Séminaire de Ave Arellano au LATMOS

Name : Séminaire de Ave Arellano au LATMOS

Title : On the Nexus between Carbon Cycle and Air Quality: Exploring Multiple Constraints on Anthropogenic Combustion and Fires

Laboratory :

Name of the speaker :

Affiliation :

Date and time : 20-11-2017 11h00

Location : LATMOS site UPMC, Salle de réunion 411, tour 45-46, 4ème étage

Summary :

It is imperative that we provide more accurate and consistent analysis of anthropogenic pollution emissions at scales that is relevant to air quality, energy, and environmental policy. Here, we present several proof-of-concept studies that explore observational constraints from ground, aircraft, and satellite-derived measurements of atmospheric composition on bulk characteristics of anthropogenic combustion in megacities and fire regions. We focus on jointly analyzing co-emitted combustion products such as CO_2, NO_2, CO, SO_2, and aerosols from GOSAT, OCO-2, OMI, MOPITT, IASI, GOME, and MODIS retrievals, in conjunction with USEPA AQS and NASA field campaigns. Each of these constituents exhibit distinct atmospheric signatures that depend on fuel type, combustion technology, process, practices and regulatory policies. Our results show that distinguishable patterns and relationships between the increases in concentrations across the megacity or large fire events due to emissions of these constituents enable us to: a) identify trends in combustion activity and efficiency, and b) reconcile discrepancies between state- to country-based emission inventories and modeled concentrations of these constituents. For example, the trends in enhancement ratios of these species reveal combustion emission pathways for China and United States that are not captured by current emission inventories and chemical reanalysis. Analysis of their joint distributions has considerable potential utility in current and future integrated constituent data assimilation and inverse modeling activities like in CAMS for monitoring, verifying, and reporting emissions, particularly for regions with few observations and limited information on local combustion processes. Our targeted evaluation of the global forecast and analysis of CAMS CO and CO_2 during KORUS-AQ field campaign in May 2016 suggests that CAMS is able to capture the constrast in combustion efficiency between Chinese outflow and Seoul. Analyses of MOPITT and IASI XCO as well as GOSAT XCO_2 column retrievals in CAMS better capture the variability in Seoul but not in the Chinese outflow suggesting insufficient constraints over this region. This work also motivates the need for continuous and preferably collocated satellite measurements of atmospheric composition (including O_3, CH_4) and studies related to improving the applicability and integration of these observations with ground- and aircraft-based measurements.

Contact :

franck.lefevre@latmos.ipsl.fr