

SNOOPY: STUDENT NANOEXPERIMENTS FOR OUTREACH AND OBSERVATIONAL PLANETARY INQUIRY. K. R. Kuhlman,¹ M. H. Hecht,¹ D. E. Brinza,¹ J. E. Feldman,¹ S. D. Fuerstenau,¹ L. Friedman,² L. Kelly,² J. Oslick,² K. Polk,² L. E. Möller,² K. Trowbridge,² J. Sherman,² A. Marshall,² A. L. Diaz,² C. Lewis,³ C. Gyulai,³ G. Powell,³ T. Meloy,⁴ P. Smith,⁵ ¹Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Dr., Pasadena, CA 91109, ²The Planetary Society, Pasadena, CA 91106, ³Visionary Products, Inc., 11814 South Election Drive, Suite 200, Draper, UT 84020, ⁴West Virginia Univ., Morgantown, WV 26506, ⁵The Univ. of Arizona, Tucson, AZ 85721.

ABSTRACT

Introduction: As scientists and engineers primarily employed by the public, we have a responsibility to “communicate the results of our research so that the average American could understand that NASA is an investment in our future...”[1]. Not only are we employed by the public, but they are also the source of future generations of scientists and engineers. Student Nanoexperiments for Outreach and Observational Planetary Inquiry (SNOOPY) is an example of directly involving students and teachers in planetary science missions.

The Mars Environmental Compatibility Assessment (MECA) Student Nanoexperiments: The MECA Student Nanoexperiment Project was a partnership between MECA, The Planetary Society (TPS) and Visionary Products, Inc. (VPI). The MECA instrument suite, developed at the Jet Propulsion Laboratory (JPL), was scheduled for launch aboard the canceled Mars Surveyor Lander 2001. The MECA Patch Plate was designed to expose various materials to the Martian environment and be observable by the Robotic Arm Camera (RAC). Students 18 years of age and younger were invited to propose experiments that were consistent with MECA’s Mission: to help us better understand how humans will be able to live on Mars.

Each nanoexperiment was required to fit into single MECA Patch Plate (Figure 1) hole, 1 cm in diameter and 1 cm deep, have a mass of 3 g or less, require no power, and require only a single image by the RAC. The students were asked to submit both a short proposal and a prototype of their experiment.

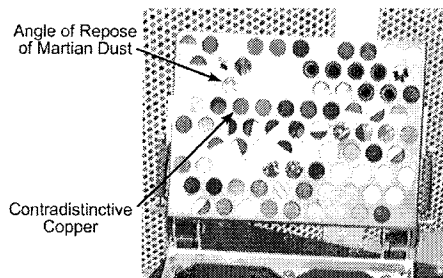


Figure 1. Nanoexperiments in the MECA Patch Plate.

Sixteen entries were received from seven countries. Two nanoexperiments were chosen for flight, the Angle of Repose of Martian Dust and Contradistinctive Copper. These experiments addressed the behavior of windblown Martian dust on surfaces and the oxidation of different textures of copper (Figure 1). An alternate

student nanoexperiment was selected to investigate the behavior of spacesuit materials on Mars (Figure 2).

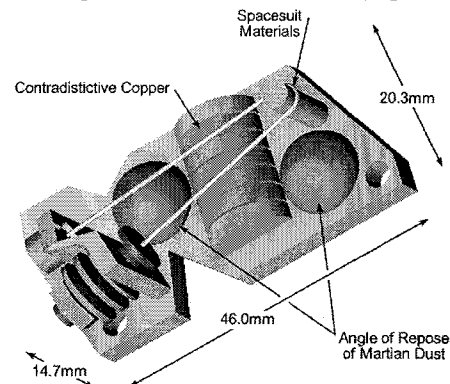


Figure 2. The SNOOPY payload.

An important goal of this project was publication of the students’ work and results in the scientific literature. One student, Lucas Möller presented the results of his Angle of Repose nanoexperiment using JSC Lunar-1 [2] and JSC Mars-1 [3] simulants at the 32nd Lunar and Planetary Science Conference [4].

SNOOPY – Payload Integrated E/PO: The nanoexperiments, now called SNOOPY, have been redesigned with a generic lander interface. The SNOOPY team plans to produce curricula describing how students and teachers can reproduce the nanoexperiments and perform their own calibration experiments. Should SNOOPY eventually fly, the data returned will be released to students and teachers as soon as it is released to the SNOOPY team. In the interim, the students will publish their calibration results in the scientific literature.

References: [1] Goldin D., (1999) Testimony before the Committee on Science, U.S. House of Representatives, April 28, 1999. [2] McKay D. S., et al. (1993) *LPSC XXIV*, 963-964. [3] Allen C. C. et al. (1997) *LPSC XXVII*, 27-28. [4] Möller L. (2001) *LPSC XXXII*, Abstract #1470.

BIOGRAPHY

Dr. Kimberly Kuhlman is a member of JPL’s Space Microsensors Technology Section. She received her Ph.D. in Nuclear Engineering and Engineering Physics from the University of Wisconsin in 1998. Kim was a project scientist on MECA and is the leader of the SNOOPY effort. She is also the Principal Investigator of the Miniature Local Electrode Atom Probe project.