

December 19, 2007

SMD/Planetary Science Division

Mr. Paul Withers
Center for Space Physics
Boston University
725 Commonwealth Avenue
Boston, MA 02215-1401

Dear Mr. Withers:

I am pleased to inform you that your proposal entitled "Development of a Mars ionosphere model with time-dependent solar forcing for studies of solar flare effects" (07-MFRP07-0008), submitted in response to NNH07ZDA001N, Research Opportunities in Space and Earth Sciences (ROSES-2007) for the Mars Fundamental Research program (MFR) received a favorable review from the MFR Review Panel, and is likely to be funded in FY2008. Until the federal budget process is concluded, I cannot be definite about the level of funding for your proposed work

The MFR Review Panel provides a comprehensive peer review that involves both external and panel reviewers to evaluate the scientific merit, relevance, and cost effectiveness of the proposed investigation. It is the panel's consensus evaluation of a proposal that forms the primary basis for selection or rejection, and a copy of the consensus evaluation is enclosed for your information. It is hoped that this information may be useful to you in any future proposal submissions.

When the budget for the MFR program is finalized (in January or February) you will receive a second letter including the funding level and important information related to your project.

Once again, I would like to extend my personal congratulations to you on the successful review of your proposal. If you have questions concerning the evaluation of your proposal or the MFR Program, please contact me at 202-358-1254 or via e-mail at marilyn.lindstrom-1@nasa.gov.

Sincerely,



Dr. Marilyn M. Lindstrom
Discipline Scientist
Mars Fundamental Research/MESSENGER Mission PS
Astromaterials Curation and EPO
Planetary Science Division
Science Mission Directorate

Enclosure

cc: Office of Sponsored Programs

**Planetary Science Research Division Review Panel
Mars Fundamental Research Program 2007
Consensus Review**

Proposal Title: Development of a Mars ionosphere model with time-dependent solar forcing for studies of solar flare effects

Proposal Number: 07-MFRP07-0008

PI Name: Withers, Paul

PI Institution: Boston University

All proposals and reviews are proprietary and should be handled by the reviewer in a confidential manner.
Comments on this page may be transmitted anonymously to the proposer.

SUMMARY OF RESEARCH OBJECTIVES:

The goal of the proposal is to understand the impact of the variable solar flux - mainly in the form of flares - on the lower (“bottomside”) ionosphere. The role of photo-electron impact ionization is specifically mentioned as one key mechanism that will be modeled. Additional upgrades to an existing model are described. They will save Ne profiles from their code for comparison against satellite data. Several series of simulations are discussed to probe various science questions.

Overall Adjectival Score (Choose one (X)):

EXCELLENT		VERY GOOD		GOOD		FAIR		POOR
		XX						

SUMMARY OF EVALUATIONS

Intrinsic Merit

Intrinsic Merit Strengths:

- (Major) Modeling the effect of time-dependent (transitory) impacts on the ionosphere/atmosphere of Mars, including those from solar events, is a much needed activity. These potentially important events have been excluded from most modeling efforts, which tend to focus on steady-state or quiescent conditions.
- (Major) The upgrades described for the existing model are clearly outlined and will likely lead to significant improvements in future runs (solar flux, photo-electron impact ionization), using very appropriate modeling tools
- (Minor) Modeling efforts will be developed with measurements as a guide, and validated using known solar flare events as recorded by MGS.
- (Minor) The approach in modeling the parameter $R(z)$ (ratio of photo-electron impact-produced ions/photo-ionization ions) as a function of observed Ne appears to be an elegant method to infer the importance of photo-electron impact ionization.
- (Minor) Good team, PI has established history in the area of research and a working knowledge of the relevant data from the MGS radio experiment.

Intrinsic Merit Weaknesses:

- (Minor) The limited number of suitable events may make it difficult to select the best parameterization(s), especially for the more open-ended Task #3.
- (Minor) Examining only Ne and not other ionospheric quantities (ion densities, composition, temperature, etc.) raises concerns about the improvement of our understanding of the physical processes leading to the Ne variations.

Relevance to NASA Objectives

Relevance Strengths:

- (Major) Relevant to a list of MEPAG goals on understanding the energy inputs to the system
- (Major) The work is definitely needed for an accurate understanding of X-ray impact on the lower ionosphere
- (Minor) Relevant to the upcoming Mars Scout missions in Phase A study
- (Minor) This may impact the ability of orbital radars (i.e., MARSIS and SHARAD) and also provide constraints on atmospheric loss processes

Relevance Weaknesses:

- None identified

Cost Realism/Reasonableness

Cost Strengths:

- (Major) This project is well suited to a graduate student, and the use of a student to do most of the work is cost effective.

Cost Weaknesses:

- None identified

Overall Evaluation

The proposed work will extend an existing 1-D ionosphere model to handle time-dependent solar flux inputs and relevant lower ionospheric chemistry to quantify the influence of solar flares on the bottomside ionosphere. The method (model development and usage) is reasonable and well defined. It will be the first quantification of the effect of flares on the Mars ionosphere. The proposal is therefore rated VERY GOOD.

Additional Comments:

Comments to PI:

Be sure to make the photochemistry additions to the model as discussed in the proposal, or the results may not be accurate.