

# SEMINAR

## **The Arctic Hotspot - what 40 years of measurements at Barrow has taught us about the Arctic carbon cycle**

**Colm Sweeney**

**University of Colorado Cooperative Institute for Research in Environmental Sciences (CIRES) and National Oceanic and Atmospheric Administration**

### **Abstract**

Large changes in surface air temperature, sea ice cover and permafrost in the Arctic Boreal Ecosystems (ABE) are significantly impacting the critical ecosystem services and human societies that are dependent on the ABE. In order to predict the outcome of continued change in the climate system of the ABE, it is necessary to look at how past changes in climate have affected the ABE. We look at 30 years of CH<sub>4</sub> and 42 years of CO<sub>2</sub> observations from the NOAA Global Greenhouse Gas Reference Network site in Barrow, Alaska. By eliminating background trends and only looking at data collected when winds are blowing off the North Slope we find very little change in CH<sub>4</sub> enhancements, but significant changes in the CO<sub>2</sub> enhancements coming off the tundra. The bulk of both CO<sub>2</sub> and CH<sub>4</sub> emissions appear to be emitted well after the first snow fall on the North Slope. CO<sub>2</sub> emissions are strongly correlated with summer surface temperatures, while CH<sub>4</sub> emissions appear insensitive to the large temperature changes that occurred over the measurement period. These results suggest that CO<sub>2</sub>, and not CH<sub>4</sub> emissions, are a likely pathway for the degradation of permafrost carbon.

**Bio:** Colm Sweeney is a Senior Scientist at University of Colorado Cooperative Institute for Research in Environmental Sciences (CIRES) who has published over 140 papers focused on understanding greenhouse gas emissions from ocean, land and atmosphere. He received his PhD in chemical oceanography from Columbia University with a concentration on the carbon cycle of the Southern Ocean. Dr. Sweeney then worked at NOAA's Geophysical Fluid Dynamics Laboratory where he published papers on air-sea gas exchange and on the effect of shortwave radiation on ocean circulation. He currently runs the aircraft network for NOAA's Carbon Cycle Group and is involved in many projects funded by NOAA, NASA, DOE, NSF and the Environmental Defense Fund. These projects seek to quantify regionally-specific greenhouse gas emissions ranging from the high latitudes to urban and oil and gas regions. Although Dr. Sweeney has continued to be involved in oceanographic research by running a long-term time series of ocean surface CO<sub>2</sub> in the Drake Passage, most of his time is devoted to the analysis of land-based and aircraft-based measurements to understand the effect of climate change on the carbon system as well as developing techniques to monitor and control greenhouse gas emissions.

**Date: Monday, November 6, 2017**

**Time: Refreshments 3:15pm, Seminar 3:30pm**

**NCAR Foothills Laboratory**

**3450 Mitchell Lane, Boulder, CO 80301**

**FL2-1022, Large Auditorium**

**Live webcast: <http://ucarconnect.ucar.edu/live>**

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