IMPACT OF INSERTION LOCATION ON THE LONGEVITY OF A MARS BALLOON
(IPPW-7)

SCOT C. R. RAFKIN*

Southwest Research Institute
e-mail: *rafkin@boulder.swri.edu*

ABSTRACT

Mars is considered a planet where balloon exploration is feasible. Due to the relatively thin atmosphere, however, balloons generally need to fly at low altitudes in order to obtain sufficient buoyancy to carry the mass of the balloon system itself, a scientifically useful payload, and communication and other spacecraft systems. This presents a problem, because Mars has extreme topography, a good portion of which is not navigable by a balloon.

Using output from GCM and mesoscale models, we show that a careful choice of probe insertion location can maximize the longevity of a superpressure (constant density) balloon. At the same time, improper selection can result in a very short mission lifetime. The Tharsis plateau is the most common impact point for all balloons at low to moderate altitude, and the region is shown to draw in air over a large region. Depending on season, there are also broad regions where balloon trajectories avoid the Tharsis region and instead are caught in circumpolar circulations that permit lifetimes of many dozens of sols with many circumnavigations at middle to high latitudes.