Saltation Sensor

PI: Don Banfield/Cornell University

Target: e.g. Mars surface, Titan Surface, Earth Surface

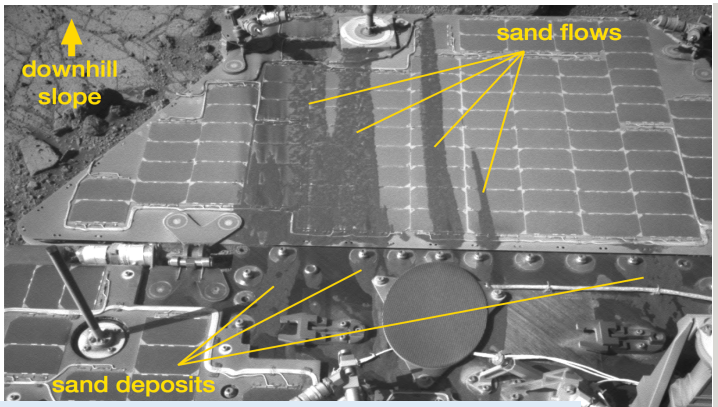
Science:

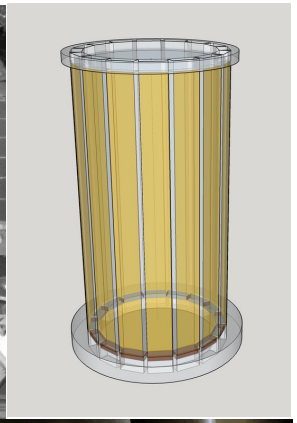
- Improve the operational safety of robotic and human planetary exploration systems
- Quantify the fundamental wind-driven, sand moving process responsible for significant erosion and sedimentation over much of Mars" arid history as well as dune formation on Titan
- Understand saltation's contribution to global dust lifting on Mars.
- Improve characterization of saltation on Earth

Objectives:

- Mature capacitive membrane ultrasonic transducers, optimizing the ability to separately identify grain impact energy and momentum from the returned signals
- Harden the transducers against abrasive saltating flux
- Develop instrument signal-processing back-end to monitor and digest the sensor data for efficient downlink to Earth
- Test the sensor under Mars, Titan and Earth conditions in the lab, wind tunnel and the field

CoIs: Rob Sullivan/Cornell; Ian Neeson, Key Vendor from VN Instruments





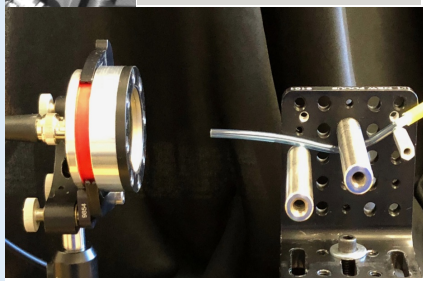


Figure Caption: (top) Sand grains flowing off MER-B's deck. (right) Notional sensor shape with multiple transducers for different impact azimuths. (bottom) image from successful proof-of-concept with existing capacitive ultrasonic transducers being impacted by 250 μm glass spheres.

Key Milestones:

- Commission variable pressure grain gun chamber
- Mature transducers for durability and capability to determine impact energy and momentum
- Develop and mature input modules to monitor an array of transducers
- Develop and mature central processor to digest impact signals and interface with s/c for downlink.
- Wind tunnel and field test instrument

TRL 2 to 5