Seminar on Physics and Chemistry
of the Atmosphere
02.11.2018, WiSe 2018 - 2019, IUP Bremen

Monitoring emissions from the 2015 Indonesian fires using CO satellite data

Prof. Maarten Krol
Narcisa Nechita-Banda, Guido R. van der Werf, Johannes W. Kaiser, Sudhanshu Pandey, Vincent Huijnen, Cathy Clerbaux, Pierre Coheur, Merritt N. Deeter, Thomas Röckmann
(Wageningen University)

Abstract

South-East Asia, in particular Indonesia, has periodically struggled with intense fire events. These events convert substantial amounts of carbon stored as peat to atmospheric carbon dioxide (CO2) and significantly affect atmospheric composition on a regional to global scale. During the recent 2015 El Niño event, peat fires led to strong enhancements of carbon monoxide (CO), an air pollutant and well-known tracer for biomass burning. These enhancements were clearly observed from space by the Infrared Atmospheric Sounding Interferometer (IASI) and the Measurements Of Pollution In The Troposphere (MOPITT) instruments. We use these satellite observations to estimate CO fire emissions within an inverse modelling framework. We find that the derived CO emissions for each sub-region of Indonesia and Papua are substantially different from emission inventories, highlighting uncertainties in bottom-up estimates. CO emissions based on either MOPITT or IASI have a similar spatial pattern and evolution in time, and a 10% uncertainty based on a set of sensitivity tests we performed. Thus, CO satellite data have a high potential to complement existing operational fire emission estimates based on satellite observations of fire counts, fire radiative power and burned area, in better constraining fire occurrence and the associated conversion of peat carbon to atmospheric CO2.
Apart from presenting the results of a recent paper (Nechita-Banda, N. et al. Monitoring emissions from the 2015 Indonesian fires using CO satellite data. Philosophical Transactions of the Royal Society of London B: Biological Sciences 373, 20170307 (2018)), I will discuss technical aspects of the assimilation of CO satellite data in a transport model, and the role of averaging kernels.