

SAMPLE PREPARATION SYSTEMS DEVELOPMENT FOR THE MICROARRAY ASSAY FOR SOLAR SYSTEM EXPLORATION (MASSE) PROJECT. Molly Potter⁽¹⁾, Kristin Showalter⁽¹⁾ and Marc D. Fries^{(2)*}, ⁽¹⁾Embry-Riddle Aeronautical University, Daytona Beach, FL 32114, ⁽²⁾Geophysical Laboratory, Carnegie Institution of Washington, Washington D.C. 20015-1305, *Contact author email: m.fries@gl.ciw.edu

Abstract

Life detection missions present special instrumentation challenges since they must detect minute quantities of specific molecules under hostile environmental conditions with minimal uncertainty. The Microarray Assay for Solar System Exploration (MASSE) project will utilize antibody microarray techniques to interrogate regolith and rock samples for a broad suite of biomarker molecules using wet-chemistry techniques already widely used on Earth. This technique is applicable to sample materials from a wide range of extraterrestrial environments but requires liquid extraction methods to liberate biomarkers from matrix material for analysis. The MASSE sample handling system must start with a solid rock or regolith sample and prepare a concentrated, aqueous extractant solution for analysis. Considerable uncertainty exists in the effects of salinity, pH, temperature, and other parameters upon the extraction and concentration procedures. A course of experimentation is underway to characterize sample handling efficiency as well as precisely understand the effects of a wide range of environmental variables. Sample handling is critical to mission success and must be thoroughly understood in a laboratory setting even before hardware design can commence. An overview of the equipment, systems, and experimental procedures necessary for the development of a sample handling system will be presented and discussed.