damage to the mineral's crystal structure that is very similar to that observed in Stardust particles. This work is continuing, and will soon involve targets cooled to very low (liquid-nitrogen) temperatures, further increasing the fidelity of the experiments.

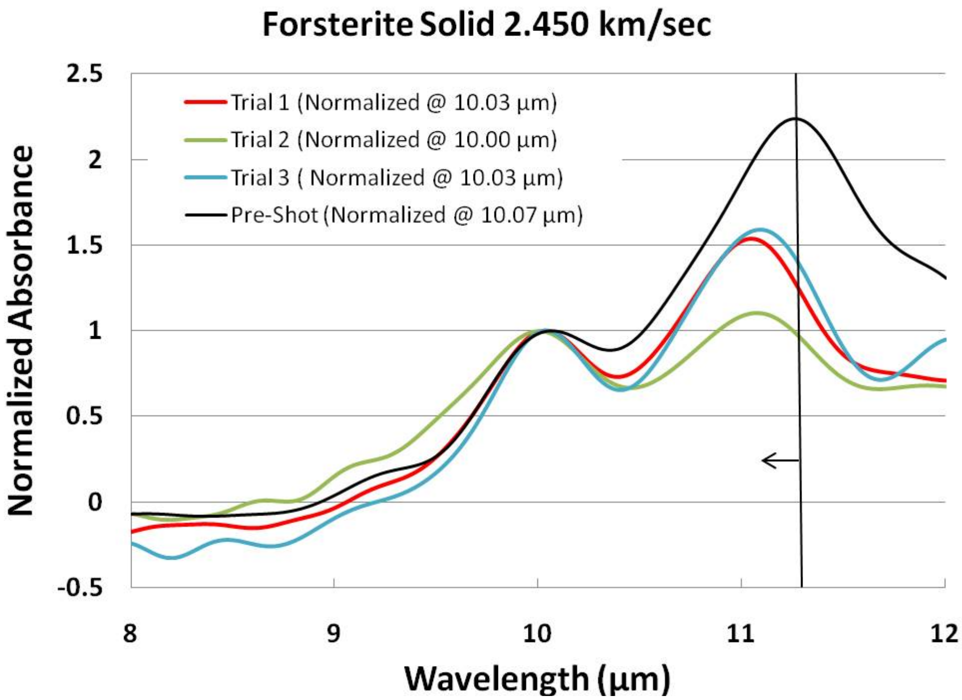

Figure 4.– Comparison of IR spectra from unshocked (black) forsterite and three samples of forsterite shocked in an impact at 2.45 km s^{-1}. The spectra of the shocked samples differ because the fragments were probably not subjected to the same shock level – a spherical projectile generates the highest shock pressure at the point of contact; the shock felt by the target at any other point depends on its location relative to the impact point.

Mars Habitability, Biosignature Preservation, and Mission Support

Dorothy Z. Oehler, Carlton C. Allen

Our work has elucidated a new analog for the formation of giant polygons on Mars, involving fluid expulsion in a subaqueous environment. That work is based on three-dimensional (3D) seismic data on Earth that illustrate the mud volcanoes and giant polygons that result from sediment compaction in offshore settings. The description of this process has been published in the journal *Icarus*, where it will be part of a special volume on Martian analogs. These ideas have been carried further to suggest that giant polygons in the Martian lowlands may be the signature of an ancient ocean and, as such, could mark a region of enhanced habitability. A paper describing this hypothesis has been published in the journal *Astrobiology*.

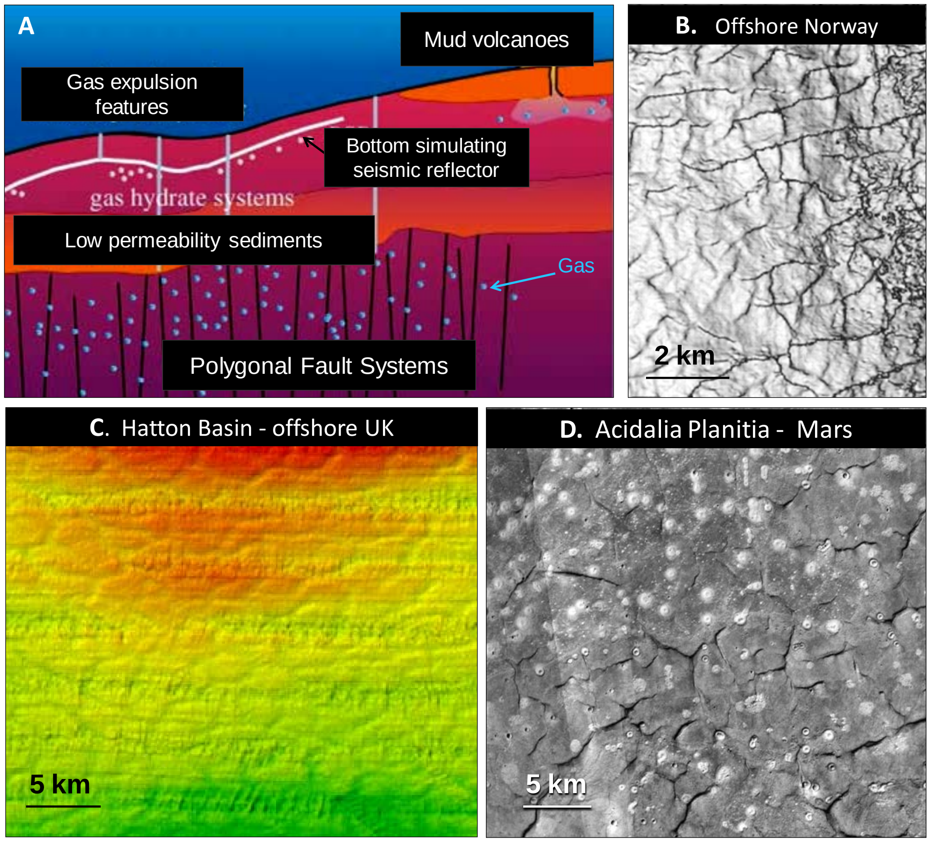

Figure 1.– Examples from Earth and Mars illustrating giant polygons and the processes that may lead to their formation. (A) Sketch showing giant polygons and mud volcanoes that can form in offshore basins (from Berndt, 2005. Phil. Trans. Royal Soc*. A). (B) A map of the Norwegian offshore, created with 3D seismic data, showing giant polygons in the subsurface (Stuevold et al., 2003.* Geol. Soc. London Sp. Publ. *216). (C) Seabed bathymetry showing giant polygons in the offshore Hatton Basin. (D) Images from the Context Camera on NASA's Mars Reconnaissance Orbiter showing giant polygons and bright mounds (interpreted as mud volcanoes) in* Acidalia Planitia*, in the Martian lowlands.*

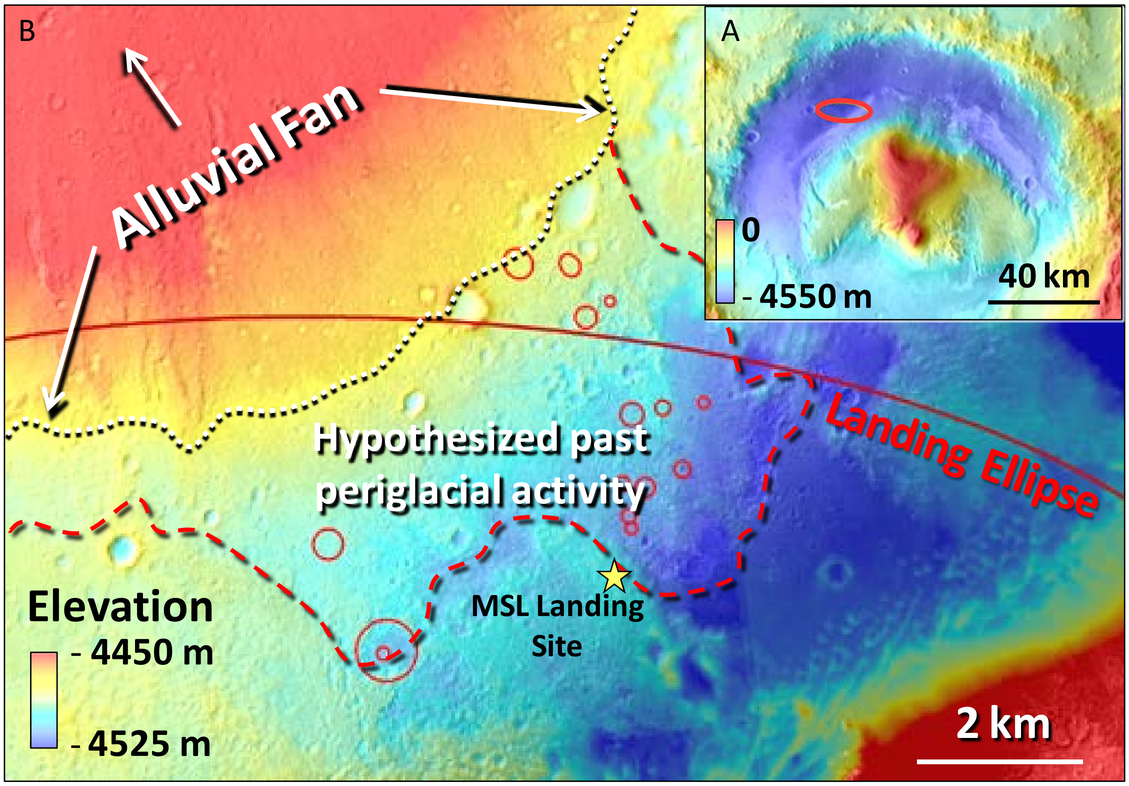

Figure 2.– Gale Crater – landing site for NASA's Mars Science Laboratory Mission. Inset (A) is an elevation map that shows Gale Crater with its central mound of sediments. The landing ellipse (red oval) is in the northwest part of the crater. (B) is a detailed elevation map showing part of the landing ellipse, the landing site (yellow star), and the unit hypothesized to have been affected by periglacial processes. This unit is bounded to the north by the white dotted line and to the east, west, and south by the red dashed line. The red circles are locations of circular patterns of polygons that resemble ice wedge features in periglacial terrain in the Arctic.

After completing work in the landing ellipse, the MSL rover (Curiosity) will traverse to Mt. Sharp, the 5-km-high central mound in Gale Crater. Curiosity is scheduled to begin its exploration of Mt. Sharp in late 2013. The mound is a massive sedimentary deposit thought to record much of the planet's early geologic history. Our preliminary investigation, with the help of Lunar and Planetary Institute summer intern Lisa Korn, supports the contention that the Mt. Sharp deposits are representative of a partially eroded sedimentary sequence covering large areas in the northern hemisphere.