

### 2018-2019 Narrative – Justin Vincent Strauss

- A) PRF# 58780-DNI8
- B) Neoproterozoic
- C) Justin Vincent Strauss, Dartmouth College
- D) Neoproterozoic Analogs for Mg-Silicate-Bearing Petroleum Basins

During the 2018-2019 reporting year, important progress has been made on this project. Most importantly, PI Strauss has identified and successfully recruited a new PhD student to work on the proposed activities. This student will be officially starting at Dartmouth College during the Fall of 2019, although she was hired over the Summer of 2019 to start a detailed literature review and get some preliminary field experience in collaboration with some of Strauss' colleagues from McGill University and Colorado College. This preliminary field and research experience, which was directly afforded by the generous support of this grant, will be instrumental in the new PhD student's progress towards her degree, as well as the process of designing and successfully completing the proposed activities. Given the late recruitment of this student, we were unable to obtain permits in time to conduct field work in northern Canada this past summer that have direct relevance to the activities proposed herein; however, PI Strauss did have his lab technician begin to make a series of key thin sections from Mg-silicate-bearing Neoproterozoic successions to start the key petrographic aspects of the project. This lab technician will be further incorporated into the grant-related activities this year, which will be an important training component for a post-undergraduate student that is considering future applications to graduate school.

In addition to the recruitment of a student and conducting some field work, PI Strauss spent the Summer of 2019 working on a manuscript that is currently in review at *Geology* that synthesizes some of his previous sedimentological observations with new evaporation modeling and mineralogical constraints to provide the first quantitative constraints on Neoproterozoic  $p\text{CO}_2$  and carbonate chemistry. This research enabled PI Strauss to step away from his focus on sedimentology and stratigraphy to explore the world of geochemical modeling, evaporation/reaction path modeling in freshwater and marine systems, and the kinetics of mineral precipitation in aqueous solutions. This represents a diverse suite of new research trajectories for PI Strauss, which has greatly expanded his background in fundamental geochemical processes. This work was directly supported by this ACS-PRF-DNI grant, and the necessary acknowledgements to the donors of ACS has been inserted into the submitted manuscript.

Over the course of the 2019-2020 academic year, the PhD student will plan all of the logistics, obtain the necessary permits, and make preparations for our Summer 2020 field season in the Mackenzie Mountains of Northwest Territories, Canada. In addition, the student will travel to the University of Oxford with PI Strauss in the Spring of 2020 to conduct preliminary experiments to precipitate Mg-silicates from Neoproterozoic marine analog solutions. This experimental work will be critical to integrate with field-based studies, and it represents a foundational part of the new line of inquiry for PI Strauss.