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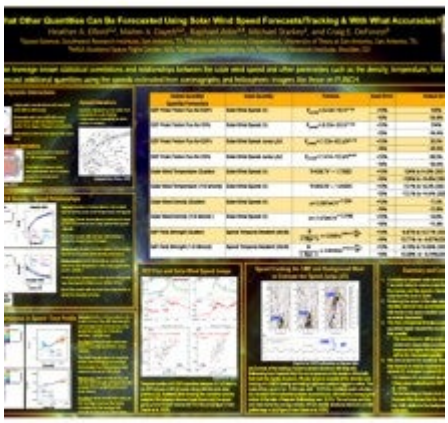
Poster
The correlations between the solar wind speed and other solar wind and IMF parameters results from a combination of differences in the source properties from given source regions, and the dynamic interaction that occurs en route from the Sun to Earth. Solar wind associated with coronal holes, streamers, and transient events such as Coronal Mass Ejections have different properties. Additionally, the solar wind parameters evolve in a systematic way as the solar wind parcels propagate from the Sun to Earth producing additional relationships between amongst the solar wind and IMF properties as compressions (rarefactions) and form when fast wind parcels run into (away from) slower wind parcels emitted earlier (later).

We can leverage these known statistical correlations and relationships between the solar wind speed and other parameters such as the density, temperature, field strength, geomagnetic Kp index, and SEP flux to forecast additional quantities using the speeds estimated from coronagraphs and heliospheric imagers like those on PUNCH.

The nature of the relationships between the solar wind speed and the quantity for which you are trying to forecast is important for determining how accurately we can estimate that given quantity using the solar wind speeds derived from the coronagraph and heliospheric imagers.

For example, the formulas for solar wind temperature have a power law exponent of ~1 for the speed term, and the formula for the density has an exponent of about -1.5 for the speed term. Therefore, a given error in the speed will produce a larger error for the solar wind density than it will for the solar wind temperature.



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