



## **DRI ENVIRONMENTAL SEMINAR** **Tuesday March 22<sup>nd</sup>, noon – 1 pm**

### **On the use of aerosol retrievals from NASA's A-Train sensors augmented by field observations for calculating direct aerosol radiative effects**

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We describe a technique for combining CALIOP aerosol backscatter, MODIS spectral AOD (aerosol optical depth), and OMI AAOD (absorption aerosol optical depth) measurements for the purpose of estimating full spectral sets of aerosol radiative properties, and ultimately for calculating direct aerosol radiative effects. As a prerequisite for the application of our methodology to the actual satellite observations, we assessed the consistency between comparable measurement quantities from the different A-Train sensors. For eight months (Jan., Apr., July, Oct. 2007 and 2009), comparisons of the standard MODIS-Aqua (Collection 5) AOD data to the AOD calculated from the latest release (Version 3) of the CALIOP level-2 aerosol extinction profile data set show differences in global, monthly mean, over-ocean AOD (532nm) between CALIOP and MODIS ranging between 0.02 and 0.06 for CALIOP V2, and between 0.025 and 0.04 for CALIOP V3, with CALIOP generally biased low. Our methodology for estimating aerosol radiative properties is based on look-up tables that have been tested using airborne field observations from several recent experiments. As a test of our methodology, we applied our retrievals to airborne HSRL (High Spectral Resolution Lidar) aerosol backscatter data, sunphotometer derived AOD, and in situ aerosol absorption measurements in a fire plume study during the ARCTAS (Arctic Research of the Composition of the Troposphere from Aircraft and Satellites) field campaign in 2008. Radiative fluxes modeled based on the multi-sensor aerosol retrievals compare well with radiative fluxes measured by an airborne spectral flux radiometer (SSFR) aboard the same aircraft. We found good agreement for the entire SSFR wavelength range of 350-2150 nm, indicating the validity of our approach for determining spectral radiative properties from spectrally limited retrieval input.