Geophysical Research Abstracts
Vol. 16, EGU2014-7223, 2014
EGU General Assembly 2014

A model-based data analysis of the atmospheric methane above Siberia during YAK-AEROSIB airborne campaign in summer 2012

Emmanuel Arzoumanian (1), Jean-Daniel Paris (1), Arnaud Pruvost (1), Antoine Berchet (1), Isabelle Pison (1), Mikhail Arshinov (2), and Boris Belan (2)

(1) Laboratoire des Sciences du Climat et de l'Environnement, CEA-CNRS-UVSQ, IPSL, Gif-sur-Yvette, France, (2) Institute of Atmospheric Optics, SB-RAS, Tomsk, Russia

High latitude regions are large sources of CH4 in the atmosphere, both natural from boreal wetlands and wildfires, and anthropogenic from natural gas extraction industry, especially in the Russian Arctic. Our current understanding of the extent and amplitude of the natural sources, as well as the large scale driving factors, remain highly uncertain (Kirschke et al., Nature Geosci., 2013). After a decade of pause, atmospheric methane seems to be increasing again, with a possible significant contribution from the wetlands of the northern high latitudes initiated by an unusual rise of regional temperatures in 2007 (Dlugokencky et al., 2009).
This work aims at better understanding high latitude CH4 sources and sinks using atmospheric measurements and transport model. YAK-AEROSIB atmospheric airborne campaigns have been performed in order to provide observational data about the composition of Siberian air. In this work, we focus on the 2012 campaign which has been conducted on July 31st and August 1st. It consisted of five flights, performed in the troposphere from the boundary layer up to 8.5 km, connecting Novosibirsk to Yakutsk and back. This particular campaign was dominated by wildfires in Western and central Siberia.
Therefore a chemistry-transport model (CHIMERE), combined with datasets for anthropogenic (EDGAR) emissions and models for wetlands (ORCHIDEE) and wildfire (GFED), has been used to interpret the collected data. From tagged tracers and model observation mismatch we describe results concerning CH4 fluxes in the Siberian territory.

This work was funded by CNRS (France), the French Ministry of Foreign Affairs, CEA (France), Presidium of RAS (Program No. 4), Brunch of Geology, Geophysics and Mining Sciences of RAS (Program No. 5), Interdisciplinary integration projects of Siberian Branch of RAS (No. 35, No. 70, No. 131), Russian Foundation for Basic Research (grants No 14-05-00526, 14-05-00590).

Kirschke, S., P. Bousquet, P. Ciais, M. Saunois, J.G. Canadell, E.J. Dlugokencky, P. Bergamaschi, D. Bergmann, D.R. Blake, L. Bruhwiler, P. Cameron-Smith, S. Castaldi, F. Chevallier, L. Feng, A. Fraser, M. Heimann, E.L. Hodson, S. Houweling, B. Josse, P.J. Fraser, P.B. Krummel, J.-F. Lamarque, R.L. Langenfelds, C. Le Quéré, V. Naik, S. O'Doherty, P.I. Palmer, I. Pison, D. Plummer, B. Poulter, R.G. Prinn, M. Rigby, B. Ringeval, M. Santini, M. Schmidt, D.T. Shindell, I.J. Simpson, R. Spahni, L.P. Steele, S.A. Strode, K. Sudo, S. Szopa, G.R. van der Werf, A. Voulgarakis, M. van Weele, R.F. Weiss, J.E. Williams, and G. Zeng, 2013: Three decades of global methane sources and sinks. Nature Geosci., 6, 813-823

Dlugokencky, E., J., and Bruhwiler, L. 2009. Observational constraints on recent increases in the atmospheric CH4 burden, Geophys. Res. Lett., 36 (18), 5p