

Measurements of Greenhouse Gases and Halogenated Compounds at Gosan (Jeju Island, Korea) for Understanding Emissions in East Asia

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East Asia is a major source region for anthropogenic emissions of many greenhouse gases (GHGs) and halogenated compounds, important for their role in stratospheric ozone depletion and global warming. Here, we present measurements of GHGs and halogenated compounds performed at Gosan, located on the southwestern tip of Jeju Island, Korea, for understanding the emissions of these species in East Asia. Measurements performed at Gosan include flask measurements of CO₂ (in association with the Scripps CO₂ program; since 1990), continuous measurements of CO₂ (LoFlo instrument; since November 2007), and a wide range of halogenated compounds including various chlorofluorocarbons (CFCs), halons, hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons, perfluorinated compounds, sulfur hexafluoride, and other chlorinated and brominated compounds (Medusa instrument in association with the Advanced Global Atmospheric Gases Experiment Network; since November 2007). Analysis of wind trajectories arriving at Gosan show that the measurements can reflect pollution events from the major source regions in China, Korea, Japan, and Taiwan. In addition “baseline” concentrations can be observed in the clean air from the Siberian regions or from the oceans to the south. Efforts to quantify the emissions of halogenated compounds from the East Asian countries/regions have been performed using both advanced inversion techniques and relatively simple ratio techniques, and confirm the region’s major role in the global budgets for these compounds. Future research will focus on refining current emission estimation techniques and extending them to other greenhouse gases.

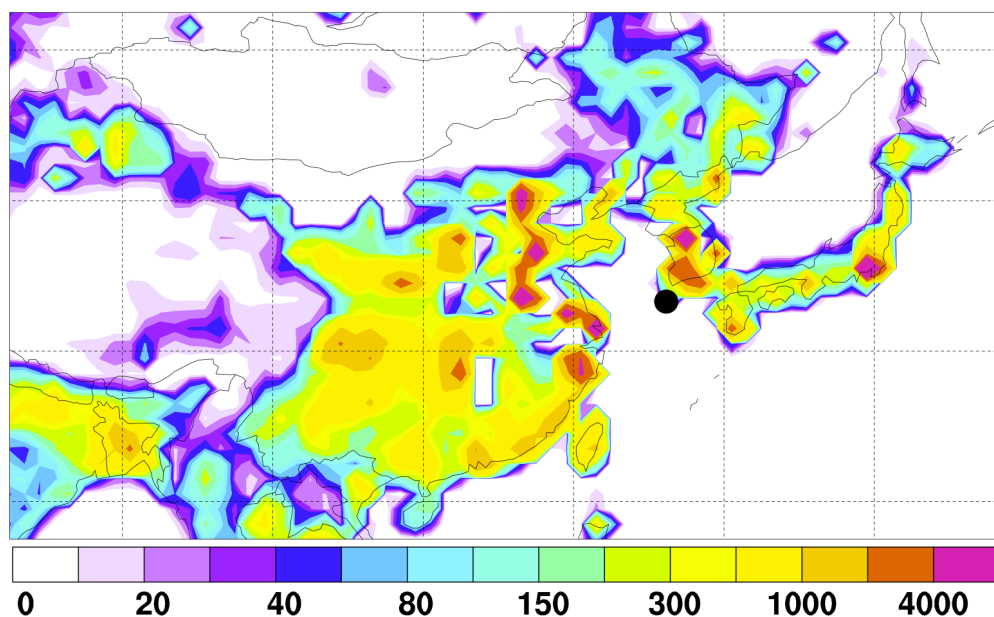


Figure 1. Emissions of HCFC-22 (CHClF₂) derived for 2008 using measurements at Gosan (shown in black circle) and inverse modeling using the FLEXPART model. Results show that emissions of this species is specially high in populated/industrialized regions of China and Korea where it is widely used in refrigeration and air conditioning. For Japan, use of HCFC-22 is banned under the Montreal protocol, however emissions may continue from old equipment still in use.