

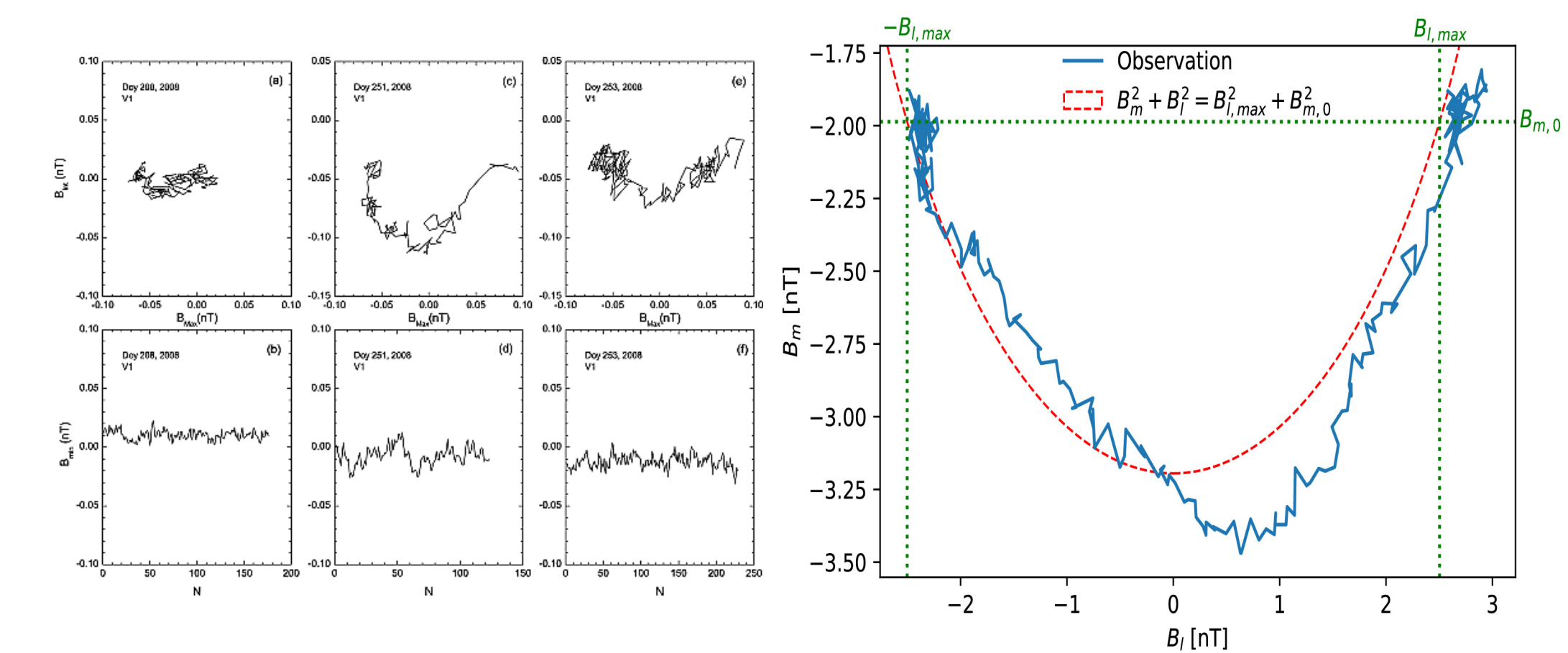
Solar wind discontinuities spatial evolution and energetic ion scattering

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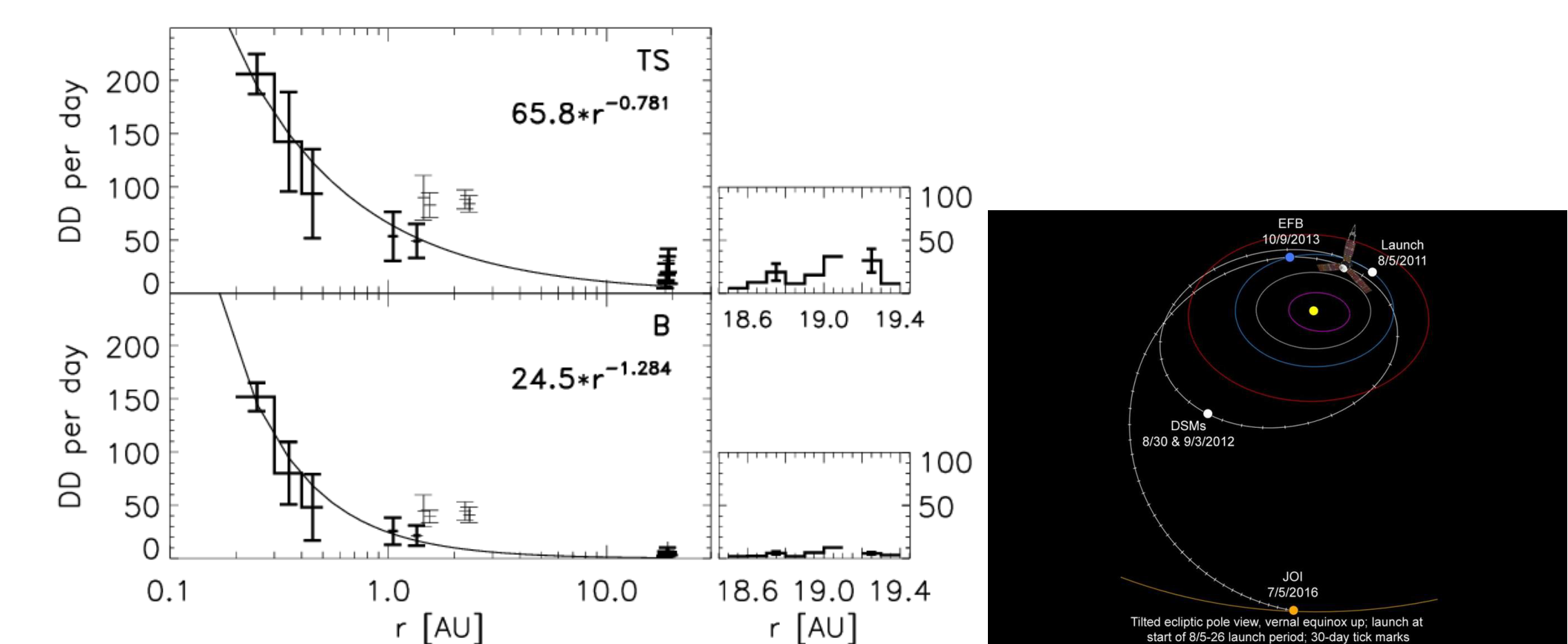
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Introduction & Motivation

‘Discontinuities’ are discontinuous spatial changes in plasma parameters/characteristics and magnetic fields (Colburn and Sonett 1966).



Söding et al. (2001) studied the radial distribution of discontinuities in the solar wind.



Joint observations of JUNO & ARTEMIS & Other missions really provides a unique opportunity!!!

Method

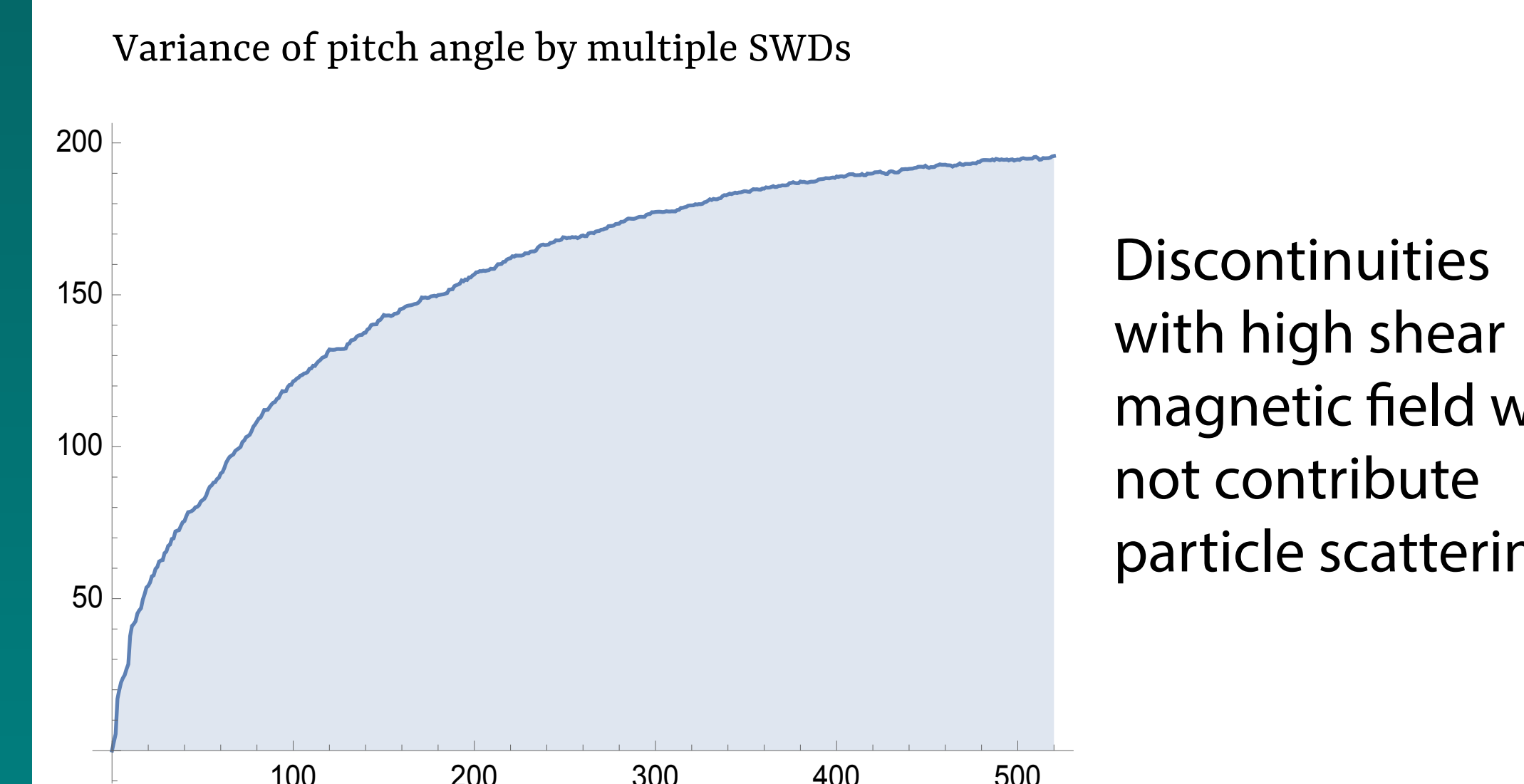
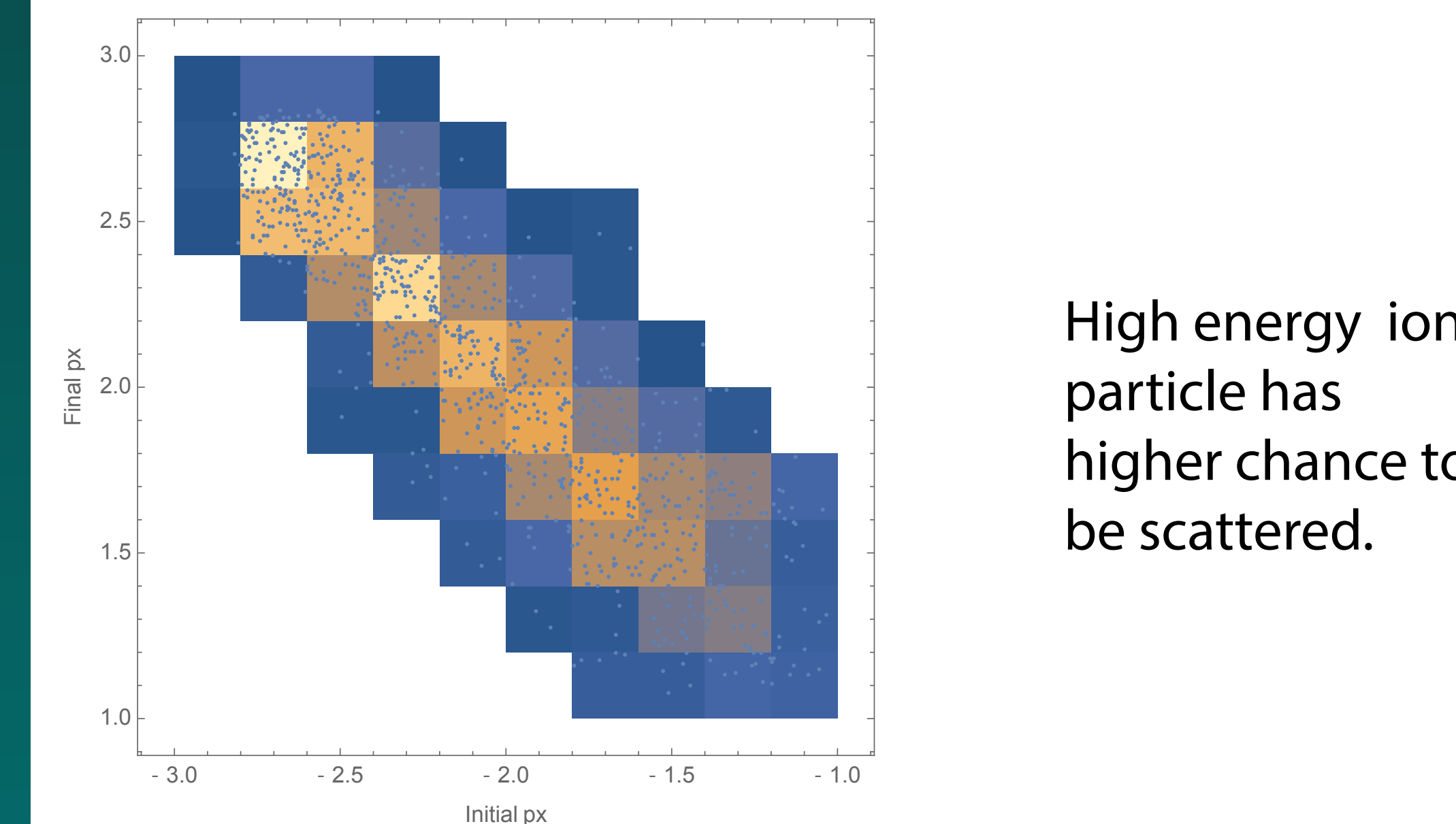
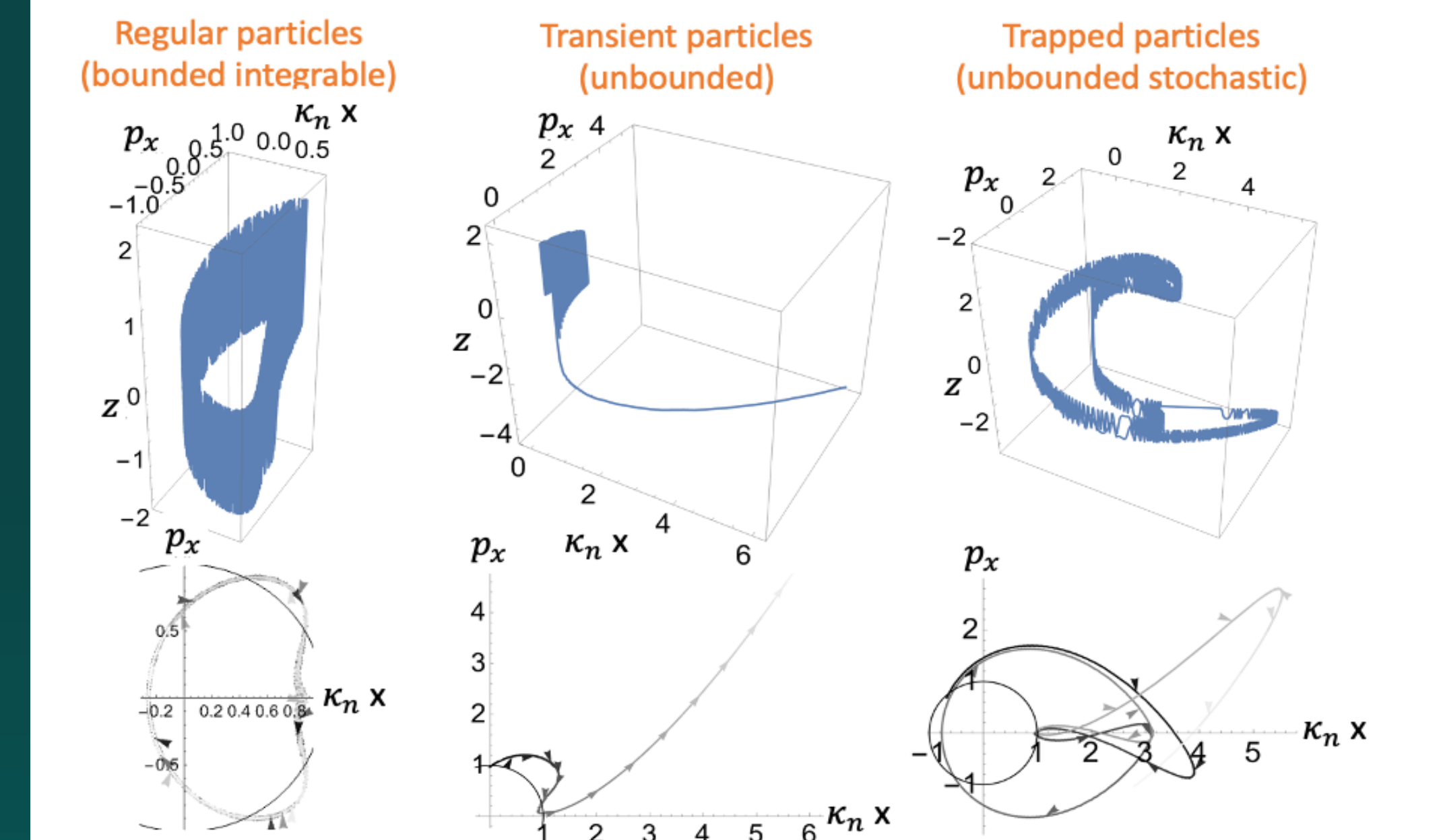
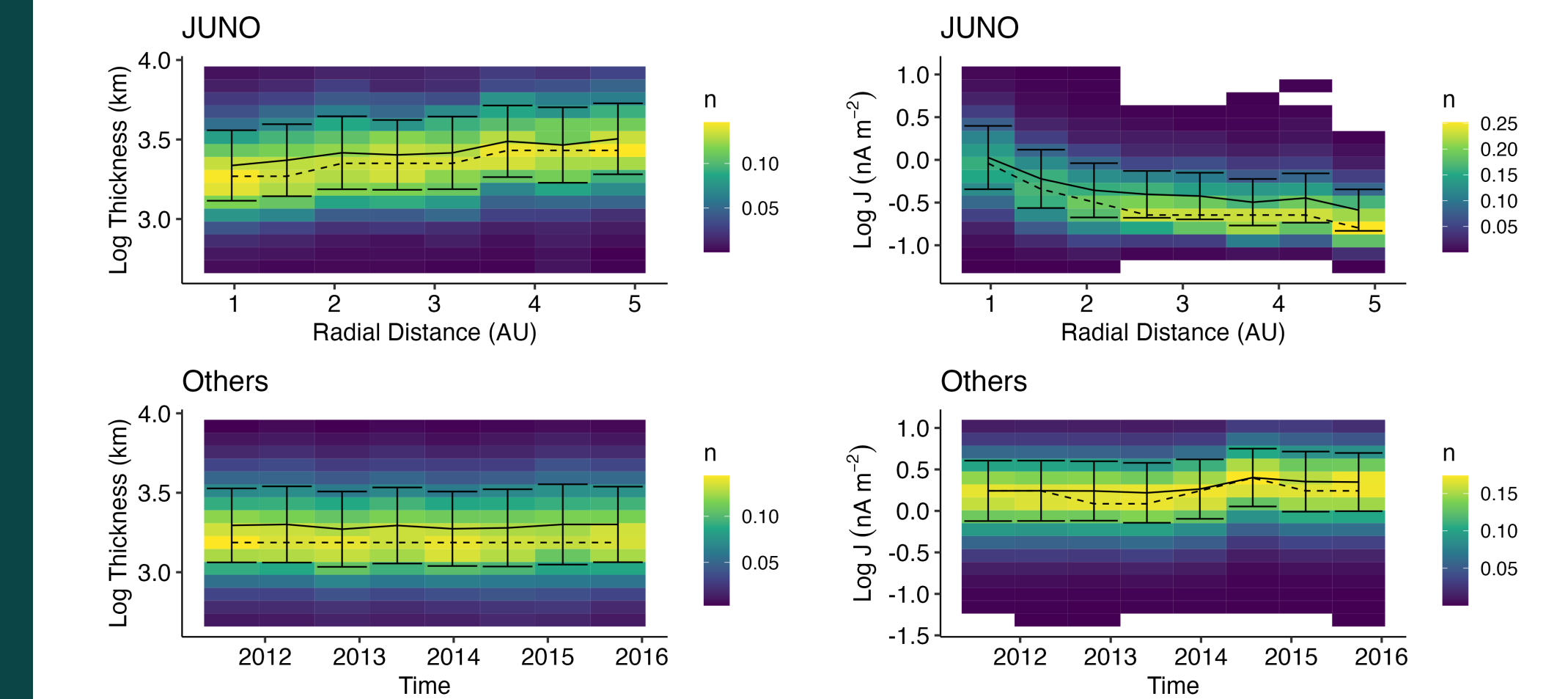
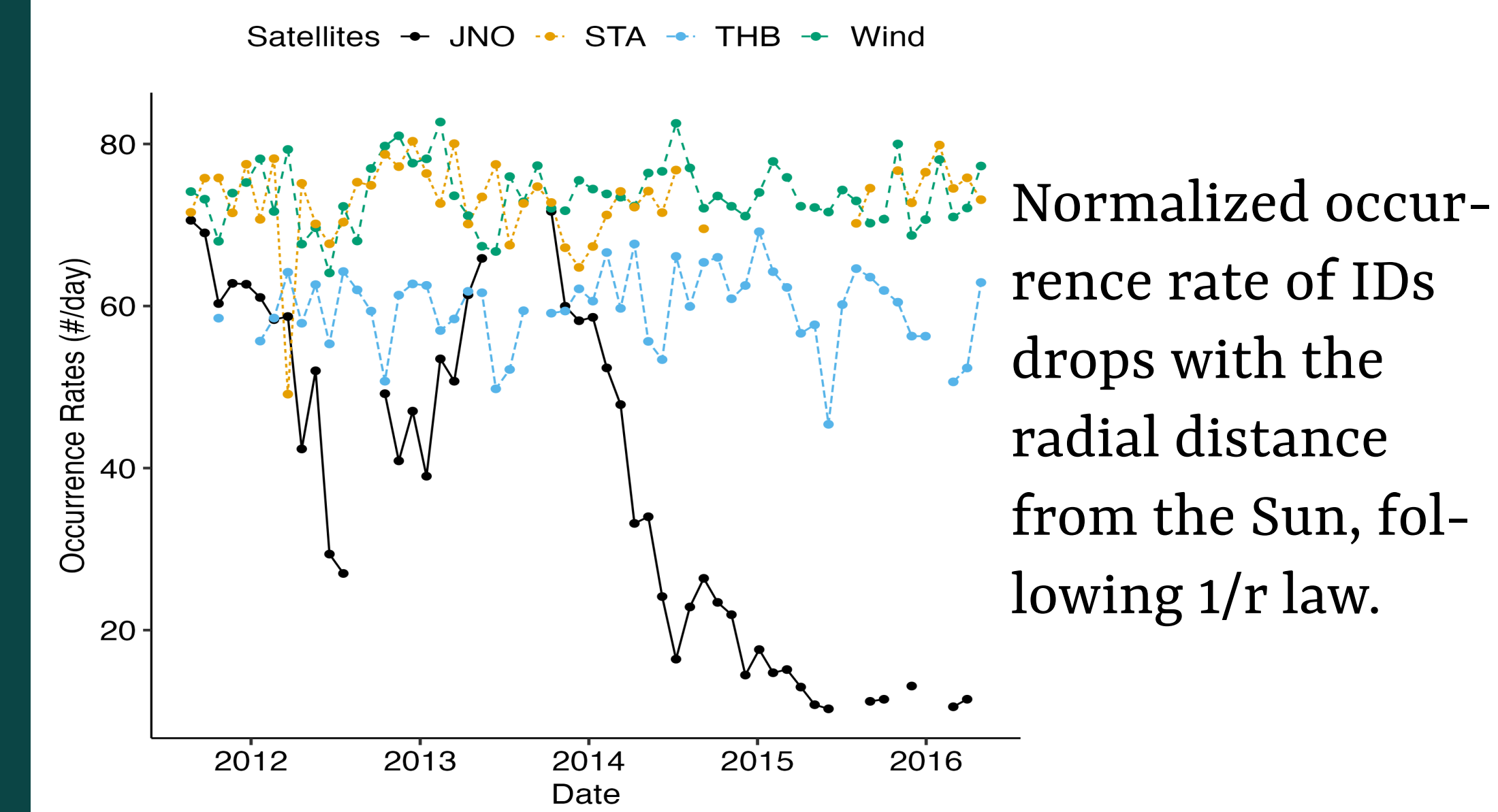
- We use (Liu et al. 2022) method to identify IDs, which has better compatibility for the IDs with minor field changes.
- Then the minimum variance analysis is applied to each ID event to obtain the boundary normal (LMN) coordinate and extract IDs' features.
- Hamiltonian model is applied for investigation of ion dynamics in the solar wind discontinuity configuration.



Solar wind discontinuities evolve in space with occurrence rate decreasing, thickness increasing and current density decreasing with distance from the Sun. And they are probably generated locally beyond 1 AU.

Solar wind discontinuities field plays an important role in determining the efficiency of ion pitch angle scattering, and characterize three ion populations: transient, trapped, regular.

Results



High energy ion particle has higher chance to be scattered.

Discontinuities with high shear magnetic field will not contribute particle scattering.