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# Analysis of the Speciated Anthropogenic VOC Emission Improvements for KORUS-AQ Aircraft Field Campaign

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The KORUS-AQ is the international aircraft field campaign to investigate air pollution effects from the internal and transboundary sources over the Korea region. The CREATE (Comprehensive Regional Emissions inventory for Atmospheric Environment) emissions inventory and SMOKE-Asia emission processing system were used to serve as a priori emissions information for evaluation and to support chemical transport modeling, respectively. Initial results of the model-measurements comparison analysis showed large discrepancies in VOC species over South Korea, especially over urban regions. Several aromatic VOC species (e.g. toluene and xylene) were observed highly near megacities and petro-chemical plants but under-predicted by Chemical Transport Models (CTMs) – possibly due to inaccurate chemical speciation profiles. The chemical speciation profiles for each emission sources, therefore, have to be re-visited to improve emissions information.
In this study, we have; 1) re-examined our emission speciation processes, and 2) tried to find possible alternative chemical speciation profiles, so that we could improve our modeling emissions inventory. Initial review of the present speciation profile mapping revealed that the painting and surface coating sources were linked with the chemical speciation profiles with relatively low aromatic species contribution. In Korea, however, the solvent use and industrial processes are dominant sectors for anthropogenic VOCs emission whereas residential sector occupies highly in China. These are the inventory sectors which needs careful selection of chemical speciation profiles. We, therefore, investigated more recent chemical speciation profiles using the literatures from Korea and China, rather than those from U.S EPA. As a results, ARO1(e.g. toluene, benzene) and $ARO_2$(e.g. xylene) emissions were increased by factor of 4 and 1.4, respectively. ARO1 shows a strong increase over the eastern China and South Korea, whereas $ARO_2$ tends to decrease over China and North Korea. We have compared the CTM modeling results using our updated VOCs speciation to the KORUS-AQ aircraft field campaign data. The simulated concentration showed higher agreements with measurements, not only for secondary species (ozone, in this case), but the precursors, such as toluene and xylene. In addition, we will present our on-going analysis on the effect of speciated VOC emission changes to the secondary organic aerosol concentrations over South Korea.

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