Updates from Boston University

Mars Upper Atmosphere Network Meeting #3

Italy, Sept 16-17

Paul Withers, Majd Matta
Model the generation of $[O_2^+, O^+, CO_2^+, N_2^+ \text{ and } NO^+]$ ions and electrons in the Martian ionosphere between 80-400 km.

Apply PC+Transport (vertical, horizontal) with a 2\textsuperscript{nd} dimension large enough to include a characteristic crustal magnetic field ($\sim 10^\circ$).
2D Model, Preliminary Results

Noon densities, $\theta = 90^\circ$, PC

- [O2$^+$]
- [O$^+$]
- [CO2$^+$]
- [N2$^+$]
- [NO$^+$]

Noon densities, $\theta = 90^\circ$, PC+Diff

- [O2$^+$]
- [O$^+$]
- [CO2$^+$]
- [N2$^+$]
- [NO$^+$]
More Preliminaries
More Preliminaries + Future Work:

Difference between PC only and PC+Diffusion densities for $I_B=90^\circ$

Difference between PC only and PC+Diffusion densities for $I_B=0^\circ$
Modeling Mars Twice:

(a) MGS Data
(b) MCS Simulation
(c) MEX Data
(d) MEX Simulation
Understanding Model Variability

Changed input parameters:
- neutral atmosphere
- electron temperature
- 2nd-ary ionization rate

and then compared with measurements
MUAN Online Forum @ BU:

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[Moderator: withers]

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<td>mfraenz</td>
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Mars Upper Atmosphere Network

The Mars Upper Atmosphere Network is a collaborative effort among US and European institutions where member scientists specifically interested in the upper atmosphere of Mars convene to network and share ideas across instruments and Martian satellites. If you are interested in participating, contact Paul Withers or Majd Matta.

- **Members**
- **Forum**

To participate in the Mars Upper Atmosphere Network's discussion forum, click [here](http://www.bu.edu/csp/MUAN) and find the "Mars Upper Atmosphere Network" forum. A Boston University username and password are required for access; please contact [Paul Withers](http://www.bu.edu/csp/MUAN) to obtain one.

- **Mars Express Campaign - March 2010**
- **Future Mars Express Campaigns**
- **Publications and Documents**
- **Meetings**

http://www.bu.edu/csp/MUAN (case sensitive)
Radio Signal Attenuation:

Withers, under review by Radio Science
Night-time Ionospheric Variabilities:

- **SZA = 100 - 105 degrees**
  - Very broad peaks

- **SZA = 105 - 110 degrees**
  - M1 peak only
  - Variations in structure of peak(s)
  - ?

- **SZA = 110 - 115 degrees**
  - Peaks are not sharp, appear almost square-edged

- **SZA = 115 - 120 degrees**
  - Peaks are all at high altitude
Unusual Ionospheric Features