

## Distinguished Alumni Winner

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## Pursuing Climate Science From Small Particles to Large Airplanes

Department of Physics Colloquium

I will present two topics to highlight how my NOAA research contributes to climate change science. First, black carbon particles play a complex role in our climate system. Refractory black carbon is the primary cause of aerosol optical absorption in the atmosphere and also changes cloud properties and snow and ice albedo. Large gaps exist in our ability to measure and model black carbon abundances and climate effects. I helped lead a recently published assessment\* which is the first evaluation of black-carbon climate forcing that is comprehensive in its inclusion of all known and relevant processes and that is quantitative in providing best estimates and uncertainties of the main forcing terms. Second, the Global Hawk unmanned aircraft system (UAS)\*\*, the world's largest, can travel 10000 nm on 30-hr flights at altitudes up to 20 km. In an ongoing flight campaign, our principal objective is to advance understanding of processes occurring in the tropical tropopause layer related to water vapor and ice clouds. These processes control stratospheric humidity, which plays an important role in Earth's radiation budget and stratospheric photochemistry. The data from recent tropical flights demonstrate the great potential of Global Hawk for Earth science research.

\* <http://onlinelibrary.wiley.com/doi/10.1002/jgrd.50171/abstract>

\*\* <http://espo.nasa.gov/missions/attrex/>

