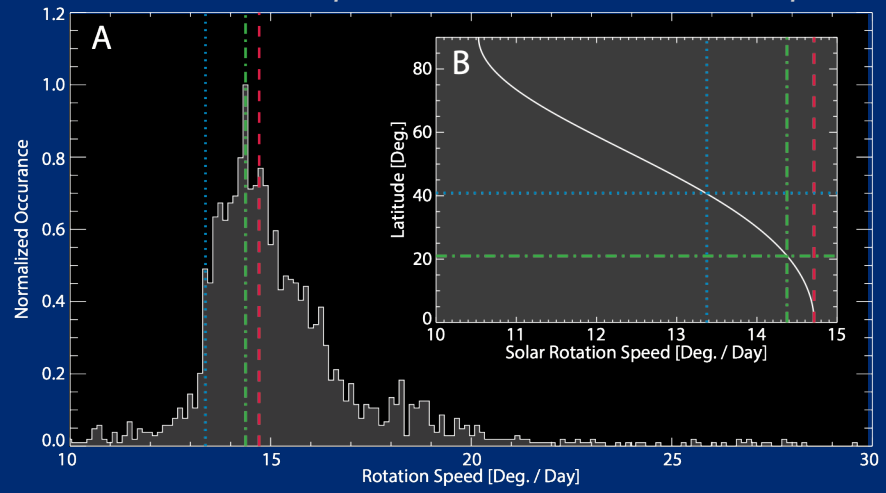
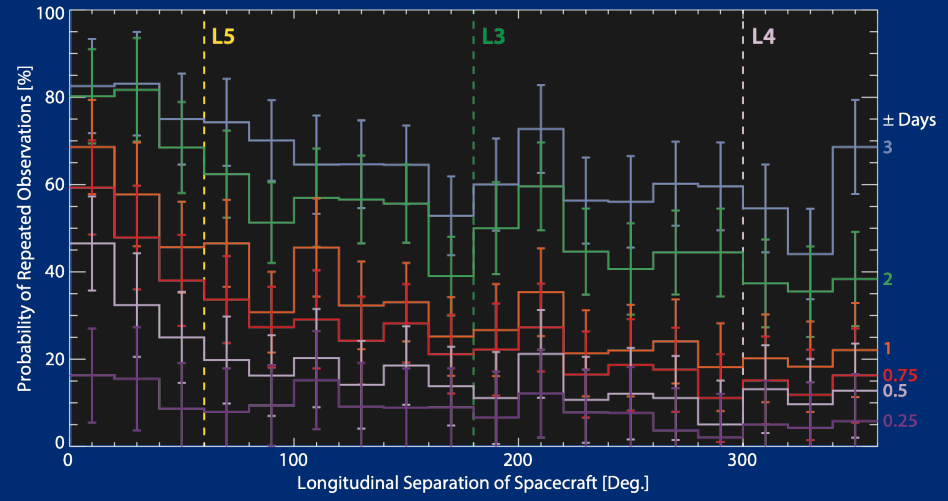
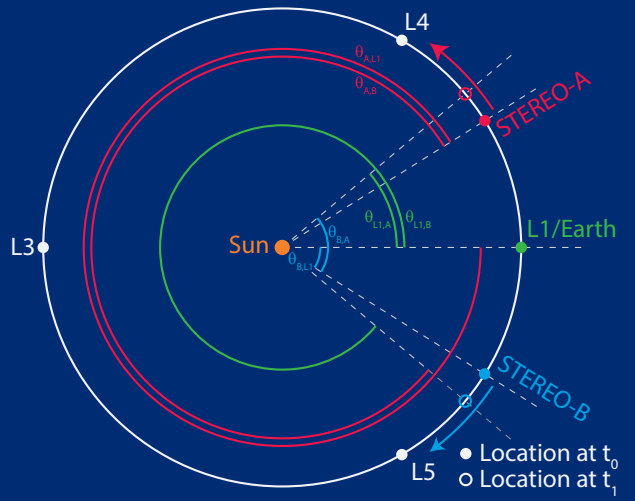
Predictive capabilities of Stream Interaction Regions at Different Solar Longitudes

SIR co-rotation speeds: Tied to solar rotation speed



SIR predictive capabilities: Tied to spacecraft separation





- Advanced warning of Stream Interaction Regions (SIRs) impacting the Earth's magnetosphere is vital for space weather forecasting, since SIRs can trigger geomagnetic storms which affect near-Earth space environment, the ionosphere, and the atmosphere.
- Since SIRs are long-lived, Earth-trailing spacecraft could be used as "warning buoys" to help predict SIRs that may hit the Earth.
- Using 10 years of STEREO and ACE observations, we assessed the predictability of SIR arrival at Earth for different latitudinal and longitudinal spacecraft separations *(upper right and lower left figures)* to test the effectiveness of an Earth-trailing warning buoy system.
- It was determined that a reliable forecast of the SIR arrival time requires coordinated measurements at multiple Earth-trailing spacecraft to mitigate the uncertainty in the SIR co-rotation speed *(upper left figure)*.

A multi-point, string-of-pearl type mission architecture would improve capabilities of capturing and predicting SIRs

Allen et al. (2020), *Space Weather*, doi: 10.1029/2019SW002437