5.066 Visualization Analysis on Uncertainties in the Global Greenhouse Gas Inventories.

Early Career Scientist

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Abstract:

Greenhouse gas (GHG) inventories document a country's GHG sources and sinks over the course of a year, and are considered as a useful tool for policy making and scientific use. To support the global policy making effectively, various global carbon dioxide (CO_2) emissions maps are developed basing on the inventory databases such as emissions maps from the Carbon Dioxide Information Analysis Center (CDIAC) at a resolution of $1^\circ \times 1^\circ$, Open-source Data Inventory of Anthropogenic CO_2 emission (ODIAC) at $1^\circ \times 1^\circ$, Emissions Database for Global Atmospheric Research (EDGAR) at $0.1^\circ \times 0.1^\circ$, and Fossil Fuel Data Assimilation System (FFDAS) at $0.1^\circ \times 0.1^\circ$. To explore the distribution of uncertainties between these inventories on map, we try to make a synthetic global CO_2 emissions map at a resolution of $1^\circ \times 1^\circ$ in 2010 to extract the gridded emissions values from these four source maps and make cross analysis on uncertainties grid by grid. The whole resolution process is conducted by ArcGIS. From the synthetic map, the global total emissions summarized as the source maps are about 33857 (CDIAC) ~ 41906 (ODIAC) teragram (Tg) $CO_2\ yr^{-1}$. The largest emissions grid (locates in China domain) is about 299 Tg $CO_2\ cell^{-1}\ yr^{-1}$ and the mean global total is about 38388 Tg $CO_2\ yr^{-1}$ that is much closer to FFDAS's estimation. Through cross analysis, we clarified the detailed distribution for the discrepancies between each source map and the synthetic map. Furthermore, we made the distribution for the standard deviation (SD) of gridded values between four maps by $1^\circ \times 1^\circ$. The areas with larger gridded SD values reflect where more uncertainties exist in the emissions estimation. This effort could detect the uncertainties distribution on map for these global GHG inventories at a resolution of $1^\circ \times 1^\circ$.