5.106 Climate drivers of Southern Hemisphere carbon monoxide.

Early Career Scientist

Presenting Author:
Rebecca Buchholz, NCAR, Atmospheric Chemistry Observations & Modeling Laboratory, Boulder, CO, USA, buchholz@ucar.edu

Co-Authors:
Louisa Emmons, NCAR, Atmospheric Chemistry Observations & Modeling Laboratory, Boulder, CO, USA
Helen Worden, NCAR, Atmospheric Chemistry Observations & Modeling Laboratory, Boulder, CO, USA
David Edwards, NCAR, Atmospheric Chemistry Observations & Modeling Laboratory, Boulder, CO, USA
Merritt Deeter, NCAR, Atmospheric Chemistry Observations & Modeling Laboratory, Boulder, CO, USA
Sarah Monks, NOAA, Chemical Sciences Division, Boulder, CO, USA

Abstract:

Australia is uniquely placed to experience influences from three major climate systems: El Niño-Southern Oscillation (ENSO); Indian Ocean dipole (IOD); and Southern Annular Mode (SAM). These three climate systems have recently been found to interact constructively when synchronized, producing a large and direct influence on Australian rainfall. Australian vegetation is water-limited over much of the continent. As a consequence, the intensity and number of fires is related to the amount of available fuel due to the amount of available water. Therefore, Australian fire emissions, such as carbon monoxide (CO), are hypothesised to be indirectly driven by the interacting climate systems.
We investigate the links between CO and the climate drivers in the Southern Hemisphere using satellite measured total column CO from MOPITT. Interannual variability in CO is determined by generating weekly anomalies over the four main biomass burning regions: Australia, Africa, South America and Indonesia. The relationship between interannual variability and the climate systems is diagnosed using climate indices, with a focus on Australia. The chemistry-climate model CAM-chem is used to quantify contributions to atmospheric CO variability, highlighting the importance of fire emissions. Model analysis also reveals the relative impact of emissions and meteorology on CO variability.