

CGD SEMINAR



DATE: Tuesday, 11 September 2018

TIME: 11 a.m.

LOCATION: NCAR, 1850 Table Mesa Drive
Mesa Lab, Main Seminar Room

TITLE: The changing flow of energy through
the Earth's Climate System

SPEAKER: Kevin Trenberth, NCAR

ABSTRACT:

Radiant energy from the sun is unevenly absorbed in the Earth system because of the sun-Earth geometry. The energy is transformed into internal energy (temperature-related sensible heat), latent energy (associated with phase changes of water), potential energy (associated with height and gravity), and kinetic energy (associated with motion). The energy may be stored in atmospheric, ocean, cryosphere and land heat reservoirs and moved around mainly by the atmosphere and ocean, which give rise to our weather and climate. Ultimately it is radiated back to space as infrared radiation, and for a stable climate the global mean outgoing and incoming radiation must balance. However, there is an energy imbalance caused by increasing greenhouse gases in the atmosphere, and most of the imbalance, over 90%, goes into the ocean. Accordingly, ocean heat content (OHC) provides a primary indicator of climate change, along with sea level rise. By adopting a holistic approach that includes top-of-atmosphere (TOA) radiation, energy imbalances, vertically-integrated atmospheric transports, surface energy fluxes, and ocean heat transports, closure of the energy and water cycles on regional scales can be achieved. A new formulation of the energetics of the atmosphere and the climate system is used to refine estimates of the surface energy fluxes as a residual of TOA and atmospheric energetics. When the surface flux is combined with OHC estimates, ocean heat transports can be computed and validated with in situ observations. This provides new commentaries on the variability in the Atlantic Meridional Overturning Circulation (AMOC) and El Niño-Southern Oscillation (ENSO). Understanding the disposition of the energy imbalance is essential for determining how climate change is manifested.

Seating is Limited

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

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