Isotopic Signal of Atmospheric Methane along the Atlantic Meridional Transect: an Interannual Comparison

Evelyn Workman

British Antarctic Survey, United Kingdom. Centre of Climate, Oceans and Atmosphere (COCOA), Department of Earth Sciences, Royal Holloway University of London, United Kingdom

Author list (excluding presenting author)

Anna Jones, James France, Rebecca Fisher, Katrin Linse

Abstract

Methane is a very potent greenhouse gas which has a global warming potential of 28 - 36 times that of CO2 over a 100-year time period (Myhre et al. 2013). The concentration of methane in the atmosphere has been increasing since the industrial revolution, and presently concentrations sit at approximately 2.6 times that of pre-industrial levels (Saunois et al. 2020). Growth accelerated in 2014 (13 ppb/yr) and has continued to be high since (7 to 10 ppb/yr). This high methane growth was unexpected and presents one of the greatest immediate challenges to the Paris Agreement. The reasons behind renewed methane growth since 2007 and acceleration in 2014 are not understood. Measurements of atmospheric methane concentrations alone are not sufficient to understand the drivers of this growth. Measurements of methane isotopes (carbon 13 and deuterium) are necessary to untangling this mystery, as isotopologues (variations in the relative amounts of 12CH4, 13CH4 and 12CH3D) identify and discriminate between source and sink changes. This study presents measurements of methane isotopes and ambient atmospheric methane concentration along the Atlantic meridional transect over several years from 2012 to 2024. Sampling along this route is valuable as we can understand how the methane isotopic signal varies with latitute in both hemispheres. It can also allow us to understand the drivers of growth in different latitudinal bands. Atmospheric methane concentrations are distinct between the two hemispheres, with greater concentrations in the northern hemisphere, so as this study involves measurements in both hemisphere it will allow us to reconcile the two hemispheres.

Early Career Scientist

YES, I am an early career scientist.

IGAC Activities

CATCH: the Cryosphere and Atmospheric Chemistry

IGAC Regional Working Groups