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Energy Flow and Alfvén Wave Propagation in Jupiter's Main Aurora

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Observations from Juno have yielded unprecedented new detail about the accelerated plasma populations that produce Jupiter's aurora. Many of these features are familiar to those at Earth; however, there are also major differences. Both inverted-V and broadband type acceleration mechanisms are observed, although the broadband precipitation seems to be more dominant at Jupiter. One major difference is the apparent lack of a large scale field-aligned current system at Jupiter, which suggests that these currents are highly structured. While the main energy source for the aurora at Jupiter is the planetary rotation, this structuring of field-aligned currents is likely due to plasma processes in the region where co-rotation breaks down. The evolution of the current system is governed by the propagation of Alfvén waves, which may form natural resonant cavities due to the extreme gradients in plasma parameters in the magnetosphere. Indeed, periodicities in the aurora with periods of about 10 minutes have been observed. First results from a model for the propagation of kinetic Alfvén waves in Jupiter's magnetosphere will be presented. The model describes a three-dimensional flux tube based on the Connerney et al. (1981) model of the magnetic field due to the Jovian current sheet. The mass density necessary to determine the Alfvén speed is determined using the model of Bagenal and Delamere (2011). This model can shed light on the dynamics of the main auroral oval at Jupiter.