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BALLOON RAPID RESPONSE FOR ISON (BRRISON)

Abstract

In September 2012 Russian astronomers at the International Scientific Optical Network (ISON) announced the discovery of an Oort cloud comet predicted to approach the sun in late 2013. For scientists this rarely observed type of comet brought great excitement and also great anxiety with there being barely a year to prepare for observations. Soon after the discovery's announcement, NASA, with leadership from the Glenn Research Center (GRC), began assessing the possibility of a quick response to achieve desired comet science. This assessment and follow-on activities has become the Balloon Rapid Response for ISON (BRRISON) project to rapidly develop a balloon-borne scientific observatory to determine the composition of Comet C2012 S1 (ISON). The Oort Cloud is a distant reservoir of dormant bodies located approximately 10,000 to 50,000 AU from the Sun. Compositional studies of Oort Cloud comets, when they fortuitously visit the inner solar system, provide important opportunities to address how these comets formed. The composition and nature of cometary nuclei are key to understanding the condensation and evolution of primitive materials in the early Solar System. ISON will be observed in the near-infrared, near-ultraviolet and visible wavelengths. A near-infrared camera will measure the ratio of CO2 to H2O emissions from the coma as a vital diagnostic of the comet's origins. The near-ultraviolet and visible camera will observe at the wavelength of the OH emission. These are unique observations that cannot be obtained by any existing space or land-based observatory. The Johns Hopkins University Applied Physics Laboratory (APL) is developing the infrared camera system and the Southwest Research Institute is developing the ultraviolet and visible camera system. APL is drawing upon its experience and flight heritage from the Stratospheric TeraHertz Observatory (STO) balloon mission to integrate the existing STO 0.8-meter telescope with a newly developed gondola frame capable of supporting a ¿1.0-meter

telescope. The new gondola is being designed for use on subsequent flights with the objective to perform decadal survey science at far lower costs than typically required for the same science objectives to be achieved by spacecraft based observatories. As such BRRISON's other objective is to establish an evolutionary path in the development of a balloon-borne planetary science platforms with broad capability to address decadal survey science questions. A one-day flight originating at the Fort Sumner, New Mexico, Scientific Balloon Flight Facility will be conducted between mid-September and mid-October 2013. This paper provides a description of the BRRISON Project.