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Space weather modeling has advanced greatly in the last few decades, with physics-based models, data assimilation algorithms, and now machine learning techniques. There are several very successful codes producing cutting-edge research at institutions across the world and making real, operational predictions for use in the private and public sectors. The accuracy of a prediction, however, depends strongly on the model input. Excellent models will produce incorrect results if they are driven by the wrong data. Physics-based geospace models use upstream solar wind observations as input, but those data are taken from one point in the vast expanse of near-Earth space. The inhomogeneous nature of the solar wind means that what one spacecraft orbiting the L1 point observes may not correspond to the actual solar wind that impacts Earth. We present a case study in which a geomagnetic storm has been simulated with the same model but driven by a number of solar wind datasets. The solar wind has been taken from several different L1-orbiting spacecraft and propagated to the upstream simulation boundary using several different methods. Comparing the results of these simulations, we find that varying the solar wind input in this way changes the predictions of crucial geospace parameters, including geomagnetic indices, leading to a significant spread in uncertainty for these predictions.

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