Urban Carbon Dioxide Emission Inventory Developed by Bottom-up Approach

*Richao Cong[1], Makoto Saito[1], Ryuichi Hirata[1], Akihiko Ito[1], Shamil Maksyutov[1], Tomohiro Oda[2,3]

1. Center for Global Environmental Research, National Institute for Environmental Studies, 2. Goddard Earth Science Technology and Research, Universities Space Research Association, 3. Global Modeling and Assimilation Office, NASA Goddard Space Flight Center

In this study, we developed a bottom-up approach to compile a fine-grained CO_2 emissions inventory of Tokyo, Japan for 2014 complying with IPCC 2006 Guidelines. The emissions map was made by linking the available and reliable statistics data with spatial data. In addition, the method could be applied in other cities of Japan. The CO_2 emissions from 8 proxy sources (residential, commercial & industrial, agricultural energy use, road traffic, aviation, navigation, power plants, and waste disposal sites) were counted. The emissions from point, line and area sources were estimated respectively by Geographic Information System (GIS) technology and described on the map of Tokyo. As our estimation, the total CO_2 emissions of Tokyo in 2014 are about 48,425 Gg CO_2 yr^{-1}. Then to do the validation, we extracted the emissions from two existing national CO_2 inventories with the same boundary: East Asian Air Pollutant Emission Grid Database (EAGrid 2010) and Open-Data Inventory for Anthropogenic CO_2 emission (ODIAC 2014) to compare the emission differences with our estimation. And our result showed good performance that was larger than EAGrid 2010`s result of 41,491 Gg $CO_2$ $yr^{-1}$ and smaller than ODIAC`s result of 56,417 Gg CO_2 yr^{-1}.

Keywords: Urban emissions inventory , CO2 of Tokyo, Bottom up approach, Anthropogenic emissions

