At the National Oceanic and Atmospheric Administration Space Weather Prediction Center (NOAA/SWPC) forecasts are issued for solar radiation storms, which consist of energetic protons. These events can be hazardous to the health of astronauts as well as passengers and crew on polar flights, and they can damage satellite electronics. Before new models from the research community can be implemented at SWPC, it is important to determine the current SWPC proton forecasting skill, to serve as a baseline for validation for how a new model could improve SWPC forecast ability. This skill was assessed over two decades in the time period from 1997 through 2017.

We then studied several case study proton events to validate the WSA-ENLIL + Cone + SEPMOD model framework as a possible tool for forecasting. For each event we ran the WSA-ENLIL model with historical SWPC forecast fits to Coronal Mass Ejections (CMEs) that left the Sun over the week of the proton event. WSA-ENLIL was used to assess when the event became magnetically connected to the earth. The output from WSA-ENLIL was then used as an input to SEPMOD to simulate the proton event that would be observed at earth. The SEPMOD time profiles were then compared to the GOES proton data to determine how accurately the model was able to reproduce an event.