Advances in Astronomy

Special Issue on

Mars Climate Evolution, Habitability, Astrobiology, and Resources

CALL FOR PAPERS

Physical evidence from Martian rocks, including future sample return and the evidence already available from meteorites, provides us with new clues on the history of the red planet. Mars' potential for both harbouring life and for providing in situ resource utilisation (ISRU) for future human missions requires us to increase our understanding of the primary locations and minerals hosting water. From an astrobiological point of view, Mars is also a fantastic planet, as ancient hydrothermal activity in Gale Crater implies a potential environment for microbial life on the planet's surface. New exploratory missions have also recognised the possible presence of subsurface environments with the potential to host simple organisms, challenging future sample return. This has been reinforced in the last decade by the NASA finding of underground ice and the Italian discovery of a subglacial lake. The presence of life the history of Mars continues to be an open question.

Several space missions have revealed that water was abundant very early in Mars' history. Still, the harsh conditions now present allow only a tiny fraction of it to be found on or near the surface, as either brines, ice, or bound into the structure of water-rich minerals. This Special Issue will focus on the discussion of some of these features: transient briny outflows (e.g., dune flows, reactivated gullies, slope streaks, etc.), diurnal shallow soil moisture, geomorphic evidence for transient lakes and rivers, and the existence of permafrost and groundwater, as recently discovered by orbiting probes and surface rovers. On the other hand, the study of returned samples and meteorites will provide ground-truth evidence on the action of water over time, clues on climatologic evolution, and the most suitable locations to perform ISRU. Laboratory studies of samples and Martian achondrites will provide detailed information about the chronological action of water in Martian terrain. The question remains as to what other scientific and technological opportunities will motivate the future exploration of Mars. There is no doubt that due to its location near the main asteroid belt and it being subjected to a large flux of asteroid impacts over time, together with the retention of a weak atmosphere during most of its evolution, the red planet a fascinating body to study. The study of the surface made by rovers has already identified meteorites on the surface. Martian achondrites have also revealed that some surface regions are almost intact from the most ancient bombardment, pointing to Mars as a planetary embryo.

This Special Issue aims to collate original research and review articles with a focus on advancing our global knowledge of the red planet. We particularly welcome submissions that increase our understanding of Mars' atmospheric and morphologic evolution, and water and habitability potential, as well as review articles discussing the current state of the art in these fields.

Potential topics include but are not limited to the following:

- Evidence for climatic change from space missions
- Challenges of sample return from Mars
- The action of water in Martian rocks as determined from rovers, orbiters, and meteorites
- Evidence for Martian vulcanism
- Martian environments and habitability in the past and present
- Preparation for human Mars exploration and the search for Martian resources

Authors can submit their manuscripts through the Manuscript Tracking System at https://review.hindawi.com/submit?specialIssue=714302.

Papers are published upon acceptance, regardless of the Special Issue publication date.

Lead Guest Editor
Javier Martín-Torres, University of Aberdeen, Aberdeen, UK
javier.martin-torres@abdn.ac.uk

Guest Editors
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eriita.jones@unisa.edu.au

Conor A. Nixon, NASA Goddard Space Flight Center, Greenbelt, USA
conor.a.nixon@nasa.gov

Josep M. Trigo-Rodríguez, Institute of Space Sciences (CSIC-IEEC), Barcelona, Spain
trigo@ice.cat

Sanjay Vijendran, European Space Agency – ESTEC, Noordwijk, Netherlands
sanjay.vijendran@esa.int

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