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Study of biomass burning emissions with Aqua/AIRS and MetOp-A/IASI

T. Thonat, C. Crevoisier, A. Chédin, R. Armante, L. Crépeau, and N. A. Scott
Laboratoire de Météorologie Dynamique, France (thibaud.thonat@lmd.polytechnique.fr)

Biomass burning is an important source of CO_2 and CO to the atmosphere, and plays a key role in the global carbon budget. However, there are still large discrepancies between existing emission inventories, stressing the need of diverse approaches to improve our knowledge of biomass burning emissions. Hyperspectral infrared sounders such as AIRS and IASI provide information on several gases emitted by fires, with the spatial and temporal coverage needed to improve our knowledge of the biomass burning issue.
From IASI, we derive monthly mid-tropospheric integrated content of CO_2 and CO by night and day (09:30/21:30 LT) in clear sky conditions, for the period July 2007-present (4.5 years will be available in April 2012). Retrieving simultaneously the two gases from the same instrument allows studying the correlations between their atmospheric distributions and provides important information on the role of fires on the evolution of these gases. For the same period, we also derive mid-tropospheric integrated content of CO from AIRS at 01:30/13:30 LT.
Focusing our analysis on Africa and Amazonia, where most of tropical fire emissions are located, and following Chédin et al. (2005, 2008) who revealed the existence of a daily tropospheric excess of CO_2 quantitatively related to fire emissions in the tropics, we will show that both daily CO and CO_2 are in good agreement with the location and seasonal variations of fires, with fires playing a key role in the interannual variations of these gases. We will also show that combining AIRS (01:30/13:30 LT) and IASI (09:30/21:30 LT) improves the characterisation of the diurnal cycle of CO and its relation with fire emissions, either in the flaming or smoldering phases, and with the vertical transport of fire plumes.