Developing Space Weather Applications of UFS in the Whole Atmosphere Modeling Framework

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The paper presents the current status of the Whole Atmosphere Model (WAM) development at NOAA based on the research configurations of the Unified Forecast System (UFS) global atmosphere model. It summarizes the recent whole atmosphere model intercomparisons and their evaluation by the empirical ionosphere-thermosphere-mesosphere (ITM) models, space-borne observations and middle atmosphere reanalyses. The UFS-WAM implementation as the novel Space Weather (SW) application of UFS will address capability gaps of the operational WAM-IPE forecasts. The L196C96 UFS-WAM configuration is now adapted for the analysis-forecast cycling in the Global Workflow of the NOAA Global Forecast System for selected case studies considering the operational data and the retrospective upper atmosphere observations. We will discuss key aspects and requirements for SW predictions by UFS-WAM and analysis of ITM observations (temperature, air density and composition) between 50 km and 500 km. The use of the specified meteorology in the lower atmosphere domain of UFS-WAM with the SW drivers of the operational WAM will be a flexible and cost-effective pathway to adapt the JEDI assimilation algorithms for assimilation of the ITM data.