

UNDERSTANDING AND LOCATING “SPECIAL REGIONS” ON MARS: THE SECOND MEPAG SPECIAL REGIONS SCIENCE ANALYSIS GROUP (SR-SAG2). J.D. Rummel¹, D.W. Beaty², M.A. Jones², N.G. Barlow³, V.J. Hipkin⁴, and the MEPAG Special Regions-Science Analysis Group 2 (SR-SAG2; 26 additional committee members). ¹East Carolina University, rummelj@ecu.edu. ²Mars Program Office, JPL/Caltech. ³Dept. of Physics and Astronomy, Northern Arizona Univ. ⁴Canadian Space Agency.

Introduction: A committee of the Mars Exploration Planning and Analysis Group (MEPAG) reviewed and updated the description of Special Regions on Mars, defined in the COSPAR Planetary Protection Policy as places where Earth organisms might replicate (the basis of this study), or that have a high potential for the existence of extant martian life forms (not the basis of this study)[1]. The review and update was conducted by an international team, drawn from both the biological and Mars exploration communities, to understand when and where Special Regions can/do occur. The study applied recently available data about Mars environments and about Earth organisms, building on a previous analysis of Mars Special Regions (2006) undertaken by a similar team. Since then, a new body of highly relevant information has been generated from the Mars Reconnaissance Orbiter (launched 2005), Phoenix (2007), and data from Mars Express and the twin MER landers (all 2003). Additional results were also gleaned from the Mars Science Laboratory (2011). In addition to Mars data, there is a considerable body of new data regarding the known environmental limits to life on Earth—including the potential for terrestrial microbial life to survive and replicate under martian environmental conditions.

Results: The analysis of Mars Special Regions included:

1. An extensive analysis of both new and previously unavailable data regarding the environmental limits of life on Earth, including both experimental results and environmental observations;
2. An examination of extensive post-2006 observational data sets, including high spacial and temporal resolution data from orbit and new data from landed spacecraft;
3. New models of Mars relevant to natural environmental variation in water activity and temperature;
4. Review and reconsideration of the current parameters used to define Special Regions;
5. Updated maps and descriptions of the Mars environments that are recommended for treatment as “uncertain,” or “special”, including the identification of locations on Mars for which we cannot demonstrate are not special; and
6. The impact (helpful and challenging) of Special Regions on future human activities on the martian surface.

Several significant changes in our appreciation of the capabilities of Earth organisms and the availability of Mars environments have led to a new appreciation of the potential for Mars Special Regions to be identified and protected.

References: [1] Rummel, J. D. et al. (2014) *Astrobiology*, 14: 887-968.