Atmospheric Carbon Dioxide Photoelectron Energy Peaks: An Indicator of the Morphology of Solar Wind Influence on the Martian Environment

Abstract

The solar photon spectrum contains both discrete spectral lines and continuum. These emissions interact with the atmospheric and the Martian surface. The continuum is derived from the bulk solar spectrum, while the discrete spectral lines are generated by the Sun and the blackbodies of the terrestrial planets. In the case of Mars, the continuum is dominated by the Sun, while the discrete lines are predominantly from the terrestrial planets. The interactions of these emissions with the solar wind can have significant impacts on the Martian environment. Specifically, the solar wind can transport photoelectrons from the solar continuum to the Martian surface, which can then interact with the Martian atmosphere.

Introduction

On June 3, 2005, the European Space Agency (ESA) launched the Mars Express spacecraft. The MI2 spacecraft retrieved Mars and was ejected into orbit on December 25, 2003. An experiment on the MI2 spacecraft is the Analyser of Solar Plasma and Energized Atoms (APEX-3). In 2004, this instrument was operated on the MI2 spacecraft to investigate the interaction of the Martian environment with the solar wind. The APEX-3 experiment is one of the main experiments on the MI2 spacecraft to investigate the interaction of the solar wind with the Martian environment.

Instrument

The APEX-3 instrument is a spherical mass spectrometer for studying the interaction of the Martian environment with the solar wind. It consists of two main components: an electron spectrometer and a magnetic spectrometer. The electron spectrometer is used to measure the energy distribution of the photoelectrons, while the magnetic spectrometer is used to measure the mass distribution of the ions.

Discussion and Possible Scenarios

In the context of the Martian environment, the photoelectrons released by the solar wind can interact with the atmosphere and the surface of Mars. This can have significant implications for the Martian environment, including the transport of energy and mass from the solar wind to the Martian atmosphere.

Observations

Mons and Harson [1997] showed that the APEX-3 instrument is detecting photoelectrons from both horizontal and vertical magnetic field conditions. These observations indicate that the photoelectrons are released from both horizontal and vertical magnetic field conditions.

Conclusion

The observations from the APEX-3 instrument are important for understanding the interaction of the Martian environment with the solar wind. These observations provide insights into the transport of energy and mass from the solar wind to the Martian atmosphere, which can have significant implications for the Martian environment and the study of exoplanets.

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References


A. R. Fralin, J. D. Cunningham, J. R. Shafter, Southeast Research Institute, 6220 Calle Xia, San Antonio, TX 78252, USA
M. W. Lichtenh, Y. M., Space Physics Research Laboratory, University of Arizona, Tucson, AZ 85721, USA
A. J. Coates, D. R. Lindner, Y. Sobolik, Mullard Space Science Laboratory, University of London, London, United Kingdom
and the APEX-3 Team.

Swedish Institute of Space Physics, Box 812, Kiruna S-9812, Sweden