Geophysical Research Abstracts
Vol. 21, EGU2019-11267-1, 2019
EGU General Assembly 2019

Characterising the isotopic composition of methane emissions in tropical Africa

Rebecca Fisher (1), David Lowry (1), James France (1,2), Euan Nisbet (1), and the MOYA team

(1) Royal Holloway University of London, Earth Sciences, Egham, United Kingdom (r.fisher@es.rhul.ac.uk), (2) British Antarctic Survey, High Cross, Madingley Rd, Cambridge, United Kingdom

Growth in atmospheric methane in recent years has been particularly strong in the tropics. There have been conflicting suggestions as to the drivers of methane growth over the last decade, from increased emissions from warmer wetlands, increased agricultural emissions, increased fossil fuel emissions and decreases in OH. The shift in the δ^{13}C isotopic composition of methane is often used to attempt identification in changes in the sources. However many methane sources have a wide range in isotopic signatures and the available data on isotopic composition of methane sources is particularly sparse in the tropics.

To help fill the gap in δ^{13}C source signatures of tropical methane emissions the NERC funded MOYA project has included both ground and aircraft sampling in tropical Africa. Flight campaigns are on the well-equipped FAAM BAe-146 research aircraft. Whole air sample collection in flasks or bags is guided by onboard measurement of methane mole fraction by cavity enhanced spectroscopy. Sample analysis using isotope ratio mass spectrometry allows high precision measurement of δ^{13}C. Low level sampling allows the isotopic signature over a wide area to be determined and locations of large point and area sources to be determined. A flight campaign over Senegal in February to March 2017 measured methane plumes from biomass burning with methane mole fraction elevations of up to 500 ppb and an isotopic composition of -28.5 $\pm$ 0.8 ‰. Flight campaigns in January 2019 over Uganda are planned to capture emissions from wetlands.

The MOYA project also includes sampling of ambient air on the ground, close to sources, with signatures identified for cattle in Zimbabwe, the Okavango wetlands in Botswana, and papyrus swamp in Uganda. The improved source signature determination from the ground and low level aircraft sampling should help in attempts to determine the relative contribution of each of these sources to total methane emissions at a regional scale.