Deciphering Solar Magnetic Activity: On the Relationship Between the Sunspot Cycle and the Evolution of Small Magnetic Features

McIntosh, Scott W. (1), mscott@ucar.edu; Xin Wang (1,2); Robert J. Leamon (3); Alisdair R. Davey (4); Rachel Howe (5); Larisza D. Krista (6); Anna V. Malanushenko (1,3,7); Robert S. Markel (1); Jonathan W. Cirtain (8); Joseph B. Gurman (9); William D. Pesnell (9); and Michael J. Thompson (1).

(1) High Altitude Observatory, National Center for Atmospheric Research, Boulder, CO, USA
(2) School of Earth and Space Sciences, Peking University, Beijing, China
(3) Department of Physics, Montana State University, Bozeman, MT, USA
(4) Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, USA
(5) School of Physics and Astronomy, University of Birmingham, Edgbaston, Birmingham, UK
(6) Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO, USA
(7) Lockheed-Martin Solar and Astrophysics Laboratory, Palo Alto, CA, USA
(8) Marshall Space Flight Center, Huntsville, AL, USA
(9) NASA Goddard Space Flight Center, Solar Physics Laboratory, Greenbelt, MD, USA

Sunspots are a canonical marker of the Sun's internal magnetic field which flips polarity every 22 years. The principal variation of sunspots, an ~11-year variation in number, modulates the amount of magnetic field that pierces the solar surface and drives significant variations in our Star's radiative, particulate and eruptive output over that period. This paper presents observations from the Solar and Heliospheric Observatory and Solar Dynamics Observatory indicating that the 11-year sunspot variation is intrinsically tied to the spatio-temporal overlap of the activity bands belonging to the 22-year magnetic activity cycle. Using a systematic analysis of ubiquitous coronal brightpoints, and the magnetic scale on which they appear to form, we show that the landmarks of sunspot cycle 23 can be explained by considering the evolution and interaction of the overlapping activity bands of the longer scale variability.