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Latest Results From The Juno Microwave Radiometer

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Abstract

The Juno Microwave Radiometer (MWR) is a six-channel microwave radiometer designed to investigate Jupiter's deep atmosphere, spanning a wavelength range from 1.4 cm to 50 cm [1]. At the longest wavelengths, the MWR is sensitive to emission originating well beneath the visible clouds. Results from the first 20 science perijove passes will be presented, including observations of the atmosphere as well as of the Jovian radiation belts.

1. Introduction and Observational Approach

The Juno spacecraft has been in a ~53-day orbit about Jupiter since July, 2016, and the MWR instrument has collected radiometric data from all 6 channels continuously for nearly the entire time. Juno is in a highly elliptical polar orbit with perijove altitudes approximately 4000 km above the 1-bar level. The spacecraft spins twice per minute, and the boresight direction for each of the MWR channels is perpendicular to the spin axis of the spacecraft. The observed absolute nadir brightness contains important information about the atmospheric composition and dynamics on a global scale. Differences between observations at nadir and off-nadir angles can be measured with far greater accuracy, so limb darkening is also a primary atmospheric data set. MWR observes synchrotron emission from the radiation belts with every spin, as well as observing the background sky when looking away from Jupiter.

2. Results

MWR data have already shown that Jupiter's atmosphere is much more complex than previously understood [2][3], with unexpected variation as a function of latitude and depth, and a surprising latitudinal distribution of lightning. We will discuss MWR results, including the latest observations about the atmospheric composition, atmospheric dynamics, distribution of lightning, and synchrotron emission from the inner radiation belts.

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