

Developing a Cal/Val Plan* for a Space-based Doppler Wind Lidar

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WG on Space-based Lidar Winds

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Purpose

- IPO (NOAA, DoD, NASA) interested in having a major role in the Cal/Val of any future space-based DWL
- Includes pre-selection/pre-launch evaluation of proposed candidate instruments and observing strategies for space-based DWLs
- Primary focus is on post-launch calibration/validation of DWL performance

Components

- Instrument performance models (LOS)
- OSSEs/OSEs
- Ground-based DWLs
- Airborne DWL facility
- Comparisons of opportunity (COOs)

Instrument Performance Models

- Community ensemble of LOS models for DWLs of various transmitting, detection and signal processing technologies
 - instrument sub-system characterization
 - atmospheric characterization of the illuminated volume along a LOS
 - error budgets for LOS measurements (instrument, platform, signal processing...)

OSSEs/OSEs

- Pre-launch use of OSEs and OSSEs to establish tradespace for requirements and impacts
- Pre-launch use of OSSEs to develop optimal strategies for assimilating DWL data
- Pre-launch evaluation of specific proposed DWL concepts
- Post-launch verification of expected impact (cal/val of OSSEs???)

Ground-based DWLs

- Multi-organization set of DWLs operating from fixed or mobile (vans, trailers) platforms.
 - NASA, NOAA, DoD, International partners, Universities, Corporations
- Advantage: similar illuminated volume and measurement perspective; long term operations
- Disadvantage: challenge to co-sight space-based and ground-based systems (frequently)

Airborne DWL Facility

- Pre-launch evaluation/development of DWL instruments, observation strategies and data product utilization with a space-based perspective
 - Cloud effects
 - Ocean environment
 - Over-sampling experiments in complex situations
- Post-launch “truth” for evaluating instrument performance and data products under conditions not appropriate for ground-based DWLs

Comparisons of Opportunity

- Comparison of DWL data products with those from “conventional” wind observing systems.
 - 10s of thousands of comparisons per day in many synoptic and geographical situations
 - Develops empirical relationships between a new data product and the more familiar (to NWP) ones
 - Accelerates adjusting data assimilation algorithms to optimize the use of new data

Related Activities

- Theoretical basis for extracting σ_m from comparisons with “validation observations”
 - include synoptic stratification
- Ground-based and airborne studies of the representativeness of cloud returns of the cloud free winds in proximity
- Laboratory and field experiments with controlled conditions to develop better algorithms for signal processing