San Joaquin Geological Society

VIRTUAL MEETING

Date: **Tuesday, April 13th, 2021**

Time: **6:30 PM Virtual Lecture**

Place: **Zoom link included in email**

Our virtual lecture will be held via Zoom. Meeting link and access code to follow!

SJGS WEBSITE

http://www.SanJoaquinGeologicalSociety.org/

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Student Night

Presentations by:

Craig Hulsey, CSU Bakersfield

Abstract: Throughout the Moon's approximately 4.5-billion-year history it has been bombarded by a litany of impactors, as clearly evidenced by its heavily cratered surface. Occasionally, a sufficiently sized impact event may eject lunar crustal (and potentially mantle) material at speeds capable of escaping lunar gravitation influence. The ejected material may then fall into the gravitational field of the Earth and eventually land somewhere on its surface in the form of a lunar meteorite. Through careful analysis of a lunar meteorite sample, many insights can be gained about lunar mineralogic & elemental distributions as well as the crystallization and thermal evolution of the parent magma that the crystals within it originated from. This project aims to conduct research on a recently acquired lunar meteorite that was recovered from Northwestern Africa which has not yet been analyzed in detail. Various analytical methods ranging from laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS), electron probe microanalysis (EPMA), X-ray microcomputed tomography (µCT), scanning electron microscope (SEM) analysis, and neutron activation analysis (NAA) will be used to analyze, document, and publish the mineralogic/elemental makeup, petrologic profile, melt history, and inferred composition of the lunar mantle that the crystals in this sample originated from. As a secondary goal, with the detailed chemistry in hand, a potential source location(s) on the Moon could be tied to this sample with the aid of lunar remote sensing datasets obtained from various NASA & international lunar missions (e.g. VNIR spectroscopy from NASA's Moon Mineralogy Mapper "M3" carried aboard India's Chandrayaan-1 spacecraft). This type of analysis will be key in the identification of future lunar lander locations prioritizing the exploration & exploitation of lunar resources and geochemical reservoirs.

Biography: Craig Hulsey is entering his second year of grad school at California State University of Bakersfield working towards a Master of Science in geology. Craig works at Aera Energy LLC as a geoscience technician. While Craig has a passion for the oil and gas industry, he has been fascinated by the field of planetary geology. Craig had the fortune of his advisor, Dr. Katie O'Sullivan being willing to take him on as a graduate student and she provided him with the unique and stellar opportunity to conduct his master's thesis research in the field of lunar science.

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Student Night

Presentations by:

Kari Hochstatter, CSU Bakersfield

Abstract: The diagenetic reaction of kaolinite to dickite can be an important reaction in hydrothermal settings and in sedimentary basins where kaolinite is a dominant clay mineral. In the San Joaquin Basin of central California, USA, the source for much of the sediment in the basin is granitic. Therefore, kaolinite (a primary alteration product of potassium feldspars in warm, wet, acidic conditions) is an important clay mineral here, particularly in sandstones. This study analyzes core samples from oil wells throughout and nearby the San Joaquin Basin using X-ray diffraction to characterize the clay mineralogy and to investigate the reaction of kaolinite to dickite. The kaolinite to dickite transformation along with the conditions represented by the transformation has been studied in some basins worldwide but has not been studied in the San Joaquin Basin. Other studies suggest the kaolinite to dickite transformation occurs at a temperature range of 110 – 130 °C and can be used as a geothermometer. Notably, this temperature range is within the range of temperatures at which catagenesis occurs. For this reason, the identification of the kaolinite to dickite transition can be used as tool for petroleum exploration to distinguish if conditions exist to generate oil. The results of this study are positive but inconclusive, with dickite being potentially detected. The information gathered from the illite/smectite mixed layer and from data calculated from bottom hole temperatures is used to determine temperatures experienced by the sediments analyzed. Furthermore, since the dickite data are inconclusive, a broader suite of tests on samples is suggested to decisively identify the kaolinite to dickite transition.

Biography: Kari Hochstatter is a geologist at Berry Corporation, while working at Berry she has also been working on her master's degree at CSU Bakersfield. Her master's research in clay mineralogy has the potential to establish a new method in the field of geothermometry, which can be a valuable exploration tool in the fields of petroleum and geothermal energy. Before moving to Bakersfield in 2014 she worked for a core analysis laboratory in the Los Angeles area after earning her bachelor's degree from UC Santa Barbara. Upon completing her Master of Science in Geology, Kari plans to continue her work as a geologist and earn her Professional Geologist accreditation. With the free time she will get back she is looking forward to returning to some of her hobbies, which include rock climbing, hiking, and camping.