

Project Details

ROSES ID: NNH07ZDA001N

Selection Year: 2008

Program Element: Focused Science Topic

Topic: Joint Focus Topics with Planetary Science: Extreme Space Weather Events in the Solar System

Project Title:

Simulations of the Effects of Extreme Solar Flares on Technological Systems at Mars

PI Name: Paul Withers

PI Email: atn@g.ucla.edu

Affiliation: Boston University

Project Member(s):

- Chamberlin, Phillip C; Collaborator; NASA
- Galand, Marina ; Collaborator; Imperial College London
- Mendillo, Michael ; Collaborator; Boston University

Summary:

We propose to study the effects of extreme solar flares and other disturbances on the Mars ionosphere in support of the Joint Focus Topic on Extreme Space Weather Events. Such flares will increase plasma densities at relatively low altitudes on timescales of minutes to hours. Ionospheric total electron content will change, affecting the accuracy of GPS-like navigation systems. Radio wave attenuation due to D-region absorption will change, affecting communications systems. GPS range error and radio signal attenuation will be calculated from a suite of ionospheric simulations. Several different flares will be simulated using time-dependent solar irradiances. Solar zenith angle and other model inputs will be varied to explore parameter space.

Publication References:

Summary: no summary

Reference: Mendillo, Michael; Withers, Paul; (2008), Solar Flare Effects Upon the Ionospheres of Earth and Mars, RADIO SOUNDING AND PLASMA PHYSICS: 2007 Radio Plasma Imager Science Team Meeting, April 27, 2007; Radio Sounding and Plasma Physics Symposium, April 29, 2007; XI International Digisonde Forum, April 30 May 3, 2007. AIP Conference Proceedings, Volume 974, pp. 58-70, doi: 10.1063/1.2885034

Summary: no summary

Reference: Withers, Paul; (2009), A review of observed variability in the dayside ionosphere of Mars, Advances in Space Research, Volume 44, Issue 3, p. 277-307, doi: 10.1016/j.asr.2009.04.027

Summary: no summary

Reference: Lollo, Anthony; Withers, Paul; Fallows, Kathryn; Girazian, Zachary; Matta, Majd; Chamberlin, P. C.; (2012), Numerical simulations of the ionosphere of Mars during a solar flare, Journal of Geophysical Research, Volume 117, Issue A5, CitelD A05314, doi: 10.1029/2011JA017399