ATS/CIRA Colloquium

Kristie Boering

Visiting ATS from the University of California, Berkeley

A New Look at Old Air in the Stratosphere: Radiocarbon Production and Transport to the Troposphere

Hosted by Jeff Collett and A. R. Ravishankara

Friday, Oct. 12, 2018

ATS room 101
Discussion will begin at 11:15 a.m.
Refreshments will be served at 10:45 a.m. in the weather lab

The redistribution of $^{14}CO_2$ from atmospheric nuclear weapons testing has long been used to quantify the inventories, residence times, and gross fluxes of carbon in and between the stratosphere, troposphere, oceans, soils, plants and other reservoirs. Now, five decades after the Limited Test Ban Treaty restricted above-ground nuclear weapons detonations, the natural cosmogenic ^{14}C production rate and the rates and details of radiocarbon transport to the troposphere are predicted to play an increasingly important role relative to the bomb radiocarbon input in studies of surface radiocarbon and its redistribution there, and the use of atmospheric observations to infer regional ^{14}C-depleted fossil fuel emissions. In this talk, I will focus on measurements of $^{14}CO_2$ in stratospheric air samples collected between 1997 and 2013 and show how we use these new observations to empirically estimate the global annual mean production rate of ^{14}C by cosmic rays and the net $^{14}CO_2$ flux from the stratosphere to the troposphere useful for carbon cycle studies, as well as to monitor stratospheric residence times to see if they are changing in response to a predicted acceleration of the Brewer-Dobson Circulation as the climate warms.

Link to colloquia page: https://www.atmos.colostate.edu/colloquia/