DEVELOPMENT OF THE EMISSION INVENTORY SYSTEM FOR SUPPORTING TRACE-P AND ACE-ASIA FIELD EXPERIMENTS

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New emission inventories were developed in support of the Aerosol Characterization Experiments(ACE)-Asia and Transport and Chemical Evolution over the Pacific (TRACE-P) experiments work on. We combine our inventories into the ACCESS(Ace-Asia and Trace-P Modeling and Emission Support System) for more integrated support for these two field studies. To support field experiments and complex atmospheric models such as STEM-II, highly resolved level of spatial, temporal, and species-component detail are needed in emission inventories.

To satisfy these requirements we include not only the gaseous pollutants SO_2, NO_x, CO, and NMVOC, but particulate pollutants such as Black Carbon, Organic Carbon, PM_{10}, and $PM_{2.5}$ for the study domain of Asia. Our domain was designed to cover –13°~53° in latitude and 60°~157° in longitude. It includes 22 Asian countries, 60 sub-regions. 115 active LPSs and 22 volcanos are also included as point sources.

The data system includes information on various emission sources, compiled by fuels and by economic sector activities, and natural emission sources such as volcano and forest fires. So, the methodologies for estimating emission are different between anthropogenic and biomass burning from fires.

For anthropogenic emission, we use year 2000 emission database from Argonne National Laboratory. The data themselves are administrative–level estimates recently compiled from official national statistics and projections. For spatial allocation of regional emission, we use geographical data from The International Institute for Applied Systems Analysis (IIASA), Global Emissions Inventory Activity (GEIA), Central

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Research Institute of the Electric Power Industry (CRIEPI), Digital Chart of the World(DCW.), and LandScan Global Population database from Oak Ridge National Laboratory(ORNL). The combined use of RS and GIS data enhances the spatial allocation capability. The system produces gridded emission datasets from 1degree by 1degree down to 30second by 30second.

For biomass burning emission from fires, we use different approach of what we did on anthropogenic emission. Total emission from fire was estimated from previous research. For more realistic temporal variability, we spatially allocate fire emission using on-line information, i.e., we use Advanced Very High Resolution Radiometer (AVHRR) data to "spot" fires and then distribute the emissions from that. We also included Total Ozone Mapping Spectrometer (TOMS) aerosol index (AI), satellite coverage, cloud coverage, and precipitation data to reduce noise of AVHRR data.

For anthropogenic SO_2, more than 60% of total anthropogenic emission comes from China. But, for NO_x, CO, and VOC, emission contribution from China is decreased to 48~ 34%. For these species, portion of India, Japan, South Korea, Indonesia, and Thailand are increased. Power generation and Industrial sector are dominant for SO_2 and transportation sector is dominant for NO_x emission. For CO emission, domestic biofuel is greatest contributor. For VOC, transport and domestic sectors are the significant contributors. For SO_2 emission distribution, Sichuan, Yunnan, Jiangsu, Shandong, Hebei, Shanxi and Henan are large in China. Emission from Thailand and Indonesia are also large. Emission with finer grid may useful for more detail analysis for smaller domain. We selected 4° × 4° domain near Shanghai to see how emission distributions are different along to the spatial resolution. From this test, we found effect of certain emission area is strongly depends on it's geographical feature – e.g. shape, length, and area etc. For example, Lake Tai (about 20% of a 1deg by 1deg grid cell)'s effect can be seen at 30' × 30' resolution, but Yangtze River's effect cannot clearly seen even in 5' × 5' resolution. So, we must use more than 5' × 5' grid resolution when we want to see the effect of Yangtze River in Nanjing area, otherwise it should be neglected.

For biomass burning emission from fires, high emission grid cells are located mainly in the part of Indian sub-continent and west part of Southeast Asia, during experiment period. After applying our noise reduction procedure, south and southeast part of China also have high emission grids. We hope, therefore, it may help to explain high CO concentration in southern China. Temporal variation of fire emission is usually large day by day, not only due to the variation of fire event but noise of AVHRR data. This variability also reduced by noise reduction procedure.

At present we are working on the evaluation procedure of out emission inventory through flight operation data from these two field campaigns. Amount and distribution of concentration field calculated from our chemical model are fairly well matched with observation data, at large. In the presentation more evaluation features can be included according to the new findings.