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The solar wind parameters near Earth have values reflecting both source properties set at the Sun and in the corona and dynamic interactions that occur as solar wind parcels emitted at different speeds interact with one another en route from the Sun to Earth. Some aspects of the source properties and some aspects of the dynamic interactions cause there to be relationships amongst pairs of the solar wind and IMF parameters. A common example of a correlation caused by dynamic interaction is when we observe a slow wind region followed by a rise in speed and then then a fast wind region. In such a case the fast wind was emitted at a later time and is catching up to a slower wind region emitted at an earlier time creating a compression region. As a fast wind parcel runs into a slower one the density, temperature, and magnetic field strength become elevated. Here, we review key solar wind statistical relationships that provide additional constraints for the PUNCH imaging analysis. We also present several relationships that can be used to leverage quantities that PUNCH measures well such as the flow speed, change in the flow speed, and change in density to estimate additional solar wind quantities and to forecast some geophysical indices.
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