STUDENT NANOEXPERIMENTS FOR OUTREACH AND OBSERVATIONAL PLANETARY INQUIRY (SNOOPY): AN UPDATE. K. R. Kuhlman[1], [1]Planetary Science Institute, 1700 East Fort Lowell Blvd., Suite 106, Tucson, AZ 85719, kim@psi.edu

Introduction: A true "public engagement payload," **S**tudent **N**anoexperiments for **O**utreach and **O**bservational **P**lanetary Inquir**y** (SNOOPY) is a potentially high-leverage education and public outreach (E/PO) payload that could fly the first student experiments to the Moon and Mars aboard future missions. New SNOOPY competitions and payloads are proposed following the model of the Mars Environmental Compatibility Assessment (MECA) Student Nanoexperiment Project that was conducted for the cancelled Mars Surveyor 2001 Lander [1], including a new competition with divisions for students in grades 4-6, 7-9, 10-12 and undergraduate college students. The public at large will be engaged through an added novel requirement that the instruments flown must be readily replicated by students, teachers and parents in backyards, kitchens and classrooms. This will enable large numbers of participants, both children and adults, to learn the various aspects of math, science and engineering involved, and arm them with their own results that they can **compare directly** to the results of the SNOOPY flight instruments.

The Apollo missions generated enormous public excitement about space exploration, which resulted in a large increase in young Americans pursuing careers in science, math and technology, often far from space exploration and space sciences. These scientists, engineers and many others whose career choices were influenced by Apollo are responsible for the high standards of technology and creativity now enjoyed by the United States. While nowhere near the scale of Apollo, SNOOPY has the potential to generate the kind of public excitement about and participation in space exploration and science that encourages young people to further explore careers in science and technology

History of SNOOPY: SNOOPY is the continuation of the first payload-integrated education and public outreach (E/PO) project to directly involve students and teachers in a mission to Mars [1]. The SNOOPY Project evolved from the Mars Environmental Compatibility Assessment (MECA) Student Nanoexperiment Project, a partnership between MECA, The Planetary Society (TPS) and Visionary Products, Inc. (VPI). United Media and the Charles Schultz Associates welcomed our use of the acronym, SNOOPY, since Snoopy has been a mascot of the U.S. Space Program for decades. The MECA instrument suite, developed at the Jet Propulsion Laboratory, was scheduled for launch aboard the canceled Mars Surveyor Lander 2001. 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.* The MECA Nanoexperiments were designed to be flown as part of the MECA Patch Plate and very strict constraints were place on the instruments that students were asked to propose. These constraints are highly educational in themselves and tend to bring out the creativity in students.

MECA Student Successes: Lucas Moller, principal investigator of one of the original experiments selected to fly in 1999 (Figure 1), has accomplished a great deal with his project and ongoing research. He has been recognized by Senator Crapo of Idaho in the U.S. Congressional Record, has been awarded over $40K in travel and research grants by the Idaho Space Grant Consortium and was recently awarded a Davidson Fellowship at the Library of Congress (Figure 2) [2].

Enormous E/PO Leverage Possibilities: Lucas Möller's Angle of Repose experiment [3], demonstrates the E/PO possibilities quite clearly. His experiment, which measures the avalanche angle of the Martian dust using a simple sphere and trigonometry, could very easily be demonstrated on television and on the World Wide Web. Relatively young students can perform the experiment using a doorknob (or other spherical object) from the hardware store and household particulates such as sugar, salt, flour, sand from the local sandbox and various kinds of dirt from their local environment. The ability to directly compare their results to the measured behavior of Martian dust and soil is very powerful because the public will have a context for this new knowledge in their own lives. This capability makes SNOOPY a true "public engagement payload," as it will not only engage the students who propose and are selected to fly their experiments, but potentially every learner with access to the Web or a television. SNOOPY has the potential to be a very high-leverage activity since everyone will be able to perform the experiments themselves and directly compare their own results

with the results of the SNOOPY experiments as they are downloaded from Mars.

A Public Engagement Payload: The SNOOPY project shares the two-part vision of the Mars Exploration Program Public Engagement Plan, "sharing the adventure; and making Mars a real place [4]." Not only does SNOOPY directly fulfill goal number 4 of the Mars Exploration Public Engagement Plan by "creating the means for direct public involvement in missions and programs [5]," it provides the opportunity to teach planetary science, geology, chemistry, physics, etc.

The ultimate goal of SNOOPY: to *inspire the next generation of explorers …as only NASA can.*

References: [1] Kuhlman, K.R., et al. (2002) "SNOOPY: Student Nanoexperiments for Outreach and Observational Planetary Inquiry," published in Proceedings of IEEE Aerospace Conference, Big Sky, MT, March 9-16, 2002, [2] The Davidson Institute Web Site, http://www.ditdservices.org/, [3] Moller, L.E. (2001) "Critical Angle of Repose of Martian Dust," in 32nd Lunar and Planetary Science Conference, Houston, Texas: Lunar and Planetary Institute, [4] Viotti, M. (2002) Mars Exploration Program Public Engagement Plan. p. 5, [5] Ibid. p. 6.

Figure 1. MECA Student Nanoexperiment Scientist Lucas Möller discussing his instrument for measuring the angle of repose of Martian dust with Dr. Martin Towner at the 33rd Lunar and Planetary Science Conference in 2002. Image courtesy of Dr. Greg Möller.

Figure 2. Lucas Möller receiving a 2005 Davidson Fellowship from Bob and Jan Davidson at the Library of Congress, Washington, D.C. for his ongoing research on Martian dust.