In-situ Switchback Variability as a Proxy for Source Region Variation

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Résumé

Magnetic switchbacks are localised Alfvénic deflections of the heliospheric magnetic field away from its background orientation. Various mechanisms have been proposed to explain their formation, with interchange reconnection in the solar corona frequently invoked in the literature. Previous studies indicate that switchbacks potentially retain signatures of their source region, which persist in the solar wind out to *Parker Solar Probe* (PSP) distances. Their in-situ properties may therefore be used as a proxy to probe the source region properties and formation mechanisms.
We present our investigation on how variability in switchback properties and the associated solar wind links back to variability at the solar source. To address this, we use a combination of remote-sensing and in-situ data from several sources to conduct two studies on this topic. In our first study, we examine the long-term variability of switchback deflection angles as the global coronal magnetic field evolves over the ascending phase of the solar cycle from 2019-2024. In our second study, we characterise the changes in the in-situ switchback properties over a week-long interval during PSP Encounter 13, as the spacecraft connectivity transitions from a coronal hole to an active region and back. Finally, we report an example of a switchback observed during Encounter 13 with an unusual bi-directional strahl signature, representing a departure from the standard properties of an archetypical switchback.

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