

BOOK REVIEW

Book Review: *The International Atlas of Mars Exploration: From Spirit to Curiosity: Volume 2. 2004 to 2014.* (2016) By Philip J. Stooke. Cambridge University Press. ISBN: 978-1-1070-3093-0, 444 p. \$125.

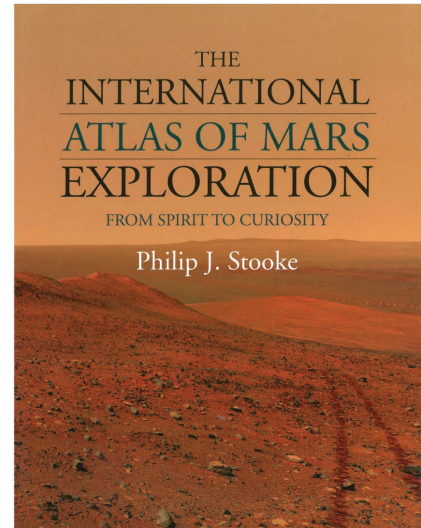
The International Atlas of Mars Exploration: From Spirit to Curiosity: Volume 2 is a wonderfully thorough collection of maps that contextualize human exploration of Mars between 2004 and 2014. These maps are presented at many scales; from hemispherical maps of potential landing sites across Mars to centimeter-scale maps of brushed spots and laser imprints on surface rocks investigated by surface rovers. By presenting maps in a chronological series based on both proposed and actualized Mars missions, Stooke provides a valuable resource for the spatial, temporal and mechanical context of our selection of Mars landing sites and specific surface observations. While missions are presented in chronological order within the atlas, there are primarily two types of places discussed: (1) potential landing sites, and (2) the four sites where we have landed surface-based missions Spirit, Opportunity, Phoenix, and Curiosity.

One of the most significant decisions associated with sending a surface mission to Mars (or Phobos or Deimos) is selecting a landing site. The landing sites are first constrained by the engineering of the spacecraft landing system and power supply, which typically restrict the latitude, longitude, elevation, and smoothness required of a landing site, along with the scale of the ellipse over which the safety requirements for landing must be met. Once engineering requirements are met, then the scientific debate begins: which site is the most likely to meet the scientific objectives of the mission? The most likely to have an interesting variety of targets? The most likely to contain evidence for past water or habitability? While a wide variety of potential landing sites are vetted, only one can be selected for each mission, and the others, worthy though they may be, can be in danger of falling away from collective memory. Stooke's meticulously compiled records are the antidote to this problem. For each mission (whether merely proposed or funded and completed), and for each stage in the landing site selection process, he documents the engineering constraints, landing ellipse sizes, brief scientific descriptions, and precise coordinates of each landing site in both tables and maps. This full set of tables and maps are not compiled elsewhere at this level, and constitute an invaluable contribution to the records of space history.

After a landing site is selected and a rover or lander successfully lands, another scale of exploration begins. Here again, for the Spirit, Opportunity, Phoenix, and Curiosity missions, Stooke has compiled an excellent resource for retracing spacecraft ex-

ploration activities in the form of daily to weekly descriptions of mission targets and observations and detailed maps of the rover locations, major targets, and landscape features. The description of mission activities includes key details that directly affect the rover's path or observations, including: the mechanical and computational state of the spacecraft and instruments, the science questions driving the investigation, effects of the martian seasons and weather, the names selected for rock targets, and even how the category of names was selected for that mission/region. The maps show the rover traverse, sols spent at each stop, key observations, and surface textures from high-resolution satellite images. These maps are interspersed with rover- or lander-based panoramas with topographic features labeled, and rover and lander images of surface features created by the spacecraft, including trenches dug by Phoenix, brushed analysis spots by the rovers, and drill holes from Curiosity.

Together, these descriptions, tables, and maps constitute an important resource for researchers, space historians, or anyone interested in retracing the steps of these four missions, which have dramatically changed our understanding of our neighboring planet. Those who are particularly interested in searching for the context of specific observations, instead of retracing the story of robotic exploration, may wish to select the online version of this book to quickly find specific observations or locations in the tables and maps.



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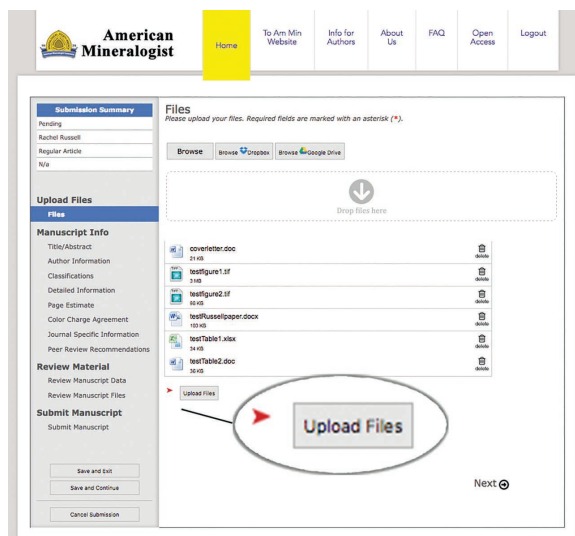
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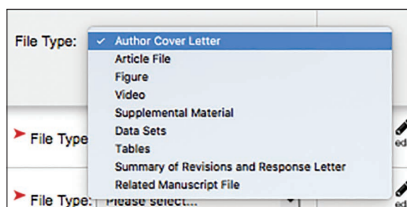
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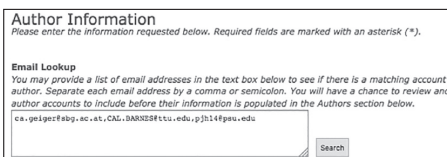
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