P81 Examining the impact of halogen emissions and chemistry on ozone using the hemispheric CMAQ model

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Reactive bromine and iodine species emitted from the ocean can alter the oxidative capacity of the atmosphere through a number of processes including the depletion of ozone. Most chemical transport models do not include these emissions and their atmospheric chemical reactions. In this study, detailed chemical reactions of organic and inorganic halogen species along with their emissions are implemented into the hemispheric Community Multiscale Air Quality model (CMAQ). Model simulations are performed without and with halogen emissions and chemistry over the Northern Hemisphere for the summer months of 2006. Meteorological fields are obtained from the Weather Research and Forecasting model (WRF).
Preliminary results suggest that these emissions, when extrapolated globally, are similar to previous estimates with the highest organic halogen emissions occurring in coastal regions while the highest inorganic halogen emissions occur in warmer waters, areas downwind of anthropogenic pollution, and regions with high sea spray production. Widespread oceanic regions in the Northern Hemisphere experience a 1-6 ppbv reduction in monthly-mean surface ozone concentrations due to halogens, with the largest decreases occurring over the Mediterranean, Red, and Arabian Seas and off the western coasts of Mexico and northern Africa. The lower model predictions of surface ozone from the inclusion of halogen emissions and chemistry are in better agreement with observed ozone concentrations over marine environments. With decreasing ozone standards in the U.S. and other countries and increasing importance of "background" concentrations, implementation of halogen emissions and chemistry into hemispheric CMAQ is an important step in improving the representation of atmospheric chemistry within marine air masses that affect the background air quality in many coastal cities.