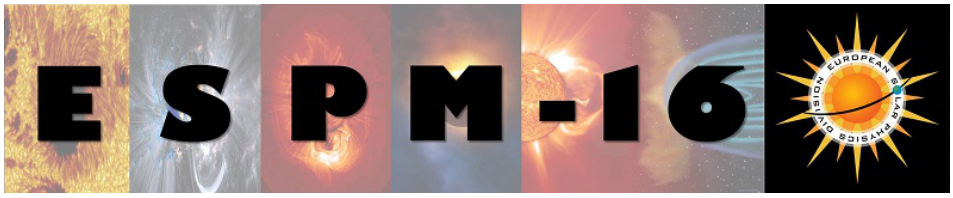

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Estimating uncertainties in the back-mapping of the fast solar wind

Monday, 6 September 2021 10:58 (13 minutes)

Although the sources of the fast solar wind are known (the coronal holes), the exact acceleration mechanism of the fast solar wind is still not fully understood. An important factor that can improve our understanding is the combination of remote sensing and in-situ measurements.
In order to combine them, it is necessary to accurately identify the source location of the in-situ solar wind with a process called back-mapping. Back-mapping consists mainly of two parts.
The first one is the ballistic mapping where the solar wind radially draws the magnetic field into the Parker Spiral, down to a point in the outer corona.
The second one is the magnetic mapping where the solar wind follows the non-trivial magnetic field line topology down to the solar surface. The magnetic field in this region is derived from a global model, like the potential field source surface extrapolations (PFSS).
In this study we focus on this back-mapping of the fast solar wind and try to determine all the uncertainties and sources of error that can affect the final location deduced on the solar surface. We compare different models for the ballistic mapping and also for the magnetic mapping and explore which free parameters have the greatest effect in the back-mapped locations.
Finally, we provide an uncertainty estimation for the back-mapped footpoints and compare our results with existing frameworks, like the Connectivity-Tool of IRAP.

Student poster?

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