IN SITU OBSERVATIONS OF REFRACTORY ORGANIC MATTER IN LACUSTRINE MUDSTONES OF GALE CRATER AND THEIR IMPLICATIONS FOR THE SEARCH FOR ORGANIC BIOSIGNATURES.

J. L. Eigenbrode[1], A. Steele[2], R. E. Summons[3], A. C. McAdam[1], B. Sutter[4], H. B. Franz[1,5], C. Freissinet[1,5], M. Millan[6], D. Glavin[1], D. W. Ming[7], R. Navarro-González[8], A. Pavlov[1], J. A. Hurowitz[9], J. Grotzinger[10], P. G. Conrad[1], P. R. Mahaffy[1], [1]Solar System Exploration Division, NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA (Jennifer.L.Eigenbrode@nasa.gov), [2]Geophysical Laboratory, Carnegie Institution of Washington, Washington, DC 20015, USA, [3]Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA 02139, USA, [4]Jacobs, NASA Johnson Space Center, Houston, TX 77058, USA, [5]Center for Research and Exploration in Space Science & Technology, University of Maryland Baltimore County, Baltimore, MD 21250, USA, [6]Laboratoire Atmosphères, Milieux, Observations Spatiales, Univ. Pierre et Marie Curie, Univ. Versailles Saint-Quentin & Centre National de la Recherche Scientifique, Paris, France, [7]Astromaterials Research and Exploration Science Division, NASA Johnson Space Center, Houston, TX 77058, USA, [8]Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de México Circuito Exterior, Ciudad Universitaria, P.O. Box 70-543, 04510 México D.F., México, [9]Department of Geosciences, State University of New York, Stony Brook, NY 11794, USA. [10]Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, CA, 91125.

Lacustrine sediments have long been hailed as a favorable environment for organic matter deposition and preservation on Mars, as they are on Earth [1]. Evidence of refractory organic matter has been discovered in the ancient lacustrine sediments of Gale Crater by the Sample Analysis at Mars (SAM) instrument suite onboard the Curiosity rover [2-3]. A diversity of organic molecules is observed after pyrolysis of drilled mudstone. Detection of this refractory organic matter in >3 Ga rocks that have been exposed to surface radiation, provides encouragement that potential remains of past life on Mars may be preserved and detectable. In this presentation, we will present SAM results juxtaposed with experimental radiation results from the laboratory [4] and discuss implications for the future search for organic biosignatures on Mars.

References: [1] Summons, R.E., et al. (2011) *Astrobiology 11*, 157–181. [2] Eigenbrode, J. L., et al. [2015] AGU Fall Meeting, Abstract #79168. [3] Eigenbrode, J. L., et al. [in preparation]. [4] Eigenbrode, J. L., et al. [2015] Astrobiology Science Conference, Abstrat #7204.