491239	113.6			
G	1598	19990	1162540	37.0			
D2	1616	12445	446596	22.8			
05					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.660	1.944	355.6
D4	1225	3551	1309700	234.8			
D1	1343	46318	5353290	73.6			
D3	1569	8271	752274	57.9			
G	1596	34147	1692290	31.6			
D2	1614	26488	983038	23.6			
06					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.678	2.106	377.8
D4	1286	1299	622539	305.1			
D1	1346	9768	1276270	83.2			
D3	1575	2595	253607	62.2			
G	1601	9153	437748	30.4			
D2	1618	6286	210206	21.3			
07					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.645	1.818	336.7
D4	1235	3696	1276800	219.9			
D1	1344	39804	5302290	84.8			
D3	1539	4858	721718	94.6			
G	1596	33072	1980470	38.1			
D2	1614	23848	916865	24.5			
08					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.669	2.020	366.4
D4	1313	6422	2885380	286.0			
D1	1346	25768	3493260	86.3			
D3	1546	5237	875365	106.4			
G	1594	23333	1515010	41.3			
D2	1613	18377	767232	26.6			
09					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.650	1.859	343.1
D4	1288	3561	1579810	282.4			
D1	1344	28035	4031620	91.6			
D3	1567	8064	876738	69.2			
G	1596	27143	1434120	33.6			
D2	1614	19224	707400	23.4			
010					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.604	1.522	284.6
D4	1226	4855	1593620	209.0			
D1	1342	38139	6593160	110.1			
D3	1521	8026	1830090	145.2			
G	1590	31952	2328760	46.4			
D2	1609	25856	1219540	30.0			
011					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.623	1.653	309.2
D4	1253	2103	597426	180.8			
D1	1345	25072	4300750	109.2			

D3	1548	5397	872283	102.9			
G	1593	22166	1407380	40.4			
D2	1613	16663	682755	26.1			
013					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.654	1.888	347.4
D4	1273	5005	2223940	282.9			
D1	1345	33777	4393420	82.8			
D3	1536	4842	899114	118.2			
G	1595	28497	1811770	40.5			
D2	1615	19933	794952	25.4			

28DF15	Method:	Lahfid et al. (2010)		RA1		RA2	
				avg T	std dev	avg T	std dev
		Avg each run		300.1	14.4	296.8	17.7
		Avg RA1,RA2		T (°C)	298.4	std dev	16.0
0					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.620	1.628	304.7
D4	1213	2495	624504	159.3			
D1	1344	30442	5289460	110.6			
D3	1536	5471	1050340	122.2			
G	1598	26835	1716330	40.7			
D2	1616	21527	865204	25.6			
01					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.625	1.664	311.1
D4	1209	1551	323956	133.0			
D1	1343	22365	3538920	100.7			
D3	1548	3411	552973	103.2			
G	1600	21191	1190370	35.8			
D2	1617	15531	577657	23.7			
02					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.639	1.767	328.5
D4	1206	1008	207657	131.1			
D1	1342	14441	2226010	98.1			
D3	1558	2306	307687	84.9			
G	1601	14336	746235	33.1			
D2	1618	9385	323349	21.9			
04					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.604	1.526	285.4
D4	1214	673	127247	120.3			
D1	1343	13051	2118340	103.3			
D3	1548	2385	374776	100.0			
G	1598	12089	700302	36.9			
D2	1616	10050	396650	25.1			
07					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.625	1.665	311.3
D4	1208	896	208689	148.2			
D1	1343	12376	1962130	100.9			
D3	1543	1803	312525	110.4			
G	1600	11900	690175	36.9			

D2	1617	8169	300717	23.4			
08					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.609	1.554	290.9
D4	1208	3307	737019	141.9			
D1	1343	34060	5580420	104.3			
D3	1534	5932	1238770	133.0			
G	1600	32735	1998150	38.9			
D2	1617	21594	827585	24.4			
09					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.608	1.552	290.5
D4	1206	2966	761227	163.4			
D1	1343	30767	5273130	109.1			
D3	1527	5791	1249450	137.4			
G	1596	24861	1722870	44.1			
D2	1614	20552	914546	28.3			
10					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.615	1.596	298.7
D4	1208	3426	810727	150.6			
D1	1343	41927	6912070	105.0			
D3	1534	7026	1352120	122.5			
G	1600	39292	2429310	39.4			
D2	1617	27631	1057740	24.4			
11					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.616	1.602	299.9
D4	1206	3042	743881	155.7			
D1	1343	32168	5257670	104.1			
D3	1532	5459	1087960	126.9			
G	1600	29881	1837860	39.2			
D2	1616	21173	820348	24.7			
03					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.600	1.499	280.1
D4	1209	3054	567460	118.3			
D1	1342	48418	7809990	102.7			
D3	1539	8117	1506510	118.2			
G	1600	48949	2935810	38.2			
D2	1617	30969	1145720	23.6			

31DF15				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		347.8	11.2
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	25291	1995610	46.9	1.849	0.704	327.8
G	1595	13682	637924	13.4			
D2	1621	6890	201798	0.2			
0							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	17327	1352670	44.1	1.749	0.656	349.0
G	1595	9906	605726	25.4			
D2	1620	3798	103240	0.4			

02							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	7291	562340	47.2	1.778	0.676	340.3
G	1591	4100	205401	20.2			
D2	1617	2286	64573.4	0.4			
01							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	19975	1609340	50.4	1.807	0.681	337.8
G	1596	11052	612061	23.1			
D2	1621	4993	140936	-0.1			
03							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	11655	814485	41.0	1.724	0.687	335.5
G	1600	6760	354365	0.0			
D2	1624	1154	17423.1	5.1			
04							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	5627	317465	0.4	1.541	0.626	362.4
G	1600	3652	173900	0.9			
D2	1622	937	15753.6	5.4			
05							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	4035	221897	-0.1	1.638	0.642	355.4
G	1594	2464	95781.9	7.9			
D2	1618	1249	28112.3	-0.1			
06							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	16707	1232490	41.8	1.750	0.694	332.3
G	1599	9548	510073	0.0			
D2	1622	1745	34334	8.4			
08							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	4772	260389	-0.2	1.581	0.633	359.4
G	1601	3018	140026	-0.8			
D2	1622	635	11077.1	6.9			
010							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	7865	474847	7.1	1.640	0.641	355.8
G	1600	4797	252268	-0.1			
D2	1621	774	13769.2	0.0			
011							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	4742	249055	-0.4	1.741	0.637	357.7
G	1600	2723	131566	1.1			
D2	1622	704	10533.5	6.4			
012							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	3919	209867	0.0	1.902	0.663	346.0
G	1593	2060	68056.2	-0.2			
D2	1619	1540	38693	0.2			
013							

Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	4084	215816	0.0	1.638	0.645	354.2
G	1597	2494	94972.6	-0.2			
D2	1622	1045	24026.3	-0.2			
014							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D2	1350	4204	225848	-0.1	1.722	0.641	355.8
G	1596	2441	87577	9.5			
D2	1619	2760	38921.3	-4.5			

39DF15	Method:	Lahfid et al. (2010)		RA1		RA2	
				avg T	std dev	avg T	std dev
		Avg each run		318.8	31.8	322.4	41.9
		Avg RA1,RA2		T (°C)	320.6	std dev	36.8
0					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.590	1.441	268.1
D4	1328	3955	359687	57.9			
D1	1355	4002	256524	40.8			
D3	1593	4123	138654	21.4			
G	1607	6650	181565	-17.4			
D2	1621	4462	107445	15.3			
3					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.630	1.700	317.2
D4	1293	800	142824	113.7			
D1	1346	8136	811973	63.5			
D3	1593	4282	255055	37.9			
G	1608	5828	213729	23.3			
D2	1622	3492	93003.2	17.0			
4					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.656	1.908	350.4
D4	1237	837	174828	133.0			
D1	1344	8459	1159110	87.2			
D3	1578	1960	170654	55.4			
G	1603	8326	363565	27.8			
D2	1619	5289	164909	19.8			
5					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.655	1.896	348.6
D4	1302	1768	711409	256.2			
D1	1346	11580	1254650	69.0			
D3	1551	1344	210742	99.9			
G	1601	10825	594552	35.0			
D2	1619	6727	231872	21.9			
6					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.610	1.564	292.7
D4	1334	1945	154509	50.6			
D1	1357	1391	75599.9	34.6			
D3	1596	2275	80022.3	22.4			
G	1611	1987	44960.7	14.4			
D2	1622	1189	22164.7	-11.9			

7					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.595	1.467	273.6
D4	1333	1266	80913.2	40.7			
D1	1357	1305	64039.2	31.3			
D3	1589	759	17319.3	14.5			
G	1604	1695	48829.9	18.3			
D2	1618	1253	32644.3	16.6			
8					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.633	1.728	322.0
D4	1325	2026	195361	61.4			
D1	1353	3391	210162	39.5			
D3	1587	1152	30324.6	16.8			
G	1602	2959	86987.2	18.7			
D2	1616	3174	117405	23.6			
9					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.626	1.672	312.5
D4	1221	2031	482695	151.3			
D1	1342	22914	3316780	92.2			
D3	1547	3119	462066	94.3			
G	1599	22799	1234660	34.5			
D2	1616	16327	575460	22.4			
10					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.674	2.066	372.6
D4	1294	1634	624682	243.3			
D1	1347	13323	1328950	63.5			
D3	1564	1413	158738	71.5			
G	1601	10854	557651	32.7			
D2	1618	6885	229226	21.2			
11					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.617	1.610	301.3
D4	1331	4065	463723	72.6			
D1	1354	4211	326084	49.3			
D3	1595	4709	219892	29.7			
G	1609	5701	172875	19.3			
D2	1622	3889	97898.6	16.0			
12					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.652	1.872	345.0
D4	1241	3889	1572660	257.4			
D1	1346	30365	3355090	70.3			
D3	1530	3257	644870	126.0			
G	1618	15488	555796	22.8			
D2	1600	24689	1431650	36.9			
13					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.634	1.729	322.2
D4	1229	1806	584681	206.1			
D1	1342	15143	2386480	100.3			
D3	1532	2799	496658	113.0			
G	1591	11494	757661	42.0			
D2	1610	10545	464141	28.0			

41DF15	Method:	Lahfid et al. (2010)		RA1		RA2	
				avg T	std dev	avg T	std dev
		Avg each run		316.9	22.4	318.6	28.6
		Avg RA1,RA2		T (°C)	317.8	std dev	25.5
0					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.636	1.748	325.4
D4	1235	4404	1734790	250.8			
D1	1345	34465	4073680	75.2			
D3	1527	4376	912365	132.7			
G	1601	32105	1844230	36.6			
D2	1618	16968	565906	21.2			
01					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.620	1.630	305.0
D4	1219	4414	1372220	197.9			
D1	1344	39482	4793710	77.3			
D3	1528	5076	1115800	139.9			
G	1602	36294	2052560	36.0			
D2	1618	18783	614606	20.8			
02					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.619	1.621	303.4
D4	1219	5918	1836900	197.6			
D1	1344	51085	6441000	80.3			
D3	1525	7022	1550910	140.6			
G	1601	47393	2724780	36.6			
D2	1618	24680	829796	21.4			
04					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.596	1.477	275.6
D4	1346	48337	3292080	43.4			
D1	1327	5451	419227	49.0			
D3	1583	23200	1444480	39.6			
G	1616	15601	419745	17.1			
D2	1600	17659	648810	23.4			
11					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.649	1.851	341.8
D4	1355	6780	345965	32.5			
D1	1342	8694	579526	42.4			
D3	1590	5594	265696	30.2			
G	1621	3906	96276.7	15.7			
D2	1605	4077	137988	21.5			
12					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.643	1.799	333.6
D4	1341	6017	369534	39.1			
D1	1356	5784	284937	31.4			
D3	1606	3589	111012	19.7			
G	1590	4315	178627	26.4			
D2	1621	3225	74196	14.6			
13					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.640	1.781	330.7
D4	1353	8094	472662	37.2			
D1	1340	4616	331640	45.7			

D3	1593	5621	283994	32.2			
G	1623	3109	67360.4	13.8			
D2	1609	3245	100300	19.7			
14					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.608	1.551	290.3
D4	1231	2013	506899	160.3			
D1	1342	13594	1974060	92.4			
D3	1602	16764	918631	34.9			
G	1525	2029	426721	133.9			
D2	1617	7787	254030	20.8			
15					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.616	1.604	300.3
D4	1233	1196	301476	160.5			
D1	1342	7958	1131870	90.6			
D3	1602	8896	485961	34.8			
G	1524	1101	213250	123.3			
D2	1616	5441	194234	22.7			
16					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.608	1.553	290.7
D4	1342	12219	1788970	93.2			
D1	1231	1887	466029	157.2			
D3	1521	1782	366246	130.9			
G	1616	9072	328660	23.1			
D2	1601	13701	756701	35.2			
18					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.631	1.713	319.4
D4	1316	791	100575	80.9			
D1	1349	3803	321533	53.8			
D3	1607	2905	91450.3	20.0			
G	1593	2181	100573	29.4			
D2	1621	2117	54454.1	16.4			
110					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.648	1.844	340.8
D4	1341	9848	595794	38.5			
D1	1357	6860	334890	31.1			
D3	1605	4971	153214	19.6			
G	1588	5979	232831	24.8			
D2	1621	4928	118624	15.3			
111					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.648	1.840	340.1
D4	1340	10276	768695	47.6			
D1	1353	10624	606275	36.3			
D3	1606	5769	180916	20.0			
G	1590	8605	408027	30.2			
D2	1621	6389	158298	15.8			
112					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.648	1.840	340.1
D4	1341	10771	739251	43.7			
D1	1354	8775	494696	35.9			
D3	1606	5134	157536	19.5			
G	1589	7884	373059	30.1			

D2	1621	5757	140088	15.5			
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43DF15	Method:	Lahfid et al. (2010)		RA1		RA2	
				avg T	std dev	avg T	std dev
		Avg each run		296.8	29.1	294.2	35.4
		Avg RA1,RA2		T (°C)	295.5	std dev	32.3
44					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.649	1.852	341.9
D4	1244	1551	392648	161.2			
D1	1340	20328	2578360	80.7			
D3	1590	10727	582759	34.6			
G	1605	18706	621291	21.1			
D2	1619	14181	400339	18.0			
11					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.621	1.638	306.4
D4	1255	811	132189	103.7			
D1	1344	12340	1873990	96.7			
D3	1572	4323	411402	60.6			
G	1599	11806	551738	29.8			
D2	1616	8022	261684	20.8			
12					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.647	1.830	338.6
D4	1264	1441	522366	230.7			
D1	1343	14379	1941730	86.0			
D3	1571	3154	330242	66.7			
G	1599	14034	704663	32.0			
D2	1616	9019	311608	22.0			
13					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.608	1.554	290.7
D4	1326	6133	726776	75.4			
D1	1354	7940	685902	55.0			
D3	1587	5732	280492	31.2			
G	1603	10321	360396	22.2			
D2	1618	8649	268406	19.8			
14					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.605	1.529	286.0
D4	1330	10561	1195050	72.0			
D1	1357	8202	642985	49.9			
D3	1589	9256	446672	30.7			
G	1605	14291	470138	20.9			
D2	1619	10150	285370	17.9			
111					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.579	1.378	254.5
D4	1358	6399	364900	36.3			
D1	1329	6735	515424	48.7			
D3	1591	6504	206927	20.3			
G	1619	7533	185633	15.7			
D2	1605	9381	246403	16.7			
17					RA1	RA2	T (°C)

Peak	Location	Amplitude	Area	FWHM	0.591	1.444	268.8
D4	1357	4651	301066	41.2			
D1	1326	5091	478464	59.8			
D3	1590	5779	187844	20.7			
G	1606	8275	229225	17.6			
D2	1618	5545	122744	14.1			
110					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.592	1.451	270.2
D4	1357	7501	526682	44.7			
D1	1328	8338	826776	63.1			
D3	1582	4404	168558	24.4			
G	1617	9574	306631	20.4			
D2	1601	12132	457617	24.0			
4					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.612	1.578	295.3
D4	1330	17038	1950500	72.9			
D1	1359	10547	800837	48.3			
D3	1588	12538	576796	29.3			
G	1604	22316	705639	20.1			
D2	1619	17062	461603	17.2			
45					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.628	1.689	315.3
D4	1303	1469	219935	95.3			
D1	1345	9591	1006780	66.8			
D3	1589	5840	271321	29.6			
G	1605	8855	280366	20.2			
D2	1619	6664	174794	16.7			

44DF15	Method:	Lahfid et al. (2010)		RA1		RA2	
				avg T	std dev	avg T	std dev
		Avg each run		309.7	28.0	309.9	33.8
		Avg RA1,RA2		T (°C)	309.8	std dev	30.9
2					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.602	1.512	282.7
D4	1229	164	44904	174.7			
D1	1345	1996	351916	112.3			
D3	1534	378	80198.6	135.0			
G	1601	2183	142098	41.4			
D2	1618	1120	40092.1	22.8			
3					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.639	1.769	328.8
D4	1264	305	31805.3	66.4			
D1	1353	2856	516068	115.0			
D3	1574	1438	128281	56.8			
G	1599	1997	96418.3	30.7			
D2	1617	2106	85066	25.7			
7					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.611	1.568	293.6
D4	1252	73	603.59	5.3			

D1	1348	1158	236744	130.1			
D3	1569	519	68415.9	83.9			
G	1600	1040	54339	33.3			
D2	1618	782	28571.5	23.3			
20					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.643	1.799	333.7
D4	1344	2715	335364	78.6			
D1	1237	159	46169.2	185.3			
D3	1575	459	35887.4	49.8			
G	1601	2501	113490	28.9			
D2	1618	1822	62645.1	21.9			
19					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.640	1.776	329.9
D4	1344	2424	295906	77.7			
D1	1265	161	43129.8	170.1			
D3	1576	450	26172.6	37.0			
G	1600	2184	94062.6	27.4			
D2	1616	2028	70672.5	22.2			
21					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.640	1.774	329.7
D4	1235	270	76318.3	180.0			
D1	1344	3798	512236	85.9			
D3	1570	697	71174.3	65.1			
G	1601	3619	170589	30.0			
D2	1618	2593	89949.5	22.1			
22					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.633	1.721	320.9
D4	1217	269	52445.6	124.1			
D1	1344	3566	504242	90.0			
D3	1558	517	67816.5	83.4			
G	1601	3514	178464	32.3			
D2	1618	2230	77114.2	22.0			
16					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.582	1.395	258.3
D4	1323	862	77308.5	57.1			
D1	1355	1097	73576.5	42.7			
D3	1594	1257	43245	21.9			
G	1609	1719	42842.4	15.9			
D2	1621	1001	22068.8	14.0			

46DF15	Method:	Lahfid et al. (2010)		RA1		RA2	
				avg T	std dev	avg T	std dev
		Avg each run		298.4	21.8	295.3	25.8
		Avg RA1,RA2		T (°C)	296.8	std dev	23.8
18					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.629	1.692	315.9
D4	1263	1186	204065	109.5			
D1	1344	13589	1739350	81.5			
D3	1586	6420	414938	41.1			

G	1604	12920	486921	24.0			
D2	1619	8400	246666	18.7			
52					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.628	1.690	315.6
D4	1265	736	47729.3	41.3			
D1	1346	13269	2187760	105.0			
D3	1579	6677	520304	49.6			
G	1602	12565	526996	26.7			
D2	1618	8933	275446	19.6			
14					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.640	1.780	330.5
D4	1256	1386	276632	127.0			
D1	1343	17035	2376870	88.8			
D3	1576	5003	379248	48.3			
G	1600	16354	706272	27.5			
D2	1617	11783	405608	21.9			
15					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.614	1.593	298.3
D4	1244	2737	833223	193.8			
D1	1342	20999	2979520	90.3			
D3	1531	3169	616330	123.8			
G	1595	20049	1248960	39.7			
D2	1613	13398	527581	25.1			
16					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.582	1.391	257.4
D4	1330	6978	681706	62.2			
D1	1359	5200	324202	39.7			
D3	1591	7287	295832	25.8			
G	1606	9612	272137	18.0			
D2	1620	6865	155348	14.4			
112					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.611	1.573	294.5
D4	1232	534	164004	195.5			
D1	1343	4993	730680	93.2			
D3	1529	752	152772	129.3			
G	1617	2739	93780.1	21.8			
D2	1601	5439	322092	37.7			
4					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.600	1.501	280.5
D4	1292	580	75213.6	82.6			
D1	1344	4628	394000	54.2			
D3	1590	2556	92826.9	23.1			
G	1605	4903	143164	18.6			
D2	1619	3187	76508.2	15.3			
5					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.606	1.536	287.4
D4	1256	1139	505802	282.6			
D1	1349	11978	2505880	133.2			
D3	1523	2920	715946	156.1			
G	1593	9048	772098	54.3			
D2	1614	9014	472239	33.4			

51					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.620	1.632	305.3
D4	1253	978	107707	70.1			
D1	1348	22993	4846350	134.2			
D3	1532	4231	804664	121.1			
G	1592	18176	1347910	47.2			
D2	1614	18886	883270	29.8			

15JT01				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		374.3	15.7
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	9934	535240	15.8	1.380	0.604	372.3
G	1588	7200	300074	-0.3			
D2	1624	2348	51157.6	-1.2			
01							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	11825	602126	0.2	0.000	0.536	402.4
G	1587	#####	429991	-28.7			
D2	1615	2992	91054.9	14.5			
02							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1353	3563	177831	10.1	1.625	0.626	362.3
G	1588	2193	81001.1	-0.2			
D2	1621	937	25154.7	-0.3			
04							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	2813	116907	-0.5	1.734	0.620	365.1
G	1589	1623	54632.9	1.1			
D2	1620	750	16996.7	2.7			
05							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	3956	216717	16.6	1.566	0.635	358.3
G	1588	2525	92892.6	-0.2			
D2	1621	1136	31504.8	-0.3			
010							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	9823	513870	13.9	1.118	0.574	385.5
G	1586	8787	322736	-2.2			
D2	1622	2530	58333.8	-1.0			
011							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	4288	400651	58.7	0.572	0.611	369.0
G	1587	7495	236074	-18.2			
D2	1621	709	18814.9	-0.1			
014							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	16157	1003070	31.0	1.262	0.638	357.0
G	1586	12807	651129	22.1			

D2	1620	3215	-82334	0.0			
013							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	10908	804164	46.7	1.149	0.599	374.5
G	1585	9497	595923	35.2			
D2	1619	2454	-57527	0.3			
012							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	12116	916868	44.0	0.789	0.550	396.1
G	1574	15361	878148	31.7			
D2	1608	4063	-128772	2.0			

15JT02				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		407.6	22.6
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	5733	423379	41.8	1.665	0.629	361.0
G	1590	3444	210834	30.1			
D2	1621	1383	38628.4	1.2			
02							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	9998	483557	0.3	0.997	0.504	416.6
G	1585	10029	389068	9.9			
D2	1617	3022	86497.4	-0.6			
03							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	20277	519420	-19.6	3.734	0.580	382.9
G	1587	5430	278200	31.8			
D2	1615	2676	97879	0.0			
05							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	14576	824605	12.3	3.896	0.491	422.5
G	1616	3741	100030	0.0			
D2	1581	16436	754419	13.7			
06							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	812	32076.6	1.9	1.171	0.475	429.4
G	1590	694	23524	0.8			
D2	1621	404	11858.4	12.9			
013							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	6546	289325	-0.1	1.056	0.514	412.4
G	1584	6200	239221	-0.2			
D2	1619	1737	34582.2	9.5			
09							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1352	10016	471047	-0.1	0.879	0.491	422.3
G	1584	11400	419650	-0.1			
D2	1620	3244	67899.7	0.0			

010							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	11822	490286	16.3	1.182	0.544	398.8
G	1581	9998	315044	-0.2			
D2	1609	2947	95608.6	0.2			
011							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	12550	577259	0.4	0.923	0.492	422.2
G	1582	13595	493046	-0.3			
D2	1617	4166	103870	8.9			

15JT04				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		359.8	13.7
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1345	31089	2618520	53.5	0.084	0.603	372.5
G	1580	369622	1510060	-31.5			
D2	1612	6381	211082	0.0			
03							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	29224	2249500	48.8	0.082	0.630	360.8
G	1585	356832	1125360	-29.5			
D2	1616	6108	197087	0.6			
04							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	6006	298385	0.0	1.694	0.600	374.2
G	1587	3545	136618	14.6			
D2	1614	1899	62707.2	0.0			
05							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	29094	1968090	42.9	0.018	0.639	356.4
G	1585	1652820	894850	-30.1			
D2	1615	6827	214631	-0.2			
06							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	24100	1739480	45.7	0.537	0.654	349.9
G	1586	44871	731847	-18.1			
D2	1616	5729	188122	0.1			
07							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	16039	969280	36.2	1.787	0.683	336.9
G	1588	8976	328570	-1.7			
D2	1619	4020	120541	0.1			
08							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	6067	269453	0.0	1.662	0.619	365.5
G	1591	3650	126812	13.3			
D2	1619	4237	38930.7	-6.1			
09							

Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	19912	1531390	48.8	0.033	0.577	384.4
G	1580	605462	1012800	-35.1			
D2	1614	3498	111210	1.5			
010							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1351	10636	675686	31.6	0.304	0.628	361.7
G	1590	35028	351382	-23.0			
D2	1621	1930	49512.6	0.3			
011							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	9687	563785	37.0	1.998	0.678	339.3
G	1590	4847	209039	0.9			
D2	1622	2058	58816.9	5.6			
0							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	30525	2250870	46.4	1.600	0.633	359.2
G	1587	19074	1074990	22.1			
D2	1619	6379	229124	21.7			
01							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	20674	1403520	42.4	1.743	0.638	357.2
G	1587	11864	668863	33.4			
D2	1616	4123	128045	-0.2			

J1409-74.1	Method:	Lahfid et al. (2010)		RA1		RA2	
				avg T	std dev	avg T	std dev
		Avg each run		315.2	20.3	316.0	26.5
		Avg RA1,RA2		T (°C)	315.6	std dev	23.4
0					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.635	1.737	323.5
D4	1267	8347	3678750	280.6			
D1	1342	42478	6219740	93.2			
D3	1517	7739	1587670	130.6			
G	1588	35763	2582060	46.0			
D2	1608	32002	1529160	30.4			
01					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.654	1.889	347.5
D4	1266	3350	1283260	243.9			
D1	1346	24413	2663190	69.4			
D3	1543	2485	405241	103.8			
G	1600	21749	1213520	35.5			
D2	1617	13696	470762	21.9			
02					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.604	1.527	285.6
D4	1253	2884	1008160	222.6			
D1	1344	18155	2271760	79.7			
D3	1498	1787	247273	88.1			

G	1583	17868	1025730	36.5			
D2	1609	17599	874989	31.7			
03					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.634	1.729	322.1
D4	1244	3546	1243530	223.3			
D1	1344	25607	3216270	80.0			
D3	1531	3121	605889	123.6			
G	1601	25014	1435690	36.5			
D2	1617	15394	538367	22.3			
05					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.652	1.873	345.1
D4	1277	9556	3821400	254.6			
D1	1345	52480	5882620	71.4			
D3	1533	6442	1164190	115.1			
G	1599	48307	2839970	37.4			
D2	1616	32022	1177880	23.4			
06					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.609	1.561	292.1
D4	1281	610	111056	115.9			
D1	1345	5361	587816	69.8			
D3	1591	3030	202757	42.6			
G	1607	4643	174250	23.9			
D2	1621	2667	70768.8	16.9			
07					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.624	1.660	310.4
D4	1305	1901	274272	91.9			
D1	1347	9610	928615	61.5			
D3	1593	6211	337100	34.6			
G	1608	7762	254586	20.9			
D2	1621	5254	132742	16.1			
08					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.627	1.678	313.5
D4	1313	1432	406078	180.5			
D1	1346	7192	732067	64.8			
D3	1590	3206	265469	52.7			
G	1606	6921	314395	28.9			
D2	1620	3560	98265.1	17.6			
09					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.624	1.659	310.1
D4	1261	1938	508131	166.9			
D1	1345	16949	2016710	75.7			
D3	1540	1514	252518	106.2			
G	1599	15277	853022	35.5			
D2	1617	11477	416405	23.1			
013					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.617	1.611	301.5
D4	1300	1178	163184	88.2			
D1	1347	7908	719704	57.9			
D3	1591	4133	210638	32.4			
G	1606	6272	213182	21.6			
D2	1620	4553	124295	17.4			

J1417	Method:	Lahfid et al. (2010)		RA1		RA2	
				avg T	std dev	avg T	std dev
		Avg each run		299.7	31.4	298.0	37.9
		Avg RA1,RA2		T (°C)	298.9	std dev	34.7
01					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.602	1.511	282.5
D4	1323	5253	1562350	189.4			
D1	1345	26923	2778100	65.7			
D3	1548	5931	801878	86.1			
G	1596	25819	1456150	35.9			
D2	1615	17631	613601	22.2			
05					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.573	1.339	245.9
D4	1329	4856	354007	46.4			
D1	1357	4243	231594	34.8			
D3	1591	4393	139369	20.2			
G	1618	5945	143944	15.4			
D2	1605	6614	153902	14.8			
06					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.632	1.717	320.2
D4	1337	8396	977481	74.1			
D1	1366	2865	229641	51.0			
D3	1588	5270	252136	30.5			
G	1605	9319	296600	20.3			
D2	1620	6424	154310	15.3			
07					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.610	1.562	292.4
D4	1337	12649	1534540	77.2			
D1	1360	3867	318362	52.4			
D3	1591	8540	498712	37.2			
G	1606	12797	436836	21.7			
D2	1620	9272	250468	17.2			
08					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.644	1.811	335.6
D4	1269	1823	541375	189.1			
D1	1344	23874	3092190	82.5			
D3	1602	21570	938653	27.7			
G	1581	7437	580127	49.7			
D2	1618	15391	487225	20.2			
09					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.654	1.890	347.7
D4	1308	2147	784692	232.7			
D1	1345	15771	1974740	79.7			
D3	1576	4122	365609	56.5			
G	1602	16031	741405	29.4			
D2	1618	10813	352959	20.8			
010					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.585	1.409	261.3

D4	1362	3869	293395	48.3			
D1	1332	5519	563895	65.0			
D3	1585	3785	188923	31.8			
G	1619	5931	166030	17.8			
D2	1603	7185	253634	22.5			
011					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.597	1.483	276.9
D4	1358	5009	386370	49.1			
D1	1331	5645	553714	62.4			
D3	1588	4159	200284	30.7			
G	1619	6329	171574	17.3			
D2	1604	7838	261893	21.3			
012					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.640	1.780	330.6
D4	1280	1823	384262	134.2			
D1	1344	21047	2668360	80.7			
D3	1588	11335	724525	40.7			
G	1605	17704	637682	22.9			
D2	1619	12936	352991	17.4			
014					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.616	1.605	300.4
D4	1345	17080	1976540	73.7			
D1	1333	6702	1677310	159.3			
D3	1542	2885	505916	111.6			
G	1617	14448	499127	22.0			
D2	1599	22312	1271340	36.3			
015					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.602	1.514	283.1
D4	1333	13179	1569670	75.8			
D1	1361	5036	375533	47.5			
D3	1591	10482	545356	33.1			
G	1606	14778	481091	20.7			
D2	1620	10504	258089	15.6			
016					RA1	RA2	T (°C)
Peak	Location	Amplitude	Area	FWHM	0.631	1.713	319.5
D4	1344	25027	3033830	77.2			
D1	1279	1880	358509	121.4			
D3	1586	10779	676313	39.9			
G	1619	16177	468032	18.4			
D2	1604	22242	835870	23.9			

J1424				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		363.8	7.7
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	2807670	2078080	-40.8	5.122	0.607	371.1
G	1586	548198	1213130	-34.1			
D2	1618	5449	134577	-0.1			
01							

Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	29398	1965510	33.1	1.618	0.660	347.5
G	1587	18170	836407	-0.1			
D2	1620	6610	178114	5.0			
02							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	31011	2031920	24.9	1.225	0.604	372.1
G	1584	25320	1112870	-4.0			
D2	1619	22530	217647	-12.8			
03							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	86322	1257070	-30.4	3.952	0.613	368.1
G	1590	21840	729482	-13.7			
D2	1620	2619	63504.1	0.4			
07							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1344	#####	2549120	-56.2	#####	0.630	360.8
G	1584	33366	1337270	-11.7			
D2	1614	4272	161515	21.2			
08							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1346	83775	1887340	-26.4	4.100	0.622	364.3
G	1589	20435	1204750	-0.8			
D2	1616	2422	-56938	0.0			
011							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	967401	2412690	-39.8	45.370	0.620	365.2
G	1587	21323	1309800	23.2			
D2	1617	6090	170994	0.1			
013							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	21103	1486040	36.1	1.658	0.632	359.8
G	1589	12730	673759	10.4			
D2	1619	4974	191742	24.5			
014							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	35171	774733	-21.0	4.690	0.636	357.8
G	1592	7499	382029	-3.9			
D2	1621	2400	60442.7	0.5			
015							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1346	2896300	2484360	-42.1	121.859	0.605	371.7
G	1582	23768	1412380	24.9			
D2	1614	7310	209065	-0.1			

J1427				Method:	Beyssac et al. 2002		
						avg T	std dev
				Avg each run		353.4	17.3
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	11726	873187	33.3	1.398	0.660	347.3
G	1600	8390	440650	-1.1			
D2	1622	626	9274.3	-0.7			
020							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1346	26268	2429770	58.8	1.593	0.671	342.5
G	1592	16492	1059830	20.9			
D2	1618	3976	132642	17.2			
03							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	8021	562620	25.7	1.401	0.633	359.1
G	1597	5725	309021	-0.3			
D2	1623	758	16607.1	11.6			
04							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	13059	986134	41.2	1.516	0.625	362.7
G	1593	8616	531781	25.9			
D2	1620	2262	58820.2	0.5			
06							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	15675	1337790	54.2	0.177	0.629	360.9
G	1593	88546	674184	-27.7			
D2	1620	3670	113607	9.7			
08							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1350	4127	270315	29.5	1.480	0.596	375.7
G	1589	2788	156841	23.7			
D2	1621	1048	26302.8	0.1			
011							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	9542	712100	26.4	1.245	0.621	364.9
G	1594	7665	417147	0.0			
D2	1620	1024	18364	10.0			
016							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1348	12070	740101	11.8	1.363	0.590	378.3
G	1594	8853	428756	14.4			
D2	1619	3342	84882.5	0.2			
017							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1349	18045	1395460	39.5	1.625	0.688	334.7
G	1596	11104	584937	0.2			
D2	1622	1945	47099.6	0.4			
018							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1347	24357	2288220	59.8	1.660	0.695	331.7

G	1594	14676	874010	21.7			
D2	1619	4114	129670	6.0			
019							
Peak	Location	Amplitude	Area	FWHM	R1	R2	T (°C)
D1	1345	19246	1904970	63.0	1.535	0.701	329.1
G	1593	12541	793159	6.5			
D2	1618	1091	19734.7	0.0			

Plate 1.

Geologic Map of the
Doonerak Anticline,
North Fork Koyukuk River Area
Central Brooks Range, Alaska

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Sample and Data Locations