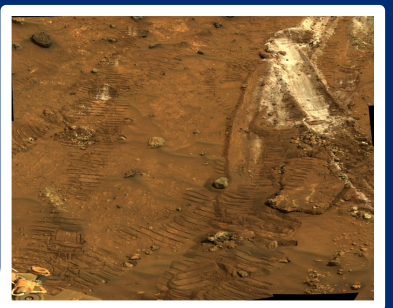
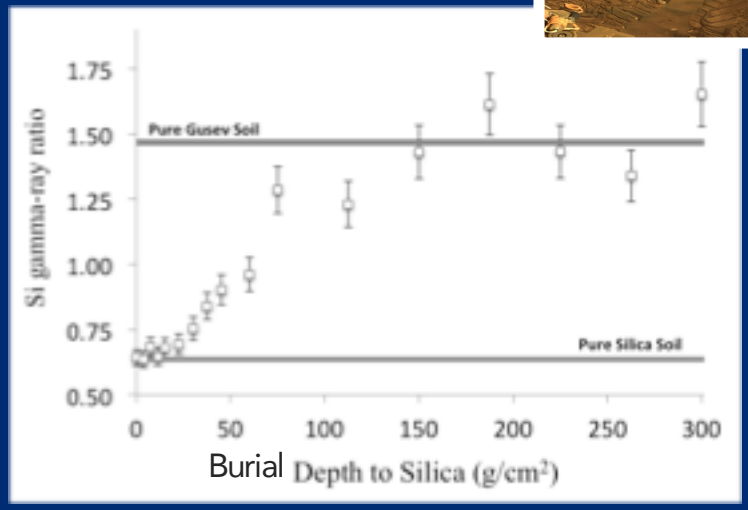
Identifying buried, compositionally-distinct materials on Mars using gamma-ray measurements.

- Identifying and characterizing buried materials is vital for unraveling the history of Mars' surface, but many techniques are only sensitive to the composition of the surface.
- Opaline silica was serendipitously discovered by Spirit's broken wheel (see figure, top) just below the exposed surface.
- Laboratory measurements have demonstrated the utility of gamma-ray data to identify buried materials
- Gamma-ray measurements could be implemented either from orbit or on the surface.

MER Spirit accidentally uncovered opaline silica (white), evidence for a now-extinct hydrothermal environment





Silica is apparent in gamma-ray measurements, even when buried by up to ~100 g/cm^2 (~65 cm) of typical Mars soils.

Gamma-ray measurements can reveal the presence of compositionally-distinct deposits buried several 10s of cm below Mars' surface.

P.N. Peplowski et al. (2017), Nuclear Instruments and Methods in Physics Research B 415, 88-99.