A strategy for linking the regional air pollution knowledge to assessment of their global climate and environment impacts

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The method is not so trivial for making a maximum use of the knowledge on the regional air pollution for assessment of their impacts on the climate and environment, i.e. impacts on the public health, regional climate, agriculture, and water cycle, because the emission process of air pollutants is highly localized phenomena, whereas their impacts are on continental to global scale. UNEP ABC and many other international/national projects have been devoted to characterization of short-lived atmospheric materials through regional chemical and radiative measurements and modeling. HTAP-type source/receptor analyses and assimilation/inversion analyses are useful for attribution of the air quality to emission sources. Model inter-comparisons by AEROCOM, ACCMIP, and others are useful for understanding the GCM performance of the chemical and aerosol process and for assessment of their climate effects.

All these heritages, i.e. regional measurements, assimilation/inversion analyses, and global climate impact simulations, are needed in searching the optimal reduction pathway of Short-Lived Climate Pollutants (SLCPs) in the Climate and Clean Air Coalition (CCAC) and national projects such as the MOEJ/S-12 project in Japan. Different reduction sequences of various pollutant species will produce very different radiative forcings and hence different climate effects, so that we first have to improve the emission inventory through assimilation/inversion analyses of regional measurement data of air quality. Then this regional knowledge has to be modeled by an integrated emission model, e.g. the Asia-Pacific Integrated Model (AIM) in the S-12 project. Once the integrated model is improved to treat SLCPs accurately along with LLHGs, then we use it to construct global emission scenarios by upscaling the regional knowledge of air pollution. An important point in this strategy is how to construct an efficient system for end-to-end performance of the three steps. In the present talk, I like to show examples from the S-12 project to discuss this strategy.

Key words: Air pollution, Aerosol, Climate, Remote sensing