"The Pattern Effect": Sea Surface Temperature modulation of radiative damping and climate sensitivity

Energy conservation is a strong constraint on any physical system. If we want to know how much the Earth will warm in response to an imposed perturbation in incoming energy, we need to know how much the Earth needs to warm in other to close its energy budget. They key quantity I will discuss is the efficiency with which the Earth sheds radiation to space, otherwise known as the net radiative feedback. I will discuss recent advances in our understanding of how the net radiative feedback depends on (a) how spatial patterns of sea-surface temperatures interact with atmospheric radiation and clouds, and (b) how these spatial patterns evolve in time. Understanding this dependence of the radiative feedback on space and time allows us to reconcile a notorious discrepancy in estimates of future warming drawn from numerical simulations, observations of ocean heat content, and the satellite record.

After establishing the feedback framework for the coupling of surface temperatures and radiation, I will discuss some open questions and future directions in constraining the energetics of the coupled climate system: how do we better leverage the satellite record of radiative anomalies, what controls the ultimate spatial pattern of warming, what is the role of coupled atmosphere-ocean variability, and how do we combine models, theory and observations in an appropriate statistical framework?

Friday April 26th, 2019 12:00p.m. POST 127

*The speaker is a candidate for a faculty position in the Department of Oceanography.