
Explaining the Hemispheric Pattern of Filament Chirality

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Abstract

Solar filaments are known to exhibit a hemispheric pattern in their chirality where dextral/sinistral filaments dominate in the northern/southern hemisphere. This pattern which has only been quantified in detail for the rising phase of the solar cycle, illustrates a global pattern of magnetic helicity and free magnetic energy that is critical for filament eruptions and CMEs. We show that this pattern can be explained through data driven 3D global magnetic field simulations of the Sun's large-scale magnetic field (Yeates et al 2008). Through a detailed comparison with 109 filaments over a 6 month period, the model correctly reproduces the filament chirality and helicity with a 96% agreement for 109 filaments. Following the model's success, the data driven simulation is extended to run over a full solar cycle (Yeates and Mackay 2012) where predictions are made for the spatial and temporal dependence of the hemispheric pattern in the declining phase of the solar cycle. This prediction may be tested through new observing programs designed for the declining phase of the present cycle.

Yeates, Mackay and van Ballegoijen, A, 2008, *Solar Physics*, 247, 103

Yeates and Mackay, 2012, *ApJ*, 753, L34

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