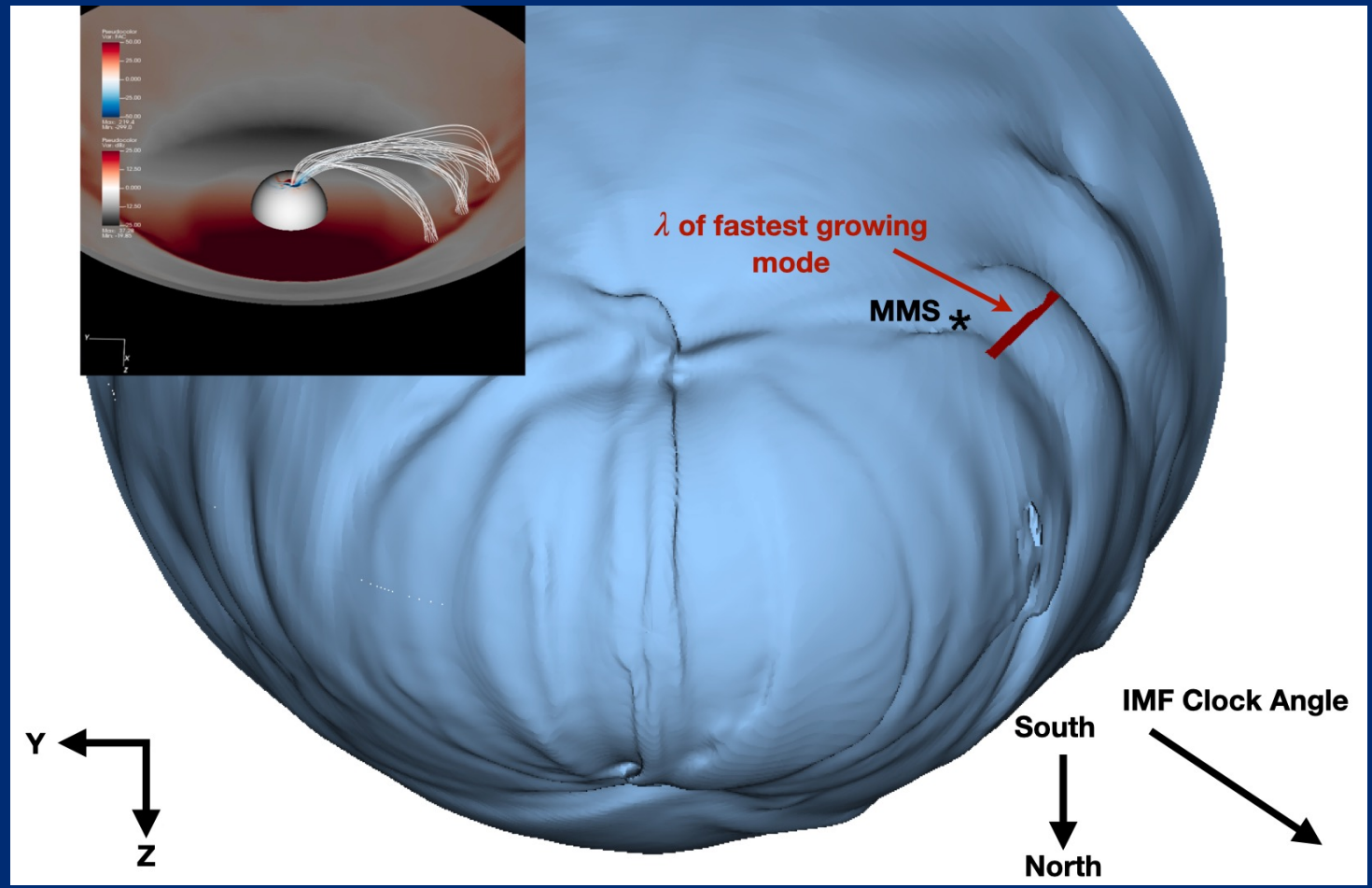
Global Magnetosphere Simulations capture the Kelvin-Helmholtz Instability at the High-Latitude Boundary Layer

- The boundary separating magnetospheric plasma and the solar wind can become unstable due to the Kelvin-Helmholtz instability, forming waves that can facilitate mass, momentum, and energy transfer into the magnetosphere.
- Determining when and where these waves occur on the boundary has remained a challenge as observations at of the waves higher-latitudes have been limited to a few event studies and no global models have been capable of resolving the region.
- Using global magnetohydrodynamic simulations, we investigate an event when the MMS mission observed periodic low frequency waves at the dawn-flank, high-latitude boundary layer.
- We show the layer to be unstable as the draped, oblique interplanetary magnetic field causes the region along the magnetopause meeting the instability criteria to be at higher latitudes. The wave characteristics are consistent with MMS observations.



For the first time, a global magnetohydrodynamic simulation of the magnetosphere reproduces Kelvin-Helmholtz waves at the high latitude boundary layer.

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