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Near Space Observations: Planetary Science from a Balloon-Borne Telescope

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Abstract

On 25-SEP-2014, the BOPPS balloon mission (*Balloon Observation Platform for Planetary Science*) launched from Ft Sumner, NM. During its 17-hour flight, BOPPS observed three comets in wavelengths from 0.8 to 4.6 μm with its infrared camera and demonstrated 66 mas image stability with its visible-UV cameras. The BOPPS payload was intended to develop and demonstrate two key capabilities of balloon-borne telescopes: the ability to acquire IR wavelengths that are obscured from the ground or from SOFIA, and the ability to obtain diffraction-limited images at wavelengths shortward of 1 μm, where ground-based adaptive optics systems typically provide poor Strehl ratios.

Now that the successful BOPPS mission is behind us, there is the potential to re-use the BOPPS instrumentation for additional long-duration balloon missions to address other planetary science investigations: a planetary observatory in the stratosphere, with the possibility of performing observations that are proposed and competed by the planetary community. NASA's Columbia Scientific Balloon Facility just flew a record-setting 32-day circumglobal super-pressure balloon mission at southern mid-latitudes. Unlike previous long-duration flights from Antarctica (zero-pressure balloons flying in constant daylight), this recent flight launched from New Zealand and passed through day/night cycles, demonstrating the ability of balloons to carry science payloads weighing up to 3000 lb and provide hundreds of hours of dark time above 99.5 % of the atmosphere.

We will provide an overview of the BOPPS payload and a review of the BOPPS flight. We will highlight the recommended changes that would allow BOPPS to become a general purpose infrared and visible/UV observatory.

1. Figures

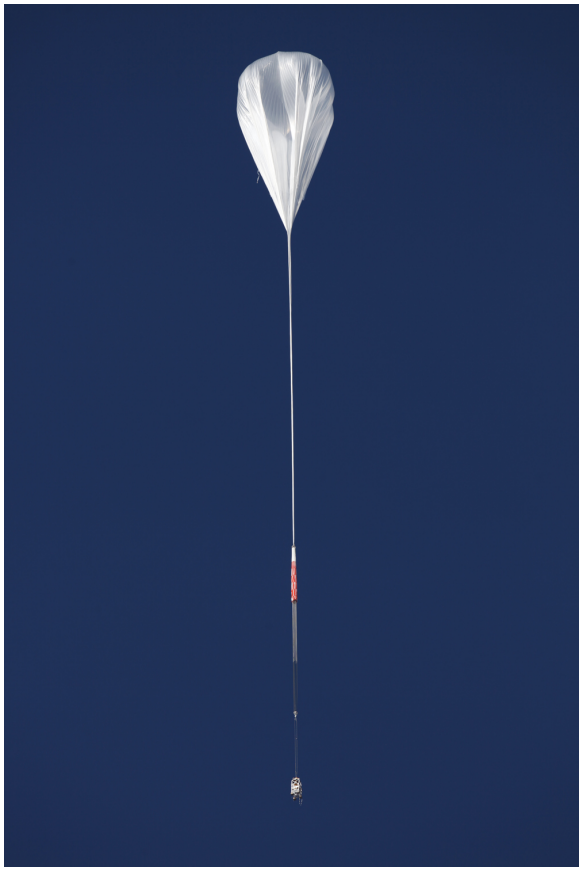

Figure 1: The BOPPS payload is shown here shortly after launch on 25-SEP-2015. The mission reached float altitude near 127,000 ft.