**E S P M - 16**

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# How good is the bipolar approximation of active regions for surface flux transport?

*Monday 6 September 2021 11:24 (13 minutes)*

We investigate how representing active regions with bipolar magnetic regions (BMRs) affects the end-of-cycle polar field predicted by the surface flux transport model. Our study is based on a new database of BMRs derived from the SDO/HMI active region patch data between 2010 and 2020. An automated code is developed for fitting each active region patch with a BMR, matching both the magnetic flux and axial dipole moment of the region and removing repeat observations of the same region. By comparing the predicted evolution of each of the 1090 BMRs with the predicted evolution of their original active region patches, we show that the bipolar approximation leads to a 24% overestimate of the net axial dipole moment, given the same flow parameters. This is caused by neglecting the more complex multipolar and/or asymmetric magnetic structures of many of the real active regions, and may explain why previous flux transport models had to reduce BMR tilt angles to obtain realistic polar fields. Our BMR database and the Python code to extract it are freely available.

## Student poster?

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