

Editorial

# The Mars Journal

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## Abstract

**Background:** The success of recent Mars missions is resulting in an explosion of new scientific information that is revolutionizing our understanding of almost every aspect of the planet. Exciting new Mars data combined with ambitious plans for future Mars missions has given rise to a vibrant and growing international Mars community.

**Description:** The Mars Journal has been created to serve the unique needs of the Mars community and to accelerate the pace of Mars research and exploration by providing rapid peer-review and publication of scholarly papers and supporting online data, free and open internet access to all papers and online data, and an authoritative and interdisciplinary forum for Mars science, technology and policy.

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## Introduction

The Mars Journal is a new peer-reviewed scholarly journal published formally as Mars: The International Journal of Mars Science and Exploration. This, the journal's first published paper, outlines the rationale for the creation of the journal and describes its key attributes.

### The growing international Mars community

The planet Mars has always been intriguing to humans. In a relatively short span of years, our view of Mars has evolved from a reddish bright point in the night sky to a diverse and dynamic world with a rich geologic, climatic, and possibly even biologic history that is literally waiting for us to explore. During the past decade, with the success of recent missions, the pace of Mars science and exploration has increased markedly. At the time of this writing, there are three Mars orbiters and two Mars rovers presently operating, returning volumes of spectacular new data that are revolutionizing almost every aspect of our understanding of the planet. During the next decade, there are plans for a string of even more ambitious robotic missions that will doubtlessly add new dimensions to our current knowledge. Looking even farther into the future, many envision a time in which a much wider range of human activities will be extended to Mars, including permanent human habitation.

The upsurge in interest in Mars has created a vibrant and

growing international Mars community that can be divided into four general groups. The first consists of scientists, engineers and managers who are actively involved in ongoing Mars missions. The second consists of scientists, engineers and managers who are analyzing the results of past and present missions, conducting Mars-related theoretical, laboratory and analog studies, and developing technology and planning for future missions. The third consists of students and professionals from related fields who are interested in becoming involved in Mars-related research and exploration. The fourth consists of members of the press and the general public who are interested in obtaining the latest information about Mars from primary source publications. The Mars Journal has been created to enhance the productivity and facilitate communication between these four groups in the Mars community.

### The need for a Mars-focused scholarly journal

The publication of peer-reviewed papers in recognized scholarly journals is the "gold standard" for the establishment and dissemination of knowledge. Presently, the peer-reviewed Mars literature is scattered among many journals that, individually and collectively, do not fully meet the unique needs of the Mars community. The Mars Journal is intended to fill a widening gap in the publishing landscape by providing an interdisciplinary forum for scholarly papers in Mars science, technology and policy. The journal is not intended to supplant the roles of existing journals, but rather

to provide a new vehicle to facilitate the intellectual expansion of the Mars community. The intended impact of The Mars Journal in the fields of Mars science, technology and policy is described in the following sections.

## Science

Rapid publication of new results is highly desirable in the sciences. In rapidly evolving fields, the rate of progress can be paced by the time required for publication. This situation is especially true for Mars research, where favorable launch opportunities occur every 26 months, and the analysis of data from ongoing missions is vital for the planning of upcoming ones. Currently, prospective authors of most Mars-related science papers are faced with a choice between two classes of non-optimal journals.

On one hand, there are high-profile journals such as *Science* and *Nature* that offer fairly rapid publication, a broad audience and very high prestige. However, because of the demographics of their readership and their advertisers, these journals are only able to publish a limited number of Mars papers each year. Furthermore, the chances of acceptance of submitted papers in all fields is extremely low, especially for Mars papers that are not reporting the latest results from ongoing missions. The high-profile journals also have severe space limitations, which restricts the ability of authors to fully present their methods and results, as well as the ability of other researchers to reproduce their published findings. Additionally, the editors of high-profile journals rely heavily on the advice of peer reviewers to judge both the content and significance of submitted papers because they are not themselves Mars experts.

On the other hand, there are the specialty journals such as *The Journal of Geophysical Research (Planets)*, *Icarus*, *Planetary and Space Science*, and *Earth and Planetary Science Letters*. These journals offer high prestige, higher rates of acceptance, fewer length limitations, and expert editing. However, publication times for these journals are quite long, often approaching one year from submission to publication. *Geology* and *Geophysical Research Letters* offer shorter publication times, but impose strict length limits and currently publish relatively few Mars papers.

The Mars Journal fills the gap that currently exists between the high-profile and specialty journals for Mars science papers by providing rapid publication, high prestige, expert editing, and no length limitations. Over time, the net effect of the journal will be to increase the overall number, speed, and quality of Mars-related science publications, and increase the pace of Mars research itself.

## Technology

The development and implementation of technology is the fundamental driver of Mars exploration. Presently, very few Mars technology papers are being published in peer-reviewed scholarly journals. Some technology work is published directly on the internet, in conference proceedings, or in other forms of non-peer-reviewed gray literature. Some

peer-reviewed specialty journals publish Mars instrument and mission description papers, but generally only for investigations that have been selected for flight by space agencies.

The relative paucity of peer-reviewed Mars technology papers can be traced largely to the existing culture within the Mars technology community, where there are fewer professional incentives for publishing in the peer-reviewed literature than in the sciences. In some organizations, publication of technology information is discouraged or even prohibited to protect competitive advantage. The net result is a shadowy and inefficient world in which technology concepts are developed and proposed by various organizations without the full benefit of experience gained from relevant past activities.

The Mars Journal provides a much-needed outlet for those in the Mars technology community who wish to publish their results in the open peer-reviewed literature. The journal accepts high-quality papers relating to technologies at all stages of development, from preliminary concepts to lessons learned from past missions. The free availability of reliable Mars technological information should result in an overall increase in the collective "know how" and efficiency of the community, as well as cost savings to the space agencies that fund Mars technology research.

## Policy

The direction and priorities for Mars exploration is a topic of wide interest and great importance, but currently there are few peer-reviewed papers published in this area. The exploration of Mars presents a host of difficult issues relating to science priorities, exploration strategy, planetary protection, and the potential impacts of robotic and human exploration on Martian and terrestrial environments. The Mars Journal provides a forum in which scholars from a wide range of backgrounds can present their policy views and critique the policy views of others. It is hoped that the existence of a forum will encourage wider participation and involvement in the formulation of Mars-related policy, as well as a greater understanding of these issues by the Mars community and the public.

## Mars Journal features

The Mars Journal includes several innovative features, some of which have been employed successfully by other publications, and some of which are unique to the Mars Journal.

### Online publication

The Mars Journal has been launched as an online publication. The advantages of online publication in the areas of speed, cost, and potential accessibility are undeniable. Many well-respected scholarly journals now consider their online versions to be the versions of record. To the reader, however, The Mars Journal looks and feels much like a conventional print journal, and it is expected that many

readers will choose to read the journal in printed form. Readers may print their own copies or purchase high-quality printed copies of individual papers or compilations of papers in volume format.

The topic of online publication of scholarly journals invariably brings up the issue of archiving and the long-term preservation of digital content. This issue is currently being faced throughout the publishing industry, and there are several emerging approaches. The Mars Journal self-archives its content in printed and digital form, and will seek to be included in multiple independent digital archives. The most immediate prospect is the LOCKSS (Lots Of Copies Keeps Stuff Safe) system developed at Stanford University, which allows libraries around the world to maintain local digital copies of online journal papers and provide them to their users even if the original online source is no longer available.

### Open access

Currently, most Mars-related peer-reviewed scholarly papers are not freely available online to the general public. Readers must either work for an organization that subscribes to the online version of the journal, belong to the organization that publishes the journal *and* pay an online subscription fee, or pay the publisher directly for online access to the paper. Fundamentally, this situation has arisen because in the traditional publishing model, sustainable widespread distribution of published material is enabled through some form of limitation to access.

The Mars Journal is an open access publication, which means that anyone can read, download, copy, distribute, print, search, or link to the full texts of published papers at no charge, and without the need to register. Open access allows authors to retain copyright to their original work, while enjoying the widest possible access to their papers by other researchers, and the public at large.

Open access to scholarly publications has been a topic of much discourse during the past few years. There are a growing number of open access scholarly journals currently publishing, and the movement appears to be gaining momentum. One of the best arguments in favor of open access is that the public should not have to pay for access to the results of publicly funded research. In response, it is argued that the collection subscription fees is a legitimate means of supporting the good work of professional and scholarly societies, and that journals that provide value-added news and analysis services are entitled to the subscription fees paid by their readers. The Mars Journal does not intend to become involved in strident debates regarding the merits of various publishing models, but instead focus on producing a high-quality publication. Open access is a desirable feature of The Mars Journal, but it is by no means its primary reason for existence.

### Online supporting data and citations

Reproducibility of results is one of the essential components of the modern scientific method. All papers published in The

Mars Journal will contain enough supporting material and/or references to allow another expert in the field to reproduce the paper's results. The basic principle that underlies this requirement is that if researchers want scientific credit for the publication of their results, then they must publish their results in formats that can be readily utilized by other researchers. The biomedical field has successfully adopted similar standards for the publication of genomic sequence data. An analogous policy is both feasible and desirable for The Mars Journal.

The format of Mars Journal papers allows authors to insert hypertext links to online supporting data directly into their manuscripts. Online data can be in the form of images, numerical data, source code, and most other information that can be displayed in a standard web browser. All supporting data are peer-reviewed, and there are no limitations on supporting online data volume. With this format, authors are free to publish extensive datasets and source code trees that can be downloaded and utilized by other researchers, and cited in future publications.

In addition to a standard reference lists, Mars Journal papers also include inline hypertext links to all DOI (Digital Object Identifier) citations to provide readers with quick access to cited works. Published Mars Journal papers themselves have their own DOI's as well as access to a forward linking service provided by CrossRef, which allows researchers to obtain up-to-date links to subsequently published papers that cite papers published in The Mars Journal.

### Streamlined publication flow

The Mars Journal employs a streamlined publication flow to enable both high quality and speed. Authors prepare their manuscripts and supporting online data in a ready-to-publish format using commonly available document preparation software, with the aid of detailed templates and examples provided by the journal. While this approach may seem a burden to authors from less technologically savvy fields, most members of the Mars community routinely produce high-quality documents for reports and proposals as part of their normal professional activities. Mars Journal authors are able to exercise complete control over the formatting of their manuscripts and thus eliminate errors, inefficiencies and delays that are commonly associated with publisher's typesetting and art departments. Nevertheless, the journal offers formatting services to authors that are unable or unwilling to submit their papers in ready-to-publish form.

The Mars Journal publication flow is similar to that of most scholarly journals. Newly submitted papers are first reviewed by the Chief Editor for general suitability and then assigned to an Associate Editor who is a recognized expert in the author's general field. Associate Editors then select two or more outside peer reviewers who provide detailed comments and recommendations. Associate Editors then synthesize the peer reviewers' comments into a well-reasoned and balanced set of recommendations to the authors, who then revise and resubmit their manuscripts for final publication. In a parallel process, the journal's editorial staff reviews each submitted

manuscript for conformance to the journal's formatting requirements, and provides authors with a separate list of recommended revisions. All journal activities are facilitated and logged through the journal's secure web site. All papers published in The Mars Journal must meet a uniform set of standards for publication, and must be approved by an associate editor and the journal's editorial staff.

### Semi-open peer review

It is well-recognized that the peer review process as currently practiced by scholarly journals is far from perfect. Critics charge that peer review is open to manipulation, that it can't be relied upon to ensure accuracy, and that it is nearly blind to intentional efforts to deceive. They argue that peer review can do no more than certify that a given work is "good enough to publish" in a given journal, whatever the journal's particular standards. Defenders of peer review point out that despite its flaws, the peer review process is probably better than the available alternatives, and that errors and omissions in the literature caused by defects in the peer review process will eventually be corrected by subsequent peer reviewed papers over time.

The Mars Journal employs a semi-open peer review process in which the names of reviewers and editors that recommend publication are revealed in the final published version of each paper. In this semi-open system, reviewers retain the freedom to recommend rejection of papers in anonymity. The system is intended to acknowledge the contributions of peer reviewers, to encourage reviewer responsibility, and to provide authors and readers with proof of the journal's rigorous peer review process.

### Public accessibility

Because of widespread public interest in Mars science and exploration, as well as the journal's open access policy, the journal's format is designed to facilitate communication of its results to the public. While the journal cannot afford to provide extensive news and views commentaries, authors are required to submit short two-sentence summaries of their papers and a representative captioned illustration for public consumption. Abstracts of the papers themselves are in the form of short paragraphs with descriptive headings to help readers quickly ascertain the paper's main points.

### Outlook

The Mars Journal represents a powerful new intellectual vehicle for the Mars community. Where the community takes this vehicle is largely an experiment in sociology. The Mars Journal aspires to be the place where the best people in the field publish their best work. However, all new scholarly journals, regardless of their publisher, face a challenge when it comes to community acceptance. The Mars Journal originated from within the Mars community, and its format and policies have been refined substantially based on community feedback. The fact that the journal is presently under no external pressure to publish large numbers of papers means that it has the luxury to be rather picky about

what it will publish. Thankfully, the papers that have been formally submitted to the journal thus far have been of high quality, and this bodes well for the journal's aspirations to achieve a high level of prestige.

In addition to the challenge of attracting high-quality papers, The Mars Journal faces challenges in managing its interdisciplinary content and ensuring its long-term sustainability. Standards for scholarly papers are not nearly as well-defined in the fields of technology and policy as they are in field of science. This imbalance could undermine the journal's desire to apply uniform standards to all published content. On the economic front, the long-term sustainability of open access publishing has yet to be demonstrated, and the survival of any new journal in the competitive field of scholarly publishing cannot be assured. The Mars Journal has built in advantages in that it serves a high-profile, forward-looking, and generally well-funded community whose publication options have not kept pace with its growth. The journal itself is run by a small number of highly competent and motivated individuals who are fully dedicated to the journal's success. It is hoped that The Mars Journal will soon become an integral part of the Mars community, and itself become a catalyst for understanding, discovery and growth.

The message of this editorial is the availability of a new publishing medium for the Mars community. As always, those with questions, comments, and suggestions are encouraged to contact the Editor.

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