

ATS/CIRA Colloquium

Robert Pincus

Visiting ATS from NOAA Earth System Research Lab

What can (and can't) the past tell us about the future?

Hosted by Christine Chiu

Friday, Nov. 30, 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

Changes in the composition of the atmosphere cause changes to the planetary radiation budget to which the Earth responds by changing its temperature; changes in temperature may also change the atmosphere's opacity in ways that damp or amplify the temperature change. This framework — radiative forcing, adjustments, and feedbacks — provides a useful lens through which to think about future atmospheric conditions and allows us to use the Earth's past behavior as a guide to the future. In this talk I'll describe a null hypothesis for climate change and use historical relationships between forcing, warming, and imbalance to infer "committed warming," i.e. the degree to which the planet would warm were emissions to cease today. The major epistemic uncertainty in this view of future warming arises from uncertainty in radiative forcing. Some of this uncertainty is due to poor parameterizations of radiative transfer in climate models, motivating the development of a new parameterization that balances accuracy with efficiency and flexibility. The bulk of the uncertainty is due to apparent uncertainty in the radiative forcing by atmospheric aerosols although both fine-scale and idealized modeling suggest that the uncertainty is not as large as is often assessed. Adding to uncertainties in past behavior is the possibility that the future will not be like the past, and particularly that feedbacks will respond to the spatial pattern of warming differently than they have to date. I'll show evidence from the CMIP5 ensemble suggesting that the climate is likely to become increasingly sensitive with warming, and that internal variability makes the recent past a particularly poor guide to future warming.

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