Solar wind discontinuities spatial evolution and energetic ion scattering

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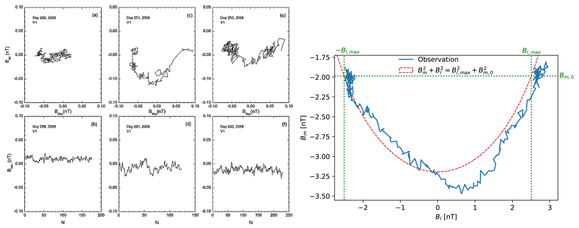
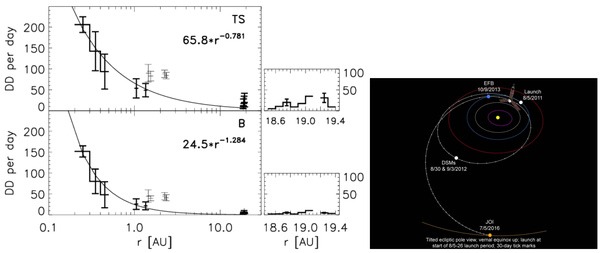
Introduction & Motivation

'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.

Results

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.

Background sheared magnetic field plays an important role in determining the efficiency of ion pitch angle scattering, and characterize three ion populations: **transient, trapped, regular**.