Geophysical Research Abstracts
Vol. 17, EGU2015-7536-1, 2015
EGU General Assembly 2015


# Constraining $NO_x$ and VOC emissions with GOME, SCIAMACHY, and OMI data for the study of long-term air quality in Los Angeles

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It is imperative to have accurate knowledge on changes in atmospheric composition for air quality and climate studies. Atmospheric chemistry-transport models are a useful tool for understanding and predicting atmospheric composition, but the reliability of the model results heavily depends on the accuracy of emission inventories that the models use. Satellite retrievals of tropospheric $NO_2$ and HCHO during the past decades may help to constrain $NO_x$ and VOC emissions in urban areas. In this study, we choose the Los Angeles Basin in the US as a test site to quantify the long-term urban emissions using GOME, SCIAMACHY, and OMI data. Recent studies revealed that there have been large decreases in ozone and its precursors in Los Angeles before and since the beginning of the satellite observational period. By comparing satellite columns with the multi-year model simulations utilizing optimized emission inventories, we examine the accuracy of satellite $NO_2$ and HCHO retrievals and explore the possibility of using multi-satellite data to improve our knowledge of long-term emissions.