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# Effects of CME removal and observation age on solar wind data assimilation

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Accurate space weather forecasting requires knowledge of the solar wind conditions in near-Earth space. Data assimilation (DA) combines model output and observations to find an optimum estimation of reality and has led to large advances in terrestrial weather forecasting. It is now being applied to space weather forecasting. Here, we use solar wind DA to reconstruct the conditions from 30 solar radii to Earth's orbital radius and over all longitudes and produce solar wind speed forecasts. In this study, we assimilate observations from the Solar Terrestrial Relations Observatory (STEREO) and the Advanced Composition Explorer (ACE). Analysis of two periods of time, one in solar minimum and one in solar maximum, reveals that assimilating observations from multiple spacecraft is preferable over observations from a single spacecraft. The age of the observations also has an impact on forecast error, whereby the mean absolute error (MAE) increases by up to 23% when the forecast lead time exceeds the time associated with the longitudinal separation between the observing spacecraft and the forecast location. It was also found that removing CMEs from the DA input observations acts to reduce the forecast MAE by up to 10% through removal of false streams in the forecast time series. This work adds further evidence to the usefulness of the L5 space weather monitoring mission, but also shows that a mission to L4 would aid in future solar wind DA forecasting capabilities.