

ERS observations of the Jovian System as a demonstration of JWST's capabilities for Solar System science

Scientific Category: Solar System

Scientific Keywords: Chemical Composition, Giant Planets, Planetary Atmospheres, Planetary Satellites, Space Weather

Alternate Category: Planets and Planet Formation

Instruments: NIRSPEC, MIRI, NIRISS, NIRCAM

Proprietary Period: 0 months

Allocation Information (in hours):

Science Time: 9.3

Charged Time: 30.9

Requested Time: 28.9

Time Request Explanation: Two instances of 3600-sec Direct Sched Overhead should be waived, because the time-constrained observations efficiently fall within groups where other observations fill in the gaps.

Abstract

We have brought together a large and diverse community in the US and Europe to observe the jovian system, with the following scientific goals:

- characterize Jupiter's cloud layers, winds, composition, auroral activity, and temperature structure;
- produce maps of the atmosphere and surface of volcanically-active Io and icy satellite Ganymede to constrain their thermal and atmospheric structure, and search for plumes;
- characterize the ring structure, and its sources, sinks and evolution.

Our program will thus demonstrate the capabilities of JWST's instruments on one of the largest and brightest sources in the Solar System and on very faint targets next to it. We will also observe weak emission/absorption bands on strong continua, and with NIRIS/AMI we will maximize the Strehl ratio on unresolved features, such as Io's volcanoes.

We will deliver a number of science enabling products that will facilitate community science, including, e.g.: i) characterizing Jupiter's scattered light in the context of scientific observations, ii) resolve point sources with AMI in a crowded field (Io's volcanoes), and compare this to classical observations, iii) develop tools to mosaic/visualize spectral datacubes using MIRI and NIRSpec on Jupiter.

Finally, our program will also set a first temporal benchmark to study time variations in the jovian system and any interconnectivity (e.g. through its magnetic field) during JWST's lifetime.

Investigators:

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Number of investigators: 14

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