

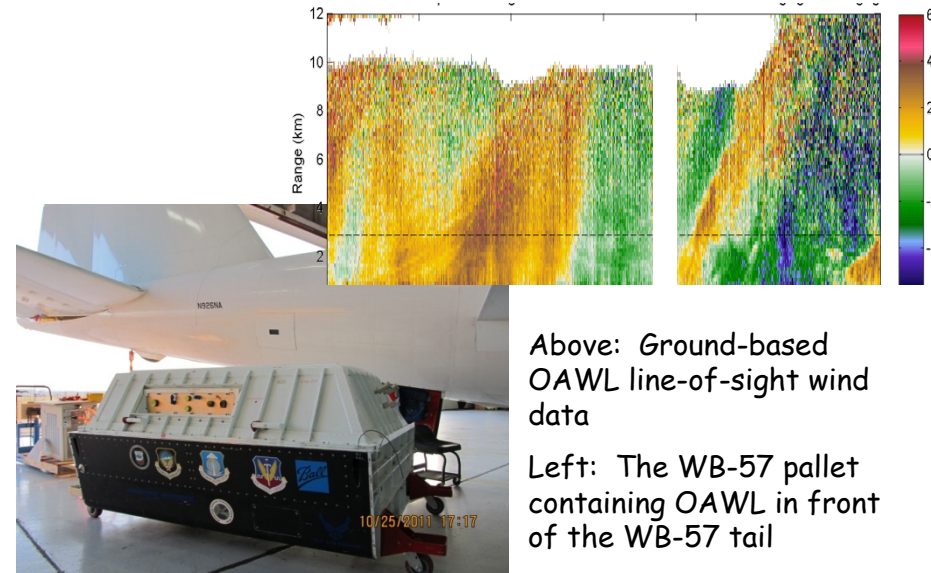
# Development and Demonstration of an Optical Autocovariance Direct Detection Wind Lidar

PI: Sara Tucker, Ball Aerospace

## Objective

Develop a complete Optical Autocovariance Wind Lidar (OAWL) transceiver for airborne testing in support of the 3D-Winds Decadal Survey Mission

- Validate OAWL measurement concept and performance in ground tests against a characterized research coherent Doppler lidar
- Validate OAWL performance by comparing WB-57 flight data with NOAA wind profilers and other corroborative measurements
- Verify alignment-free interferometer construction is suitable for space-qualified design
- Validate radiometric and integrated system performance models for space-based OAWL



Above: Ground-based OAWL line-of-sight wind data

Left: The WB-57 pallet containing OAWL in front of the WB-57 tail

## Accomplishments

- Tested and adapted the OAWL receiver to withstand NASA WB-57 jet operating environment conditions
- Designed, fabricated, & integrated a complete lidar system with laser, telescope, receiver and data acquisition system
- Validated the lidar performance (< 1 m/s precision) in ground tests with a co-located NOAA coherent detection Doppler Wind Lidar
- Ruggedized and qualified the lidar system for autonomous in-flight operation, inside a pallet, on the NASA WB-57
- Flew 5 autonomous test flights on the NASA WB-57 and measured winds with 2-6 m/s precision (aerosol dependent)
- Corroborated the flight data against ground-based radar wind profiler data
- Validated space-based radiometric and system performance models against test data
- Demonstrated TRL 6 for aircraft operation, demonstrated TRL 5 for Space

Co-Is/Partners: none

TRL<sub>in</sub> = 3    TRL<sub>out</sub> = 6