# Polarization Signatures and Coronal Magnetic Memory During the April 8 2024 Great North American Eclipse

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The total solar eclipse of April 8, 2024, provided a rare opportunity to investigate the Sun's corona at the peak of Solar Cycle 25. In this study, we employ a data-driven global MHD model to predict the coronal magnetic field and compare our postdictions with observed large-scale structures. While solar maximum presents challenges for forecasting coronal activity, the integration of a surface flux transport model enables meaningful predictions. Our model, initiated one week prior to the eclipse, successfully reproduces multiple complex streamer-like structures that closely match features seen in white-light eclipse images and SDO/AIA observations. We also compute the magnetic squashing factor to examine the spatial complexity of the separatrix web (S-web), identifying regions prone to magnetic reconnection. Additionally, we perform forward synthesis of the coronal emission's polarization by modeling the Stokes I, Q, U, and V parameters for key spectral lines, thereby shedding light on the Sun's coronal magnetic structure. The results further reveal signs of dynamical memory in the global coronal configuration, persistent over one Carrington rotation. This work contributes toward advancing coronal magnetometry, with relevance for current and future missions such as the Daniel K. Inouye Solar Telescope, Coronal Multichannel Polarimeter (CoMP), Solar Orbiter, and ISRO's Aditya-L1 mission.