

Magnetospheric Drivers of Auroral Variations at Jupiter

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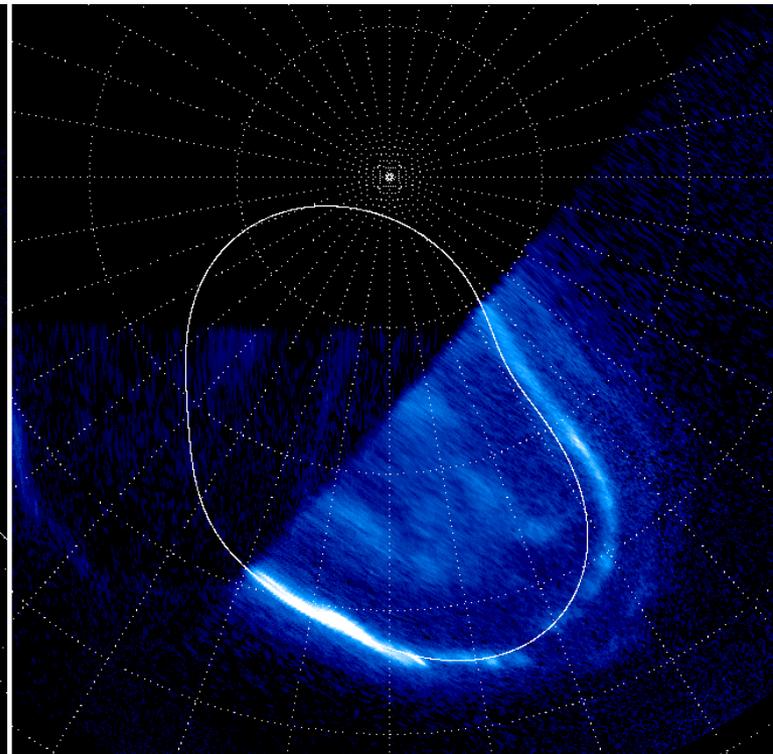
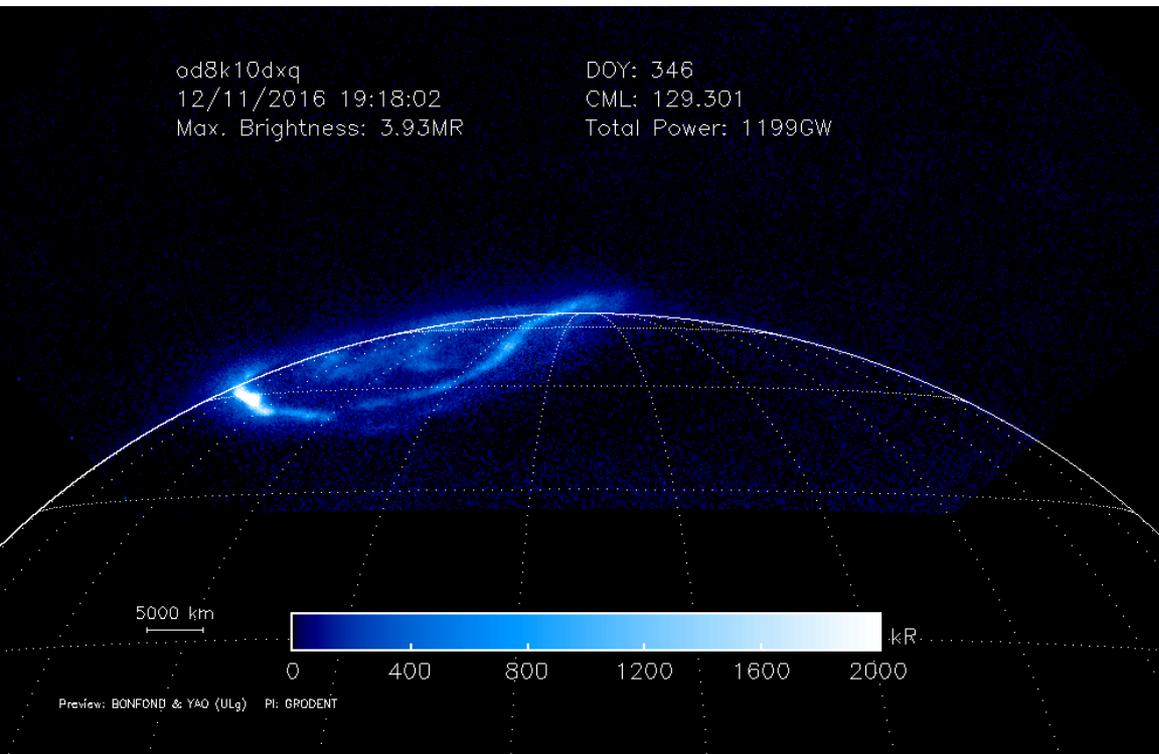
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Abstract

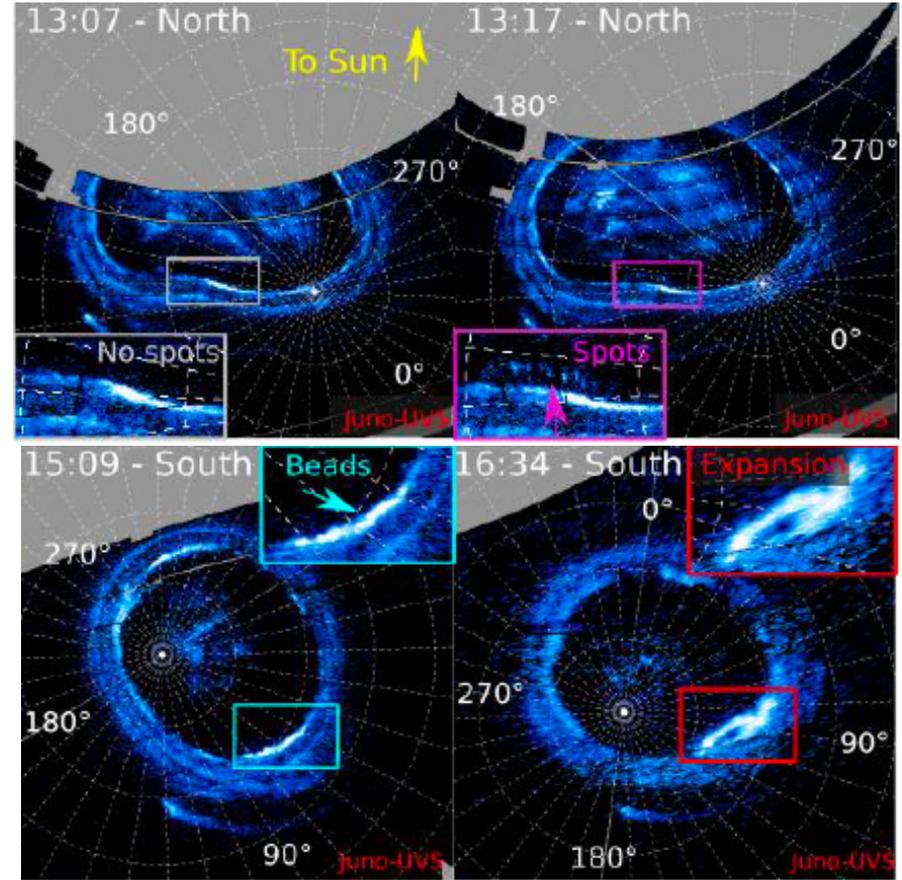
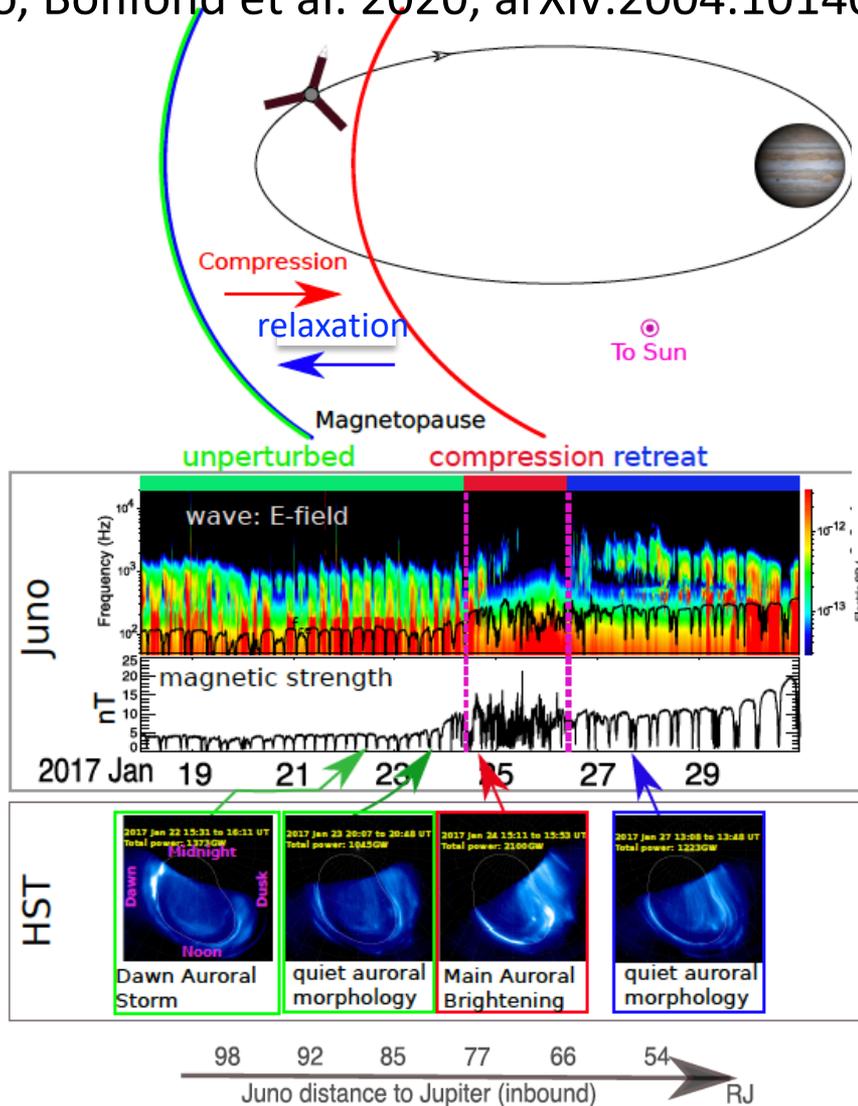
Although mass and energy in Jupiter's magnetosphere mostly come from the innermost Galilean moon Io's volcanic activity, solar wind perturbations can play crucial roles in releasing the magnetospheric energy and powering aurorae in Jupiter's polar regions. The relative importance of solar wind and internal processes in driving Jupiter's auroras remains poorly understood. Recently, the contemporaneous measurements from NASA Juno mission and the Hubble Space Telescope provide an unprecedented opportunity to determine the magnetospheric drivers of auroral variations at Jupiter, and key evidence on how solar wind would affect the auroral brightening. In this presentation, we will discuss several important advances on several distinctive auroral morphologies at Jupiter, i.e., auroral dawn storm, the main auroral brightening and auroral injection processes. We find that magnetic reconnection and dipolarization play crucial roles in driving these auroras, and the auroral drivers for the Earth and Jupiter have more in common than ever expected.

2016-now: more than 200 HST visits are obtained, providing an unprecedented opportunity to study Jovian aurora with **simultaneous measurements.**



Two key questions:

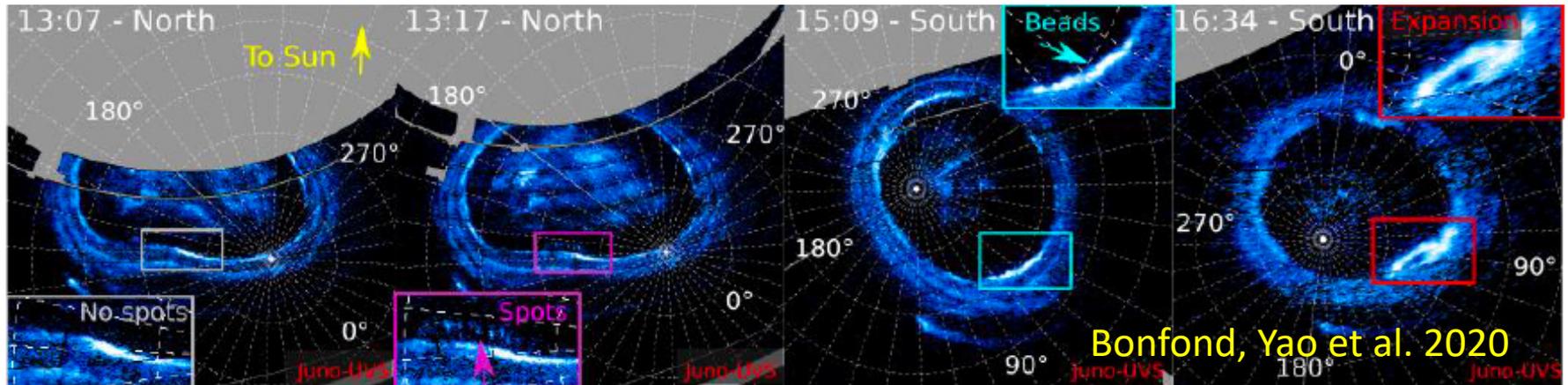
- what mechanisms drive the main aurora?
- Is the night the same as the dayside feature?



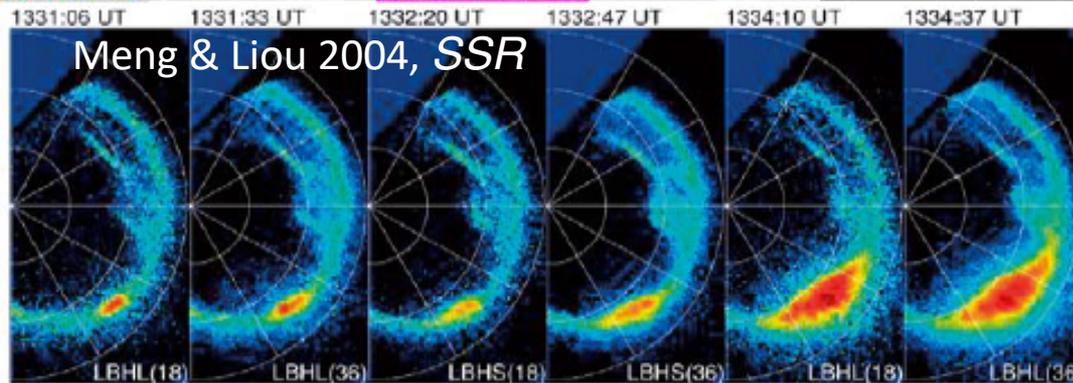
- Solar wind compression enhances the main aurora
- Near-noon aurora is enhanced but not dimmed during a compression

- Auroral dawn storm is initiated from midnight poleward boundary
- Beads and poleward auroral spots are discovered at the dawn storm initiation

Fundamental processes for energy dissipation?



Bonfond, Yao et al. 2020



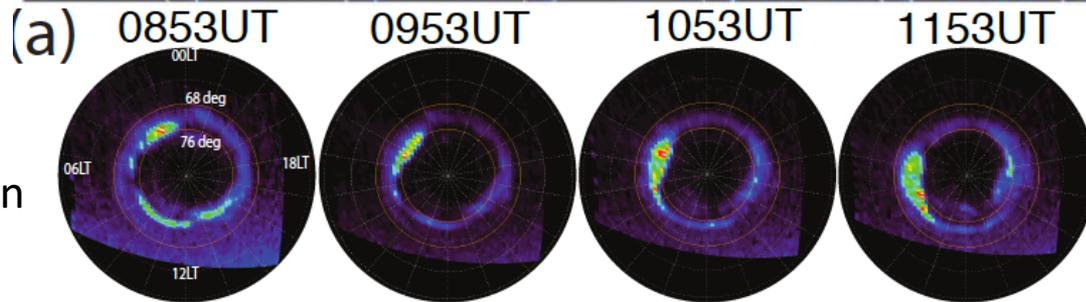
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Earth



Saturn

Yao et al. 2018, JGR