Geophysical Research Abstracts
Vol. 20, EGU2018-6960, 2018
EGU General Assembly 2018

Comparing coronal and heliospheric magnetic fields over several solar cycles

Jennimari Koskela, Ilpo Virtanen, and Kalevi Mursula
University of Oulu, Space Climate, Finland (jennimari.koskela@oulu.fi)

We use the PFSS model and photospheric data from Wilcox Solar Observatory, SOHO/MDI, SDO/HMI, and SOLIS to compare the coronal field with heliospheric magnetic field measured at 1 AU, compiled in the NASA/NSSDC OMNI 2 data set. We calculate their mutual polarity match and the power of the radial decay, p, of the radial field using different source surface distances and different number of harmonic multipoles. We find the average polarity match of 82% for the declining phase, 78%–79% for maxima, 76%–78% for the ascending phase, and 74%–76% for minima. On an average, the source surface of 3.25 RS gives the best polarity match. We also find strong evidence for solar cycle variation of the optimal source surface distance, with highest values (3.3 RS) during solar minima and lowest values (2.6 RS–2.7 RS) during the other three solar cycle phases. Raising the number of harmonic terms beyond 2 rarely improves the polarity match, showing that the structure of the HMF at 1 au is most of the time rather simple. All four data sets yield fairly similar polarity matches. Thus, polarity comparison is not affected by photospheric field scaling, unlike comparisons of the field intensity.