MANNED MARS MISSION EXPLORATION ZONE: GUSEV CRATER-APOLLINARIS SULCI.

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Science Rationale: Our proposed 200 km diameter Exploration Zone centered near 13°S; 175°E is located along the floor and north eastern rim of Gusev crater and Apollinaris Sulci.

Science ROIs: *Noachian age* Gusev crater rim materials/massifs and ancient fluvially dissected cratered plains.

Hesperian age lava flows on the floor of Gusev and dissected fluvial plains located in the highlands outside of Gusev crater.

Hesperian-Amazonia age lava flows from Apollinaris Mons and fluvio-lacustrine deposits in east central Gusev crater as well as in the cratered highlands outside of Gusev crater.

Amazonian age Medussae Fossae Formation materials that are interpreted to be thick deposits of pyroclastic material and welded ash flow tuffs interbedded with aeolian deposits.

Extra Incentives: The Spirit Rover explored a small portion of our EZ, namely the Noachian age Columbia Hills as well as the Hesperian age basaltic plains. The Columbia Hills are most likely the upper remnants of a central peak or peak ring in Gusev Crater.

The two biggest discoveries made by Spirit were the silica–rich hydrothermal deposits and carbonates. The opaline silica deposits (as much as 91 weight percent SiO2) are interpreted to have formed in a hydrothermal environment because they are found in close association with volcanic materials such as Home Plate. Two types of environments could have been responsible for forming these materials: fumaroles or hydrothermal sinter deposits produced by hot springs. This discovery is of paramount importance for understanding the past habitability of Mars because terrestrial hydrothermal environments support thriving microbial ecosystems.

The discovery of carbonates (16 to 34 wt %) in the Comanche outcrops of Haskin Ridge implies extensive aqueous activity under near-neutral pH conditions that would be conducive to habitable environments on early Mars. Additionally, silica and carbonate precipitation are well known to promote biosignature preservation.

A final extra incentive for revisiting this site is that Spirit can be located and inspected (i.e., Apollo 12 and Surveyor III). Thereby making for an excellent long duration exposure experiment providing long-term data on the martian environment, including weathering, micrometeorites, and its effects on materials degradation and other systems (including power, propulsion, and optics). This data will aid in the design of surface systems, equipment and structures for the future robotic and manned exploration of the planet. Perhaps one day a crew will crate up Spirit and bring her back home to be on display and inspire the next generation of Martians.

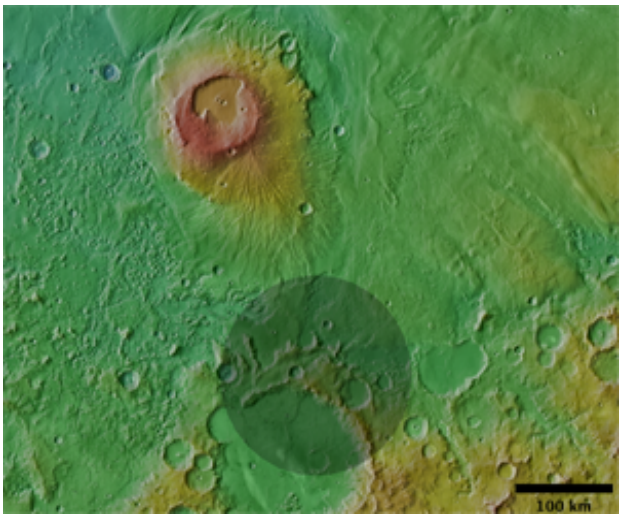

Figure 1. Regional view of the EZ located in the NE portion of Gusev crater and just south of the Apollinaris Mon volcano.

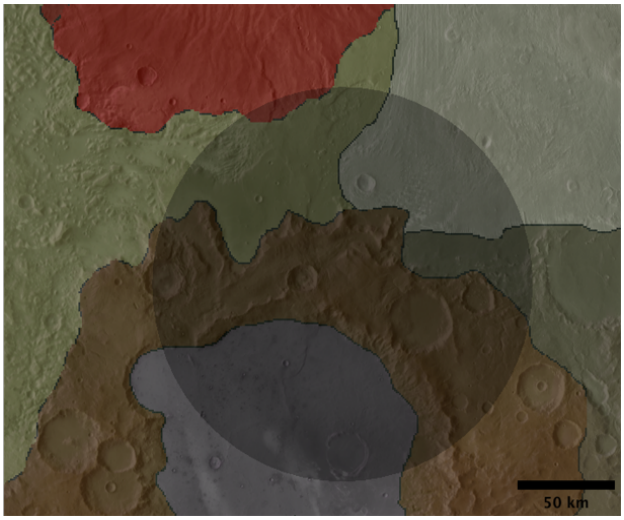

Figure 2. EZ placed on the geologic map of the area.