[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-CG Complex & General

[A-CG35]Global Carbon Cycle Observation and Analysis

convener:Kazuhito Ichii(Chiba University), Prabir Patra(Research Institute for Global Change, JAMSTEC), Toshinobu Machida(国立環境研究所, 共同), David Crisp(Jet Propulsion Laboratory)
Tue. May 22, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
The Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC) is a landmark agreement in the 21st Conference of the Parties (COP21) in December 2016, which aims at reduction of greenhouse gases (GHGs) emission for keeping the global warming below 2 degC. The national commitments and progresses should be carefully monitored and verified by international bodies.

In recent years, the number of observational platforms for monitoring atmospheric GHGs and air pollution species is increasing. National or regional emission inventories have also been prepared at greater resolution in space and time using different methodologies. However, due to uncertainties in modeling and sparse observation network, high uncertainty persists in global and regional sources/sinks estimations, particularly for CO2.

Developing integrated observation and analysis systems for GHGs are the most urgent tasks. Atmospheric transport models, inverse models, and process-based bottom-up models should be tested and improved. The "top-down" (with inverse models) and "bottom-up" (with surface flux/emission network data and ground-based models) estimations have to be reconciled for gaining confidence in verifying the national commitments.

The purpose of the session is to discuss state-of-the-art techniques for estimations of surface budget of GHGs and air pollutants. Ideally, these results would allow us to detect changes at an early stage under the changing climate and human activity, and to disseminate scientific knowledge for mitigation policies in a timely manner. Improved estimates of emissions from land use change, forest fires, and other anthropogenic sources (urban developments and thermal power station etc.) should be addressed. We also welcome discussions for designs and plans for future studies targeting city and country scale emission estimations using sophisticated modeling tools.

[ACG35-P05]Northern boreal methane emission estimates from CTDAS-CH_4 data assimilation system

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Boreal and arctic terrestrial land is covered by a large areas of peatlands, where about one fifth of global terrestrial carbon is stored. The region is very sensitive to the changes in temperature and water balance; the annual average temperate increase is nearly twice the global mean change, plus it is expected to release soil carbon into the atmosphere due to the warming. The largest sources of methane (CH_4) emissions from the boreal and arctic regions are natural biospheric sources, such as peatlands, wetlands and permafrost. However, their magnitude and spatial distribution still vary greatly in the process model estimates, mainly due to the heterogeneity of CH_4 fluxes, and the uncertainty in wetland extent. In this study, we estimate CH_4 fluxes in northern Fennoscandia, north west Russia and west Canada for 2004-2015 using the CTDAS-CH_4 data assimilation system. Continuous and discrete atmospheric CH_4 observations from in situ stations are assimilated, and CH_4 fluxes are optimized at 1^{o}x1^{o} horizontal resolution in those regions. In addition, atmospheric CH_4 observations from the global in situ stations are assimilated to constrain the global budget. The estimated fluxes will be compared with the process model estimates and flux observations, such as those based on the eddy covariance method, to better identify the spatial distribution and magnitude of CH_4 emissions in boreal and arctic regions.