Breakout Session Report
ARM/ASR User and PI Meeting
March 16-20, 2015

Session Title: Lidar Applications Breakout
Session Date: March 16, 2015
Session Time: 7:00–9:00pm
Summary Authors: Rob Newsom and John Goldsmith

Main Discussion

The goal of this session was to provide a forum for instrument mentors to communicate current instrument status, and to allow any interested members of the science community to describe how lidar data are being (or how data could be) used. The meeting focused on the Doppler, Raman, and High Spectral Resolution lidar systems. The meeting agenda was as follows:

- Doppler lidar instrument update and Doppler lidar VAPs by Rob Newsom

- Raman lidar VAP update by Rob Newsom

- Raman lidar instrument update by John Goldsmith

- Cloud and aerosol retrievals from the Raman lidars by Tyler Thorsen

- HSRL instrument Update by Ed Eloranta

- Three-wavelength (three backscatter, two extinction) measurements at the SGP by Rich Ferrare

- Using lidar to evaluate boundary layer turbulence parameterization schemes by Dave Turner

- Doppler lidar scan strategy for 3D drizzle (and cloud) retrievals by Mark Fielding.

Rob Newsom presented a brief overview of the ARM Doppler lidars and their current operational status. The impact of the SGP restructuring and the need for real-time data products was discussed. Work is currently under way at the DMF to "operationalize" two Doppler lidar VAPs, i.e. the horizontal wind VAP and the vertical velocity statistics VAP. The push to operationalize these VAPs is motivated by the need to support the planned high-resolution model effort at the mega-SGP.

Rob Newsom also provided a brief status on Raman lidar VAP revisions. A new MERGE VAP has been developed and tested and is ready for implementation within the DMF. The mentor (Rob Newsom) needs to submit an implementation plan to initiate the process of making this operational. Rob also highlighted the need to update the aerosol VAPs. Tyler Thorsen gave a presentation on his algorithm for retrieval of cloud and aerosol optical properties from the Raman lidar. His approach is very thorough and appears to represent a big improvement over the current operational VAP. It is recommended that these data be submitted as a PI data product. Additionally, the instrument mentor plans to investigate the potential for operationalizing Tyler's algorithm.

John Goldsmith provided a brief overview of the ARM Raman lidars and their current operational status. The Oliktok system has been down since November due laser issues and problems with site-wide power. However, the laser issues have since been resolved and the plan is to bring the system back into operation as soon as the primary and backup power generation systems for the site are completely functional. John also discussed the plans for redeployment of the Darwin Raman lidar to the ENA site, as well as the upgrade and relocation of the SGP system.

Ed Eloranta provided an overview the ARM HSRLs and their current operational status. Ed presented the following list things that need to be done:

- NSA HSRL
    - Install new USB DAQ board
    - Repair spare laser
- AMF2 HSRL
    - Install new USB DAQ board
    - Modify processing code to correct for frequency drift with locked up USB DAQ
- Setup HSRL processing software within ARM data system.

Ed also discussed preparations of his in-house HSRL system for Pecan and the three-wavelength (three backscatter, two extinction) IOP.

This then provided a segway for Rich Ferrare to discuss the three-wavelength (three backscatter, two extinction) measurements proposed for the late summer of 2015 at SGP. Rich gave a brief overview of the technique, and described the data and uncertainty bounds that the 3-beta+2-alpha algorithm requires. The algorithm will require extinction estimates with uncertainties less than ~20%. This will be a challenging requirement to meet for both the HSRL and Raman lidar.

The session concluded with two talks describing science applications of the various lidar systems. Dave Turner gave a brief overview of his work in which water vapor data from the SGP Raman lidar and aerosol data from the University of Wisconsin HSRL were used to examine turbulence statistics and assess model turbulence parameterization schemes. Mark Fielding talked about using cross-wind RHI scans from a Doppler lidar together with simultaneous scans from a cloud radar to improve the retrieval of 3D drizzle parameters. The instrument (Rob Newsom) plans to write a BCR (or IOP request) to support this effort. Currently, the plan is to try this out at the ENA site for a limited period of time (i.e. a few days). This will require coordination with the radar mentor.

Action Items

- Get the Oliktok Raman and Doppler lidar operational again.

- Relocate and perform upgrades to the SGP Raman lidar.

- Prepare the AMF2 HSRL for the Antarctic deployment and perform minor repairs on the NSA HSRL.

- Submit Tyler Thorsen's cloud and aerosol retrievals as a PI data product. The instrument mentor will investigate the potential for implementing Tyler's algorithm operationally.

- Write a BCR (or IOP request) to reconfigure the Doppler lidar at ENA to do cross-wind RHI scans for a few days (exact dates are TBD). Coordinate with the radar mentor.

- Write implementation plan to initiate the process of making the revised MERGE operational in the DMF.

- Reconfigure Doppler lidar and Raman data processing to enable delivery of real-time data products.