

2.022 Investigating Ammonia Sources with the Cross-Track Infrared Spectrometer (CrIS).

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Abstract:

Ammonia (NH_3) can react with sulfuric and nitric acid in the atmosphere to produce ammonium nitrate and ammonium sulfate aerosols. Uncertainty in NH_3 emissions, primarily from agricultural sources such as animal feed lots and fertilizer use, can thus lead to uncertainty in the formation, vertical distribution, and radiative impacts of ammonium nitrate and ammonium sulfate aerosol, which in turn can lead to significant uncertainties in air quality and climate models. Here we present the first use of the Cross-Track Infrared Sounder (CrIS) aboard the Suomi NPP satellite to investigate and improve modeled concentrations of NH_3 in California from the Community Multiscale Air Quality (CMAQ) model. Our baseline model simulation uses the bi-directional NH_3 flux capability of CMAQ along with a version of the California Air Resources Board (CARB) emission inventory that includes an empirically derived diurnal cycle for NH_3 emissions. The extensive spatial and temporal coverage of the CrIS satellite provides a wealth of data on NH_3 concentrations over California. We will discuss the errors identified in our emission inventory as well as the meteorological and other conditions leading to remaining discrepancies between the model and observations. We will also present recommendations for the further use of CrIS data in atmospheric chemistry studies.