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# Optimizing the Time-lag Estimate between Spacecraft for Recurring Solar Wind Structures

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One may use the longitudinal coverage of different spacecraft assets, or the same asset over sequential Carrington Rotations, to study the solar wind behavior and evolution from long-lived large-scale solar structures (coronal holes, active regions). The STEREO observatories are ideally suited for these longitudinal studies. Since commissioning in 2007, the two STEREO spacecraft (A, B) drifted away from the Earth by 22.5 degrees per year, in opposite directions. Since solar conjunction in 2015, the STEREO spacecraft began drifting back toward the Earth. The early mission included the declining phase of Cycle 23, while the recent observations cover the same phase for Cycle 24. These orbital and cycle phase circumstances present unique conditions for studying the persistence of solar wind parameters over various delta solar longitudes during solar minimum conditions. Prior solar wind persistence studies during solar minimum estimated about 2-3 days robustness (e.g., Opitz et al. 2009 and references therein), although this result depends upon the type of solar wind structure being studied.

Here we look at intervals during the declining phase of Cycle 23 (early mission) and Cycle 24 (post solar conjunction), when solar winds emanating from long-lived coronal-hole structures are observed both at STEREO and at near-Earth assets (OMNI2). The observations have been selected for similar solar latitudes but temporal separation in solar longitude. We look at different aspects for optimizing the time-lag estimate between observations.

This study has space weather applications, as the accuracy of L5 monitor 'forecasts' will depend on the persistence of solar wind structures. At 60 deg longitude prior to Sun-Earth Line, solar wind at L5 will be sampled $\sim$ 4 days prior to recurring structure arrival at the Sun-Earth line (e.g., see Simunac et al. 2009 for STB as a test bed for a L5 monitor).