

Supporting Information for “Solar and solar wind energy drivers for O^+ , and O_2^+ ion escape at Mars”

N. R. Schnepf¹, Y. Dong¹, D. Brain¹, K. G. Hanley³, W. K. Peterson¹, R. J.

Strangeway², E. M. B. Thiemann¹, J. S. Halekas⁴, J. R. Espley⁵, F.

Eparvier¹, J. P. McFadden³

¹Laboratory for Atmospheric and Space Physics, University of Colorado Boulder, Boulder, CO, USA

²Institute of Geophysics and Planetary Physics, and Department of Earth, Planetary, and Space, University of California Los

Angeles, Los Angeles, CA, USA

³Space Sciences Laboratory, University of California Berkeley, Berkeley, CA, USA

⁴Department of Physics and Astronomy, University of Iowa, Iowa City, IA, USA

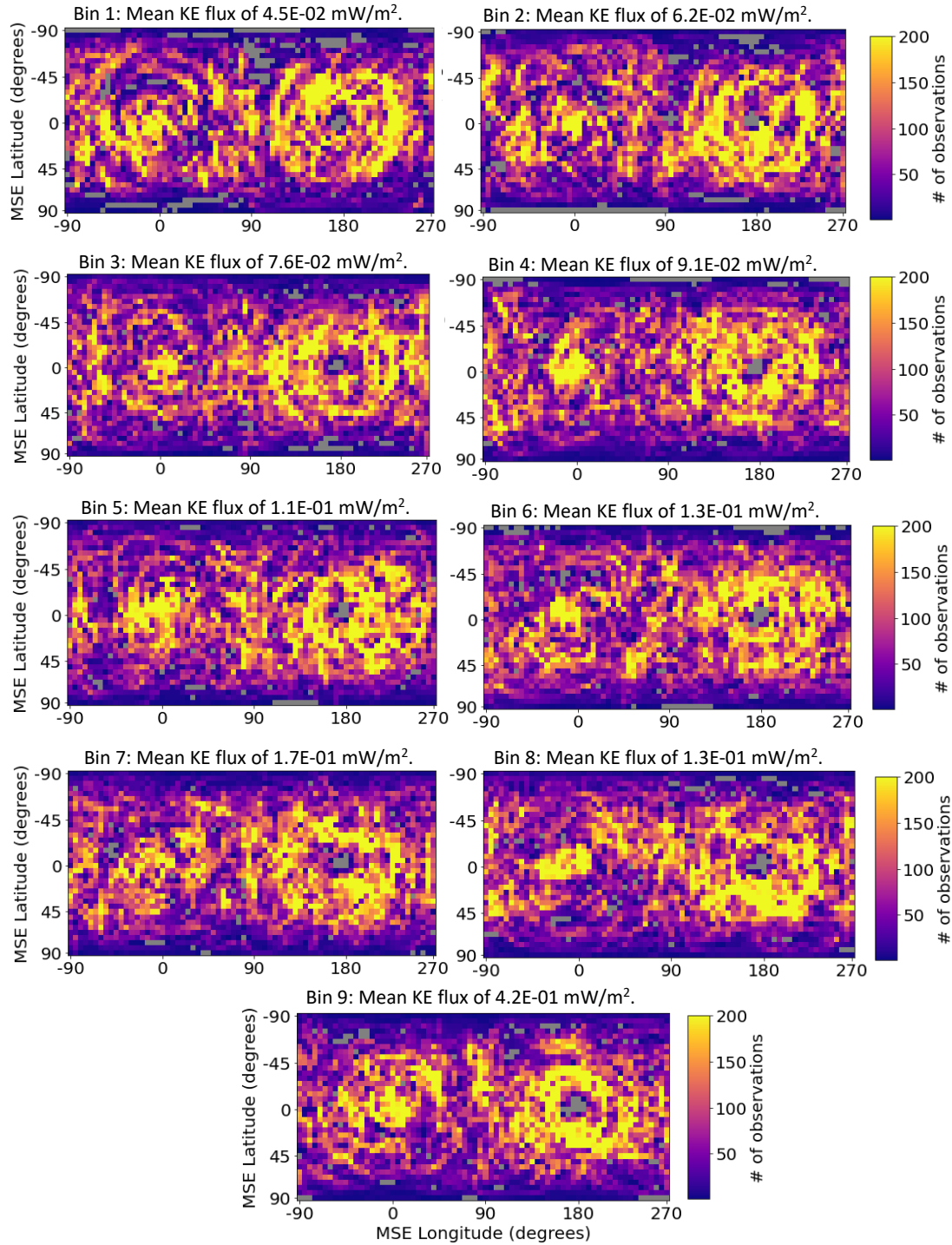
⁵NASA Goddard Space Flight Center, Greenbelt, MD, USA

Contents of this file

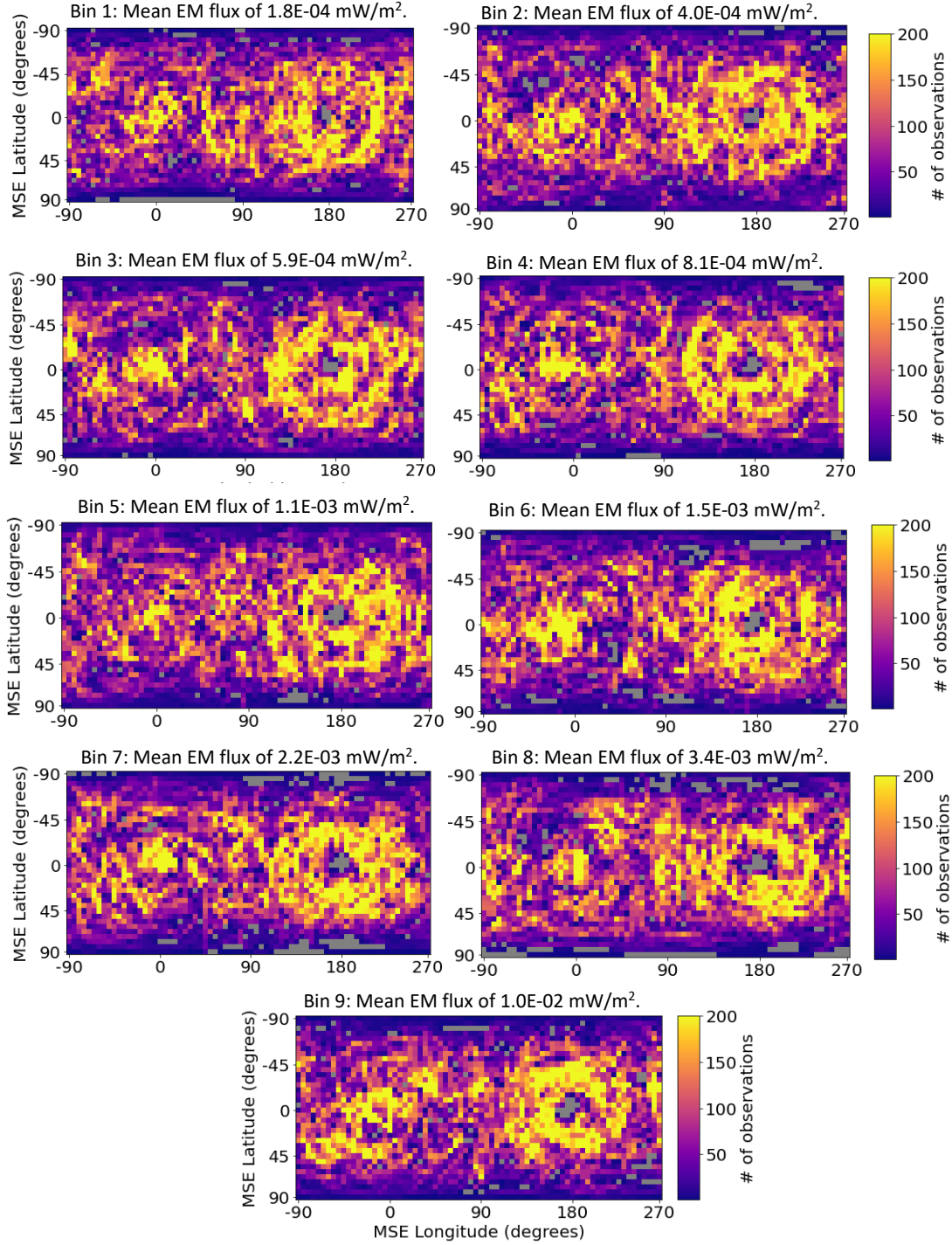
1. Figures S1 to S8

Corresponding author: Neesha R. Schnepf, Laboratory for Atmospheric and Space Physics, University of Colorado Boulder, 3665 Discovery Dr, Boulder, CO 80303, USA. (neesha.schnepf@lasp.colorado.edu)

January 29, 2024, 9:01pm

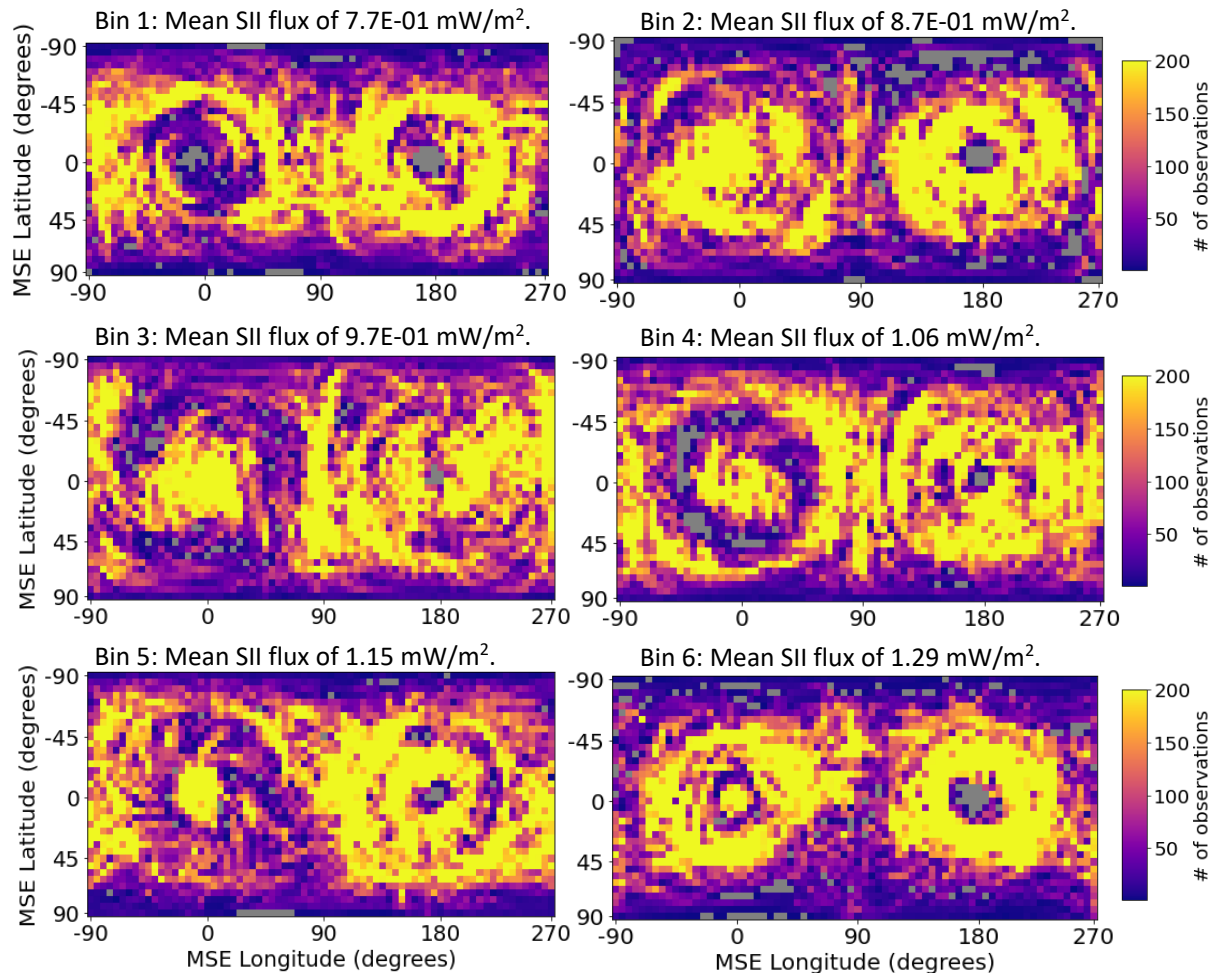
Data density for solar wind kinetic energy flux bins:

S1. The density of ion flux observations in each grid cell is shown for each solar wind kinetic energy flux bin.

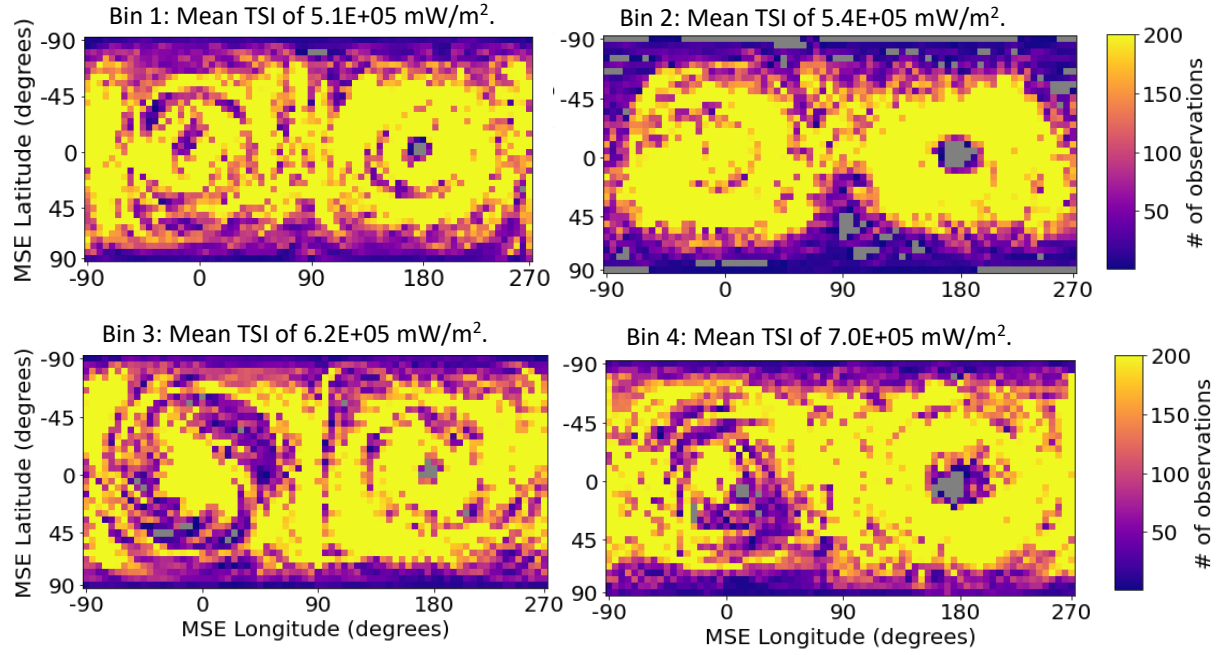
Data density for solar wind electromagnetic energy flux bins:

S2. The density of ion flux observations in each grid cell is shown for each solar wind electromagnetic energy flux bin.

Data density for solar ionizing irradiance bins:

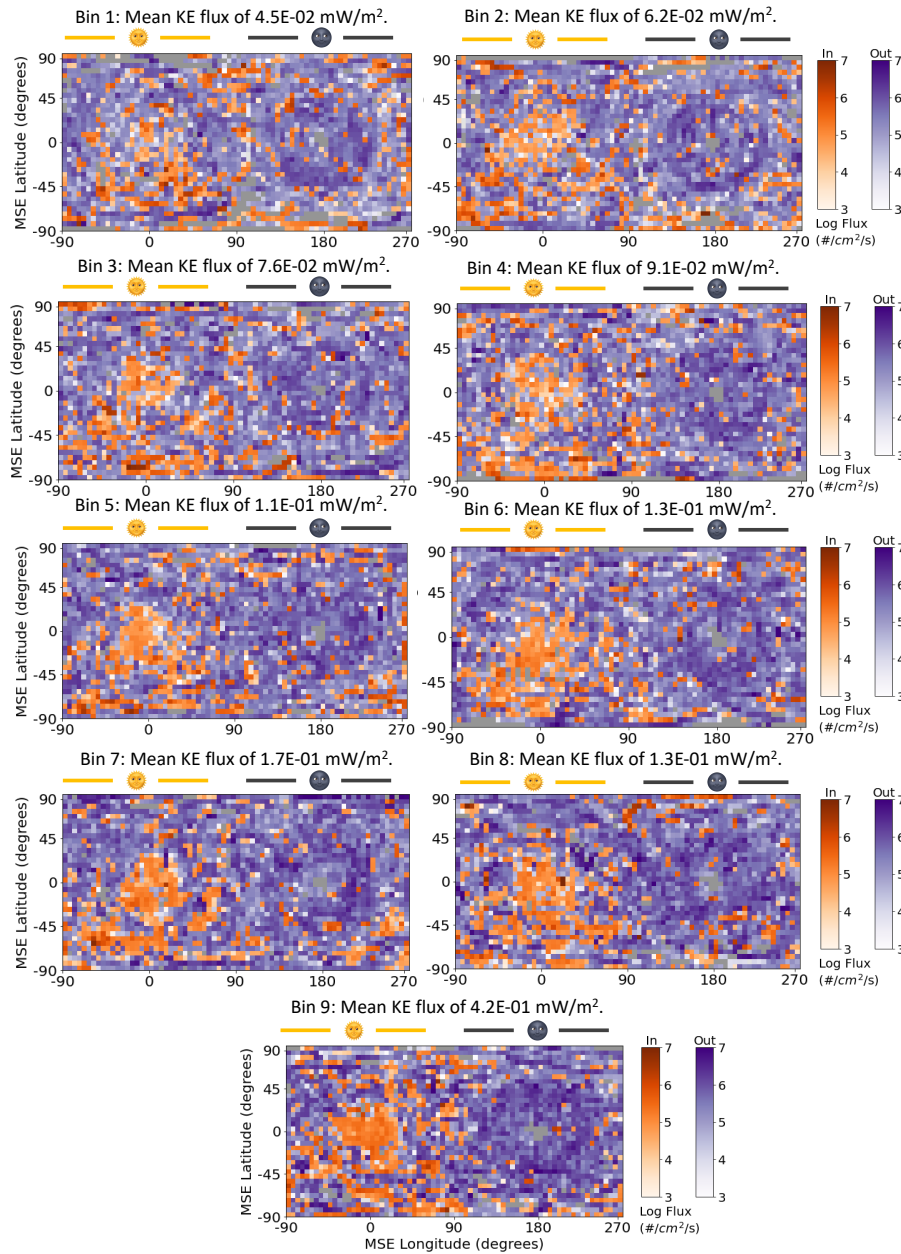


S3. The density of ion flux observations in each grid cell is shown for each solar ionizing irradiance bin.

Data density for total solar irradiance bins:

S4. The density of ion flux observations in each grid cell is shown for each total solar irradiance bin.

Ion flux maps for the solar wind kinetic energy bins, O^+ :

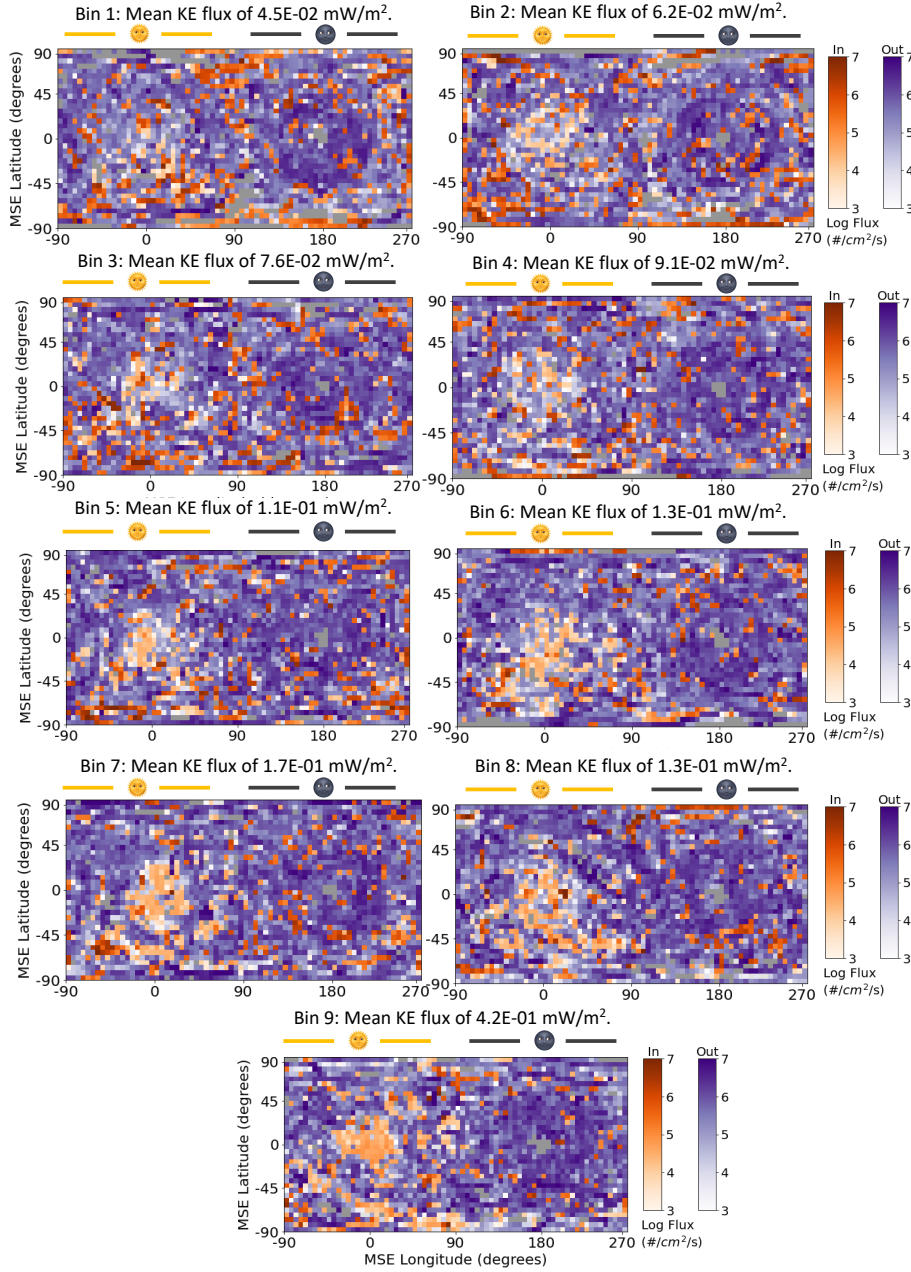


S5a. The average observed outwards (purple) and inwards (orange) net flux for O^+ from February 1, 2016 to May 21, 2022

for the solar wind kinetic energy flux bins. The data is on a Mars Solar Electric grid; the day-side and night-side of Mars are denoted accordingly.

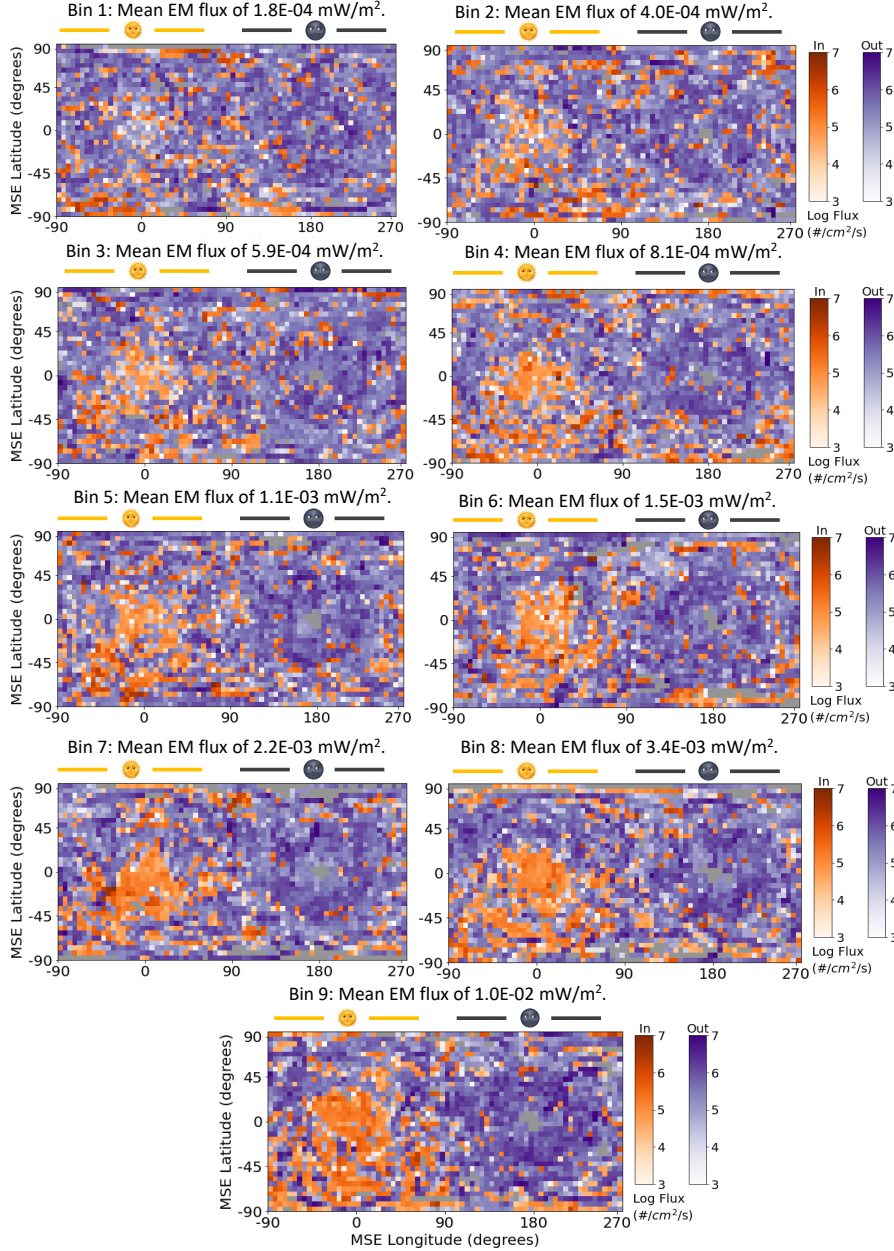
January 29, 2024, 9:01pm

Ion flux maps for the solar wind kinetic energy bins, O_2^+ :



S5b. The average observed outwards (purple) and inwards (orange) net flux for O_2^+ from February 1, 2016 to May 21, 2022 for the solar wind kinetic energy flux bins. The data is on a Mars Solar Electric grid; the day-side and night-side of Mars are denoted accordingly.

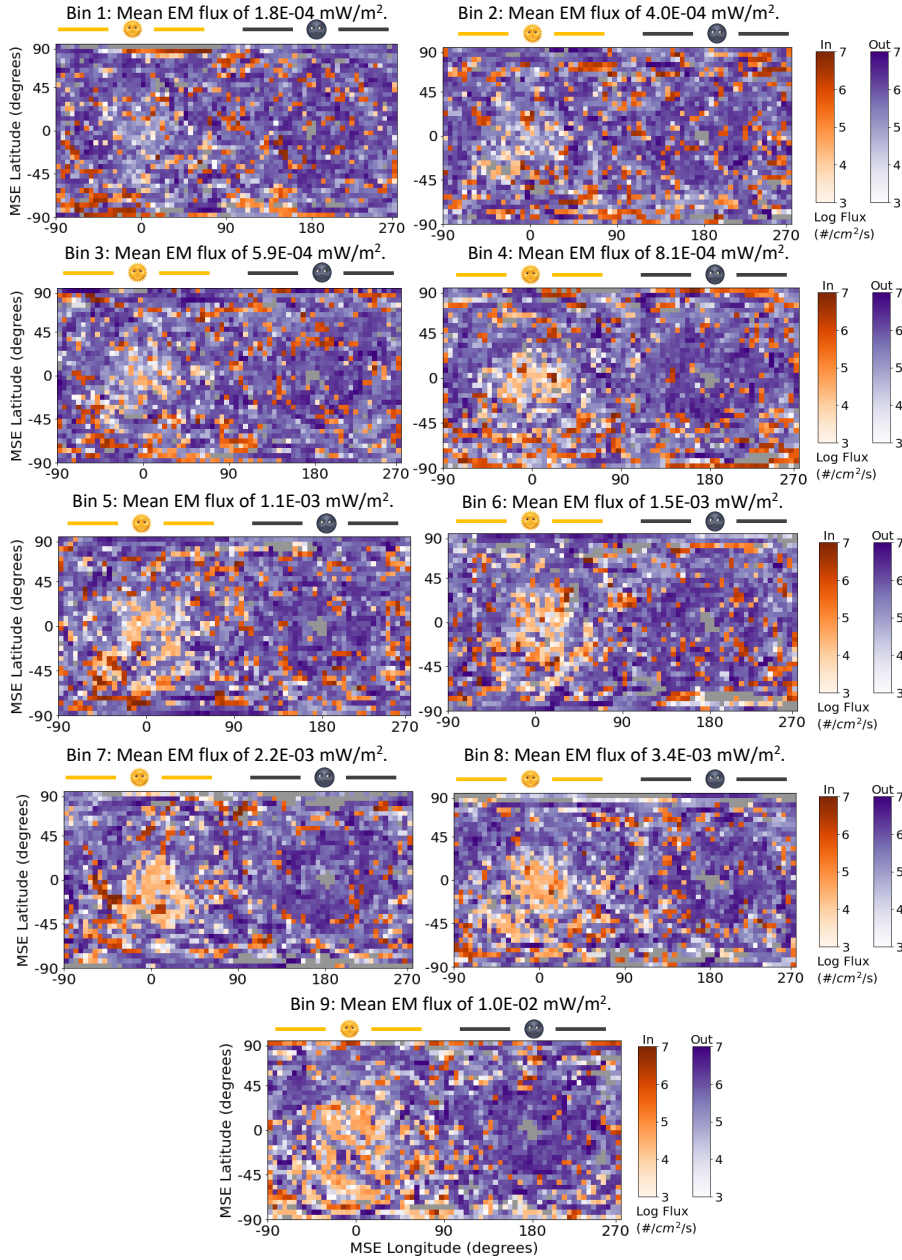
Ion flux maps for the solar wind electromagnetic energy bins, O^+ :



S6a. The average observed outwards (purple) and inwards (orange) net flux for O^+ from February 1, 2016 to May 21, 2022

for the solar wind electromagnetic energy flux bins. The data is on a Mars Solar Electric grid; the day-side and night-side of Mars are denoted accordingly.

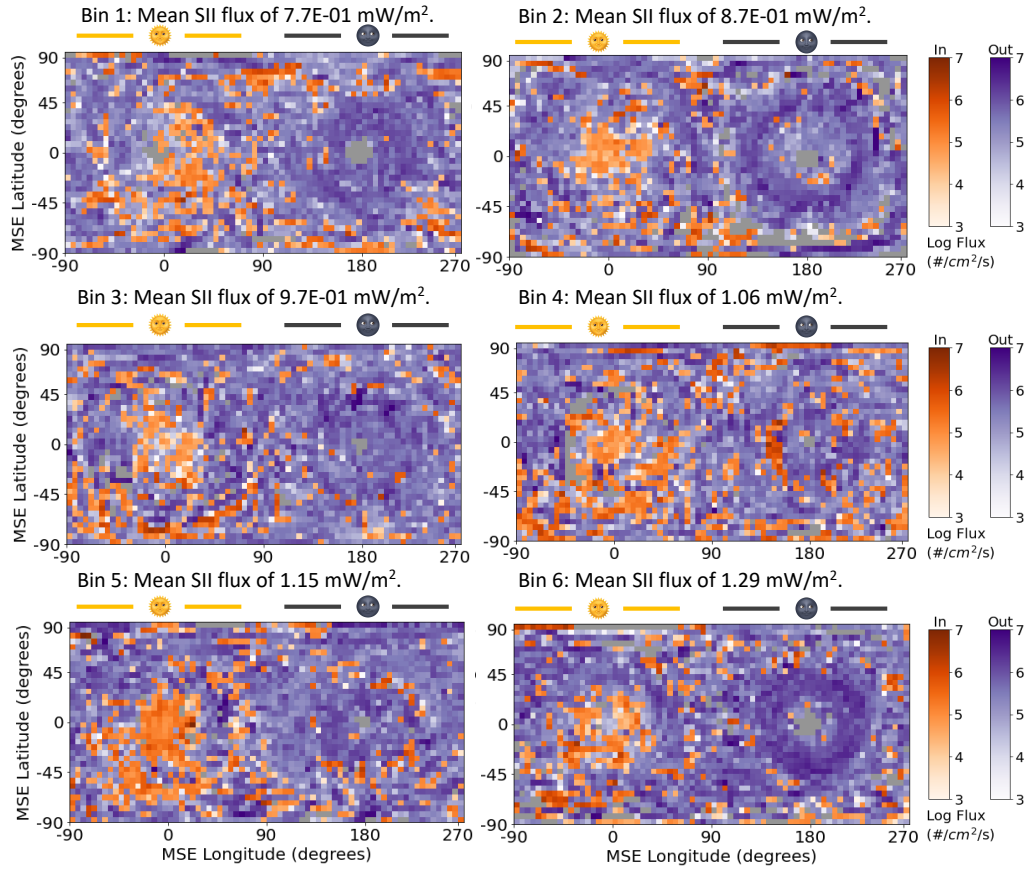
Ion flux maps for the solar wind electromagnetic energy bins, O_2^+ :



S6b. The average observed outwards (purple) and inwards (orange) net flux for O_2^+ from February 1, 2016 to May 21, 2022

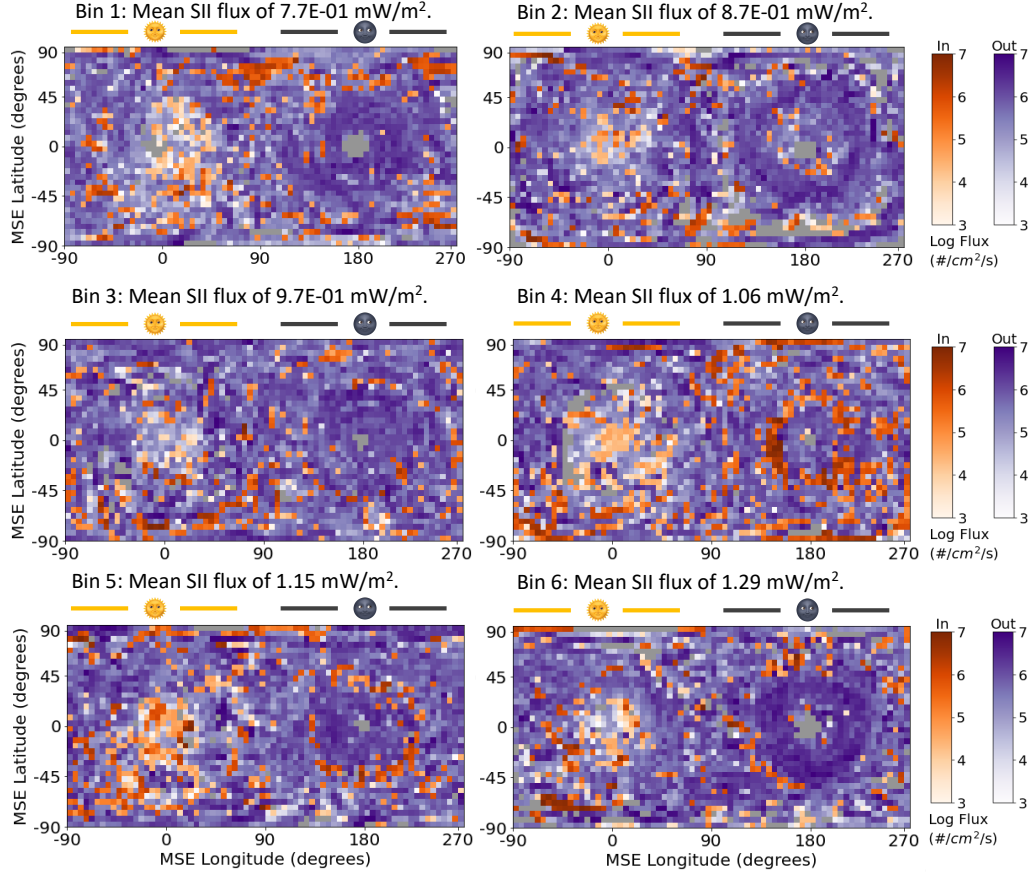
for the solar wind electromagnetic energy flux bins. The data is on a Mars Solar Electric grid; the day-side and night-side of Mars are denoted accordingly.

Ion flux maps for the solar ionizing irradiance bins, O^+ :



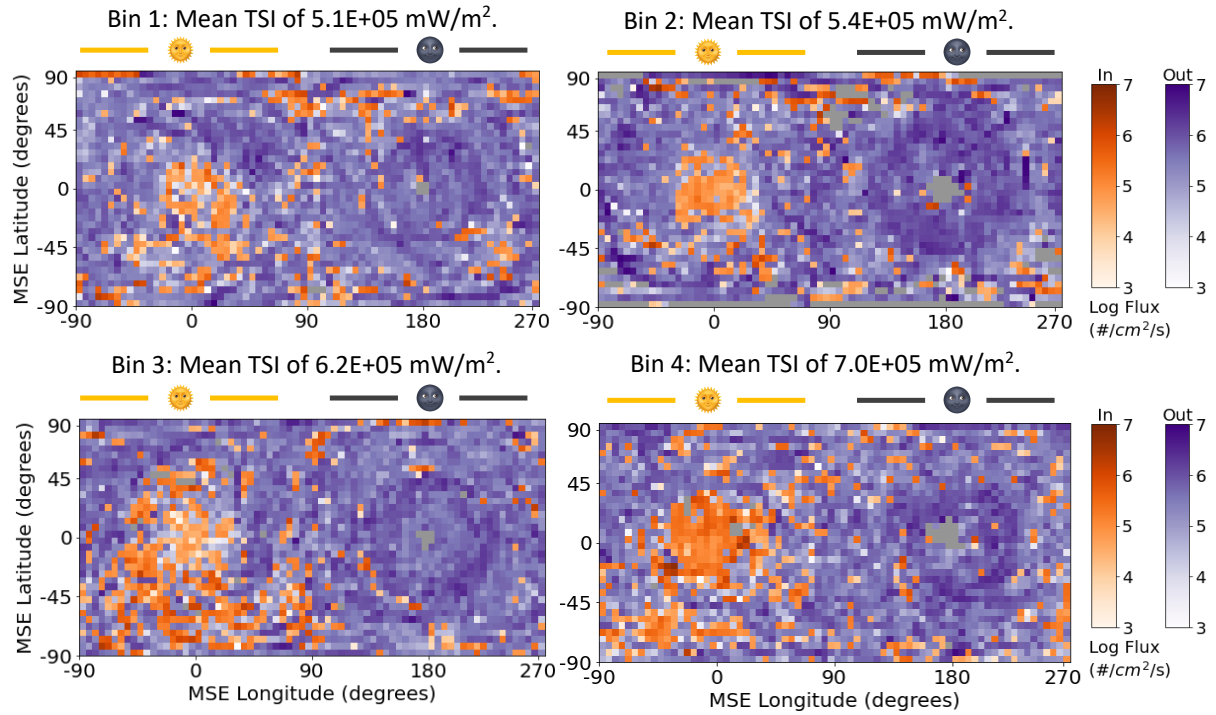
S7a. The average observed outwards (purple) and inwards (orange) net flux for O^+ from February 1, 2016 to May 21, 2022 for the solar ionizing irradiance bins. The data is on a Mars Solar Electric grid; the day-side and night-side of Mars are denoted accordingly.

Ion flux maps for the solar ionizing irradiance bins, O_2^+ :



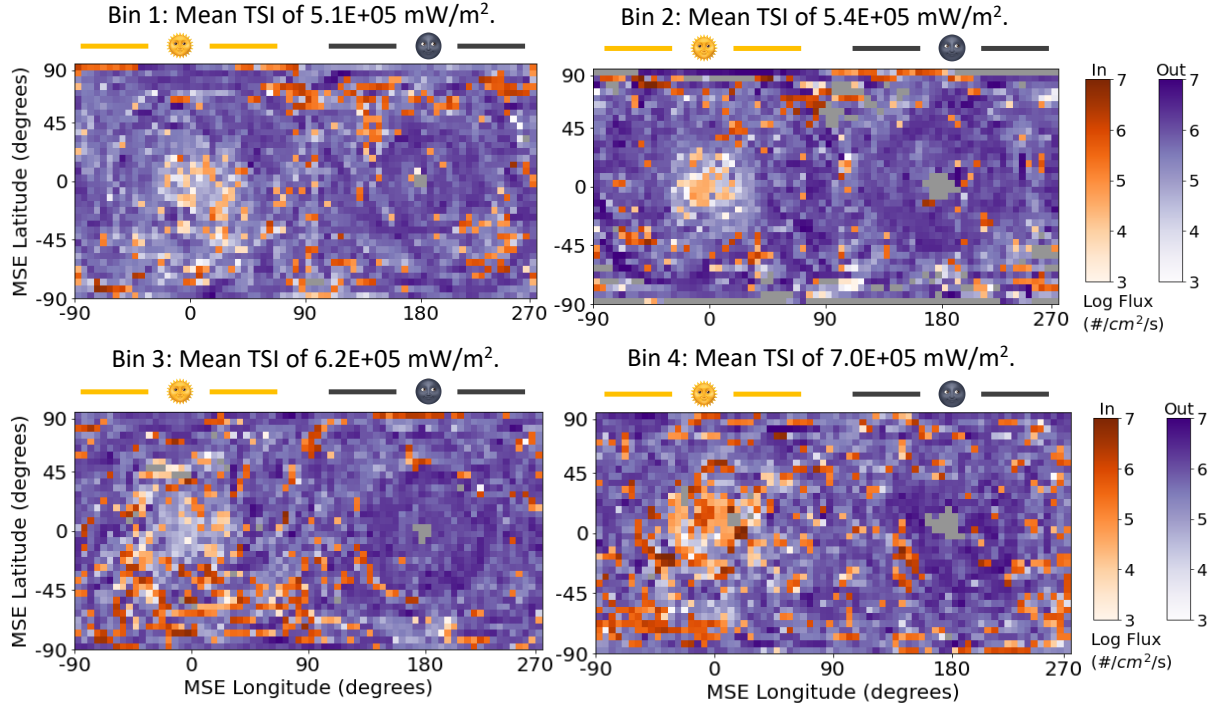
S7b. The average observed outwards (purple) and inwards (orange) net flux for O_2^+ from February 1, 2016 to May 21, 2022 for the solar ionizing irradiance bins. The data is on a Mars Solar Electric grid; the day-side and night-side of Mars are denoted accordingly.

Ion flux maps for the total solar irradiance, O^+ :



S8a. The average observed outwards (purple) and inwards (orange) net flux for O^+ from February 1, 2016 to May 21, 2022 for the total solar irradiance bins. The data is on a Mars Solar Electric grid; the day-side and night-side of Mars are denoted accordingly.

Ion flux maps for the total solar irradiance, O_2^+ :



S8b. The average observed outwards (purple) and inwards (orange) net flux for O_2^+ from February 1, 2016 to May 21, 2022 for the total solar irradiance bins. The data is on a Mars Solar Electric grid; the day-side and night-side of Mars are denoted accordingly.