

Investigating the Origins of Radial Magnetic Fields within Solar Wind Rarefaction Regions



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While underwound magnetic fields are not uncommon in solar wind rarefaction regions radial IMF is not expected near 1 AU for ambient solar wind conditions. In spite of this, extended periods of nearly radial IMF (defined as $B_r/B \gtrsim 0.9$ for 6 hours or more) have been observed. Interchange reconnection at the Sun is a proposed mechanism for creating a change in the solar wind speed for a given source region, resulting in elongated magnetic fields that connect fast and slow solar wind streams. If reconnection is the cause we expect to observe enhanced in situ charge states. In addition, because reconnection is a transient process we do not expect to see evidence of corotation. Using in situ and remote observation data from STEREO---A, STEREO---B, and Wind from early to mid 2007 (when there was minimum transient solar wind activity) we have found examples of nearly radial IMF (6 hours or more duration) that were observed at multiple spacecraft separated by several hours in time and no more than 10 degrees in longitude. In this respect the nearly radial field periods behaved like transients. However, we did not see any indication of enhanced iron charge states.

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