4.2 Wildfire smoke and volcanic ash forecasting over North America with the RAP and HRRR NWP systems.

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A novel approach to forecasting aerosol concentrations using a minimal-complexity version of WRF-chem is described in this talk. Representing only a small additional computational cost with the addition of just one tracer, the RAP-smoke and HRRR-smoke real-time modeling systems predict wildfire smoke concentrations over North America and the contiguous United States at 13km and 3km grid spacing, respectively. Fire hotspots detected by polar-orbiting satellites (both the Visible Infrared Imaging Spectroradiometer VIIRS, and the Moderate Resolution Imaging Spectroradiometer MODIS) are used to initialize wildfire smoke sources in the models, with biomass burning emissions and smoke plume rise parameterizations handled within WRF-chem. A single smoke aerosol tracer is then advected in the NWP simulation, with scavenging by wet removal and other processes also included. In this talk, we describe the real-time workflow of the RAP-smoke and HRRR-smoke, present some preliminary verification of smoke forecasts at the surface, and outline future plans for the system. We also present some retrospective volcanic ash forecasts using a similar model configuration for the May 2017 Bogoslof eruption in the Aleutian Islands. Work continues to improve the initialization of volcanic ash emissions and decrease model run time, in preparation for real-time ash forecasting over the HRRR-Alaska domain.