

## 2020 EOL Seminar Series

### PROGRESS ON SIMULTANEOUSLY DENOISING CALIOP IMAGES AND MEASURING HIGH IMAGE RESOLUTION EXTINCTION COEFFICIENTS

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**DATE:** March 10, 2020

**TIME:** 3:30 - 4:30 pm

**LOCATION:** NCAR Foothills Laboratory  
3450 Mitchell Lane, Building 2  
FL2-1022 Large Auditorium

#### ABSTRACT

Currently the standard noise reduction method for CALIOP measurements is averaging over multiple profiles. Consequently, for non-uniform aerosols and clouds non-linear biases are introduced in the measured extinction coefficient (coeff.) due to the non-linearity of the single scatter lidar equation. E.g. in order to measure daytime aerosol extinction coeffs. the CALIOP measurements have to be downsampled from 333m to 80km horizontal resolution.

We introduce a methodology that simultaneously denoise and measure high image resolution attenuated backscatter coeff. from CALIOP images. The methodology exploits the fact that the underlying backscatter has a coherent spatial-temporal structure which can be separated from the random detector and solar background radiation noise; the inference is achieved through a theoretically supported mathematical optimization framework in which a cost function is minimized that includes a photon detector noise model and the single scatter lidar equation. Through this framework the proposed methodology allows the measurement of the extinction coeff. at full spatial and temporal image resolution.

In this presentation I will provide an update on progress that has been made on developing the methodology specifically for CALIOP, which give insights on the future possibilities of space-based lidar missions.

**Live Webcast:** [www.ucar.edu/live](http://www.ucar.edu/live)

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