Organizing PMODE Dopplergrams of Jupiter with MATLAB

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ABSTRACT

The interiors of the giant planets are poorly known. At the time of writing, such investigations have been limited to measuring gravitational effects from a handful of orbital probes. The most recent attempt to map the interior is via PMODE (the Planetary Multilevel Oscillations and Dynamics Experiment), designed to explore Jupiter's core by collecting Dopplergrams. Small radial velocity shifts in Jupiter's upper cloud decks enable us to map its atmospheric dynamics and consequently its interior via Dioseismology (techniques similar to Helioseismology, applied to Jupiter). This campaign produced a vast dataset with more than 50,000 exposures, every 30 seconds, over 24 nights. These unique data currently lack basic archival header information such as pointing locations, planetary latitude, instrumental statistics etc., which makes efficient analysis difficult. Our goal is to collect and insert required information automatically into each individual FITS file header and upload the entire database to NASA's Planetary Data System for the general scientific community. The indexed catalog will open up a significant wealth of data for further study of Jupiter's interior. We present the current state of the project, the ultimate end goals, and a plan for future analysis.

KEYWORDS: Jupiter, PMODE, Dopplergram