**EXCEPTIONAL PRESERVATION OF BIOMARKERS IN THE 1.2 GA ANGMAAT FORMATION CHERT, BYLOT SUPERGROUP, BAFFIN ISLAND** A. R. Manning-Berg[1], M.Tuite[2], K. Williford[2], A. D. Czaja[3], and L.C. Kah[1], [1]Department of Earth and Planetary Sciences, U. of Tennessee, 1412 Circle Drive, Knoxville, TN 37966, aberg@vols.utk.edu, [2]Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Dr, Pasadena, CA 91109, [3]Department of Geology, U. of Cincinnati, 500 Geology-Physics Bldg., Cincinnati, OH 45221.

**Introduction:** Peritidal chert deposits are common in Meso- and Neoproterozoic carbonate strata [1]. Cherts in these environments precipitated during early diagenesis and commonly record textural evidence of both mineral and organic precursors [2]. Exceptional preservation of microbial elements observed in such cherts [3] has great potential to inform our understanding of early Earth ecosystems. Even exceptionally well-preserved morphology, however, provides little data on metabolic processes. Information regarding microbial processes, as well as paleoenvironmental conditions, [4] can be obtained from lipid biomarkers within the preserved organic matter associated with these cherts.

**Sample Locality:** The Angmaat Formation, Bylot Supergroup, records late Mesoproterozoic carbonate strata deposited within an intertidal to supratidal microbial flat [5, 6]. Early diagenetic silicification records microbial growth and decomposition across a range of peritidal environments, which contain several discrete filamentous and coccoidal mat types. These mats are also preserved under various taphonomic states. Mat taphonomy ranges from mats that are well-preserved and appear to have been silicified during active growth of the mat to samples that show compaction and morphological degradation, which are inferred to represent mat decomposition.

*Cherts of the Angmaat Formation.* Chert samples from the Angmaat Formation contain 1–2 wt. % TOC [3]. Raman spectra indicate that the preserved microfossils have experienced low-grade thermal alteration [7]. The similarities in the spectra also indicate that taphonomic variation of the microfossils is unrelated to thermal alteration. Here we present an initial characterization of the organic matter preserved in the chert of the Angmaat Formation.

**Methods:** Between 3–5 mg of powdered samples and a procedural blank of combusted quartz sand were weighed out for bitumen extraction. A solvent mixture of 9:1 dichloromethane (DCM) and methanol (MeOH) was added to each sample. The samples were then heated by microwave to 100 °C for 15 minutes in sealed Teflon tubes. The solvent was removed from the samples and filtered through a 2 µm glass fiber filter. To ensure the complete extraction of bitumen, this extraction process was repeated three times. After the third extraction, the solvent and powders were removed from the Teflon tubes and filtered. Total lipid extracts were obtained from the chert samples as a first step toward characterizing the organic chemistry of the preserved organic matter. Extracts and blank were analyzed by gas chromatography mass spectroscopy.

**Results:** Both hopanes and steranes were observed in each sample and were absent in the blank. The presence of eukaryotic steranes is further supported with petrographic evidence for the red alga *Bangiomorpha* [8]. An even-over-odd carbon preference, typical for marine organisms in a hypersaline carbonate environment [10], was observed in the long chain *n*-alkanes ($n$C$_{24}$-$n$C$_{35}$) of each of the samples (Fig. 1). Preservation of the distinctive carbon preference suggests thermal alteration of the organic matter has been minimal.

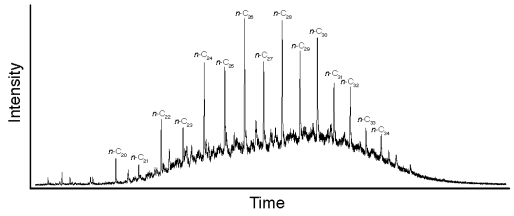


Figure 1. Chromatograph of an Angmaat Formation sample. Long-chained n-alkanes show an even-over-odd preference.

Despite the limited sample size, the data indicate that the organic matter within the Angmaat Formation is well-suited for detailed organic geochemistry. It also suggests that samples in which the morphology is exquisitely preserved may also have a higher potential for molecular preservation. Future work will focus on further separation of the organic fraction and more specific biomarker analysis.

**References:**

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