



Direct Detection LIDAR Validation & Testing Results for Long-Range, Simultaneous Wind Speed, Direction, Temperature & Density

OptoAtmosphericTM offers Direct Detection Light Detection and Ranging (Lidar) technology that has been utilized for space, airborne, and ground applications. Direct Detection Lidar differs from other techniques in that measurements are made directly on air molecules, providing temperature and density simultaneously with wind speed and direction.

Two ground-based instruments (GroundWinds) have been funded by the National Oceanic and Atmospheric Administration (NOAA) and validated against LIDARs and rawindsondes from NOAA, as well as the National Aeronautics and Space Administration (NASA). Figure 1 shows two comparisons between the GroundWinds New Hampshire instrument and rawindsonde (weather balloon) data. Figure 2 compares the GroundWinds Hawaii instrument with rawindsondes, validating wind speed, temperature, and pressure measurements out to 10km. Figure 3 displays the results of a long range conical scan using the GroundWinds Hawaii instrument.

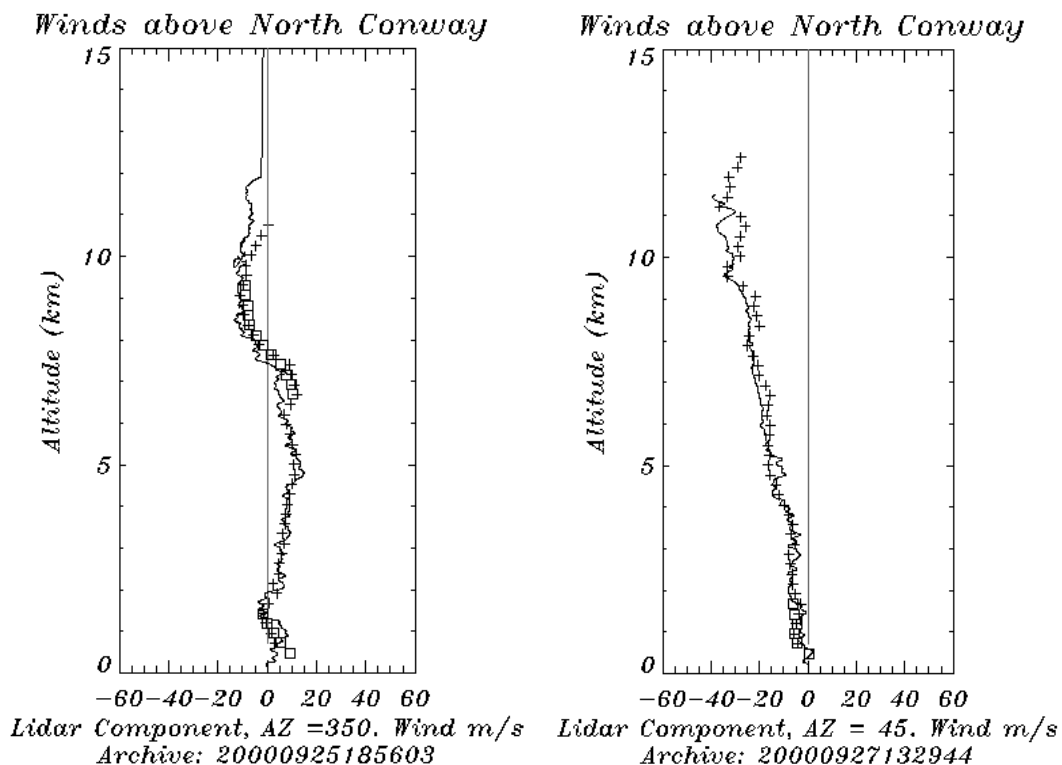


Figure 1: Two plots showing altitude profiles in the azimuth direction that GroundWinds was viewing. The aerosol channel is shown with square data points, and the molecular channel is shown with crosses. The rawindsonde data is the solid line.

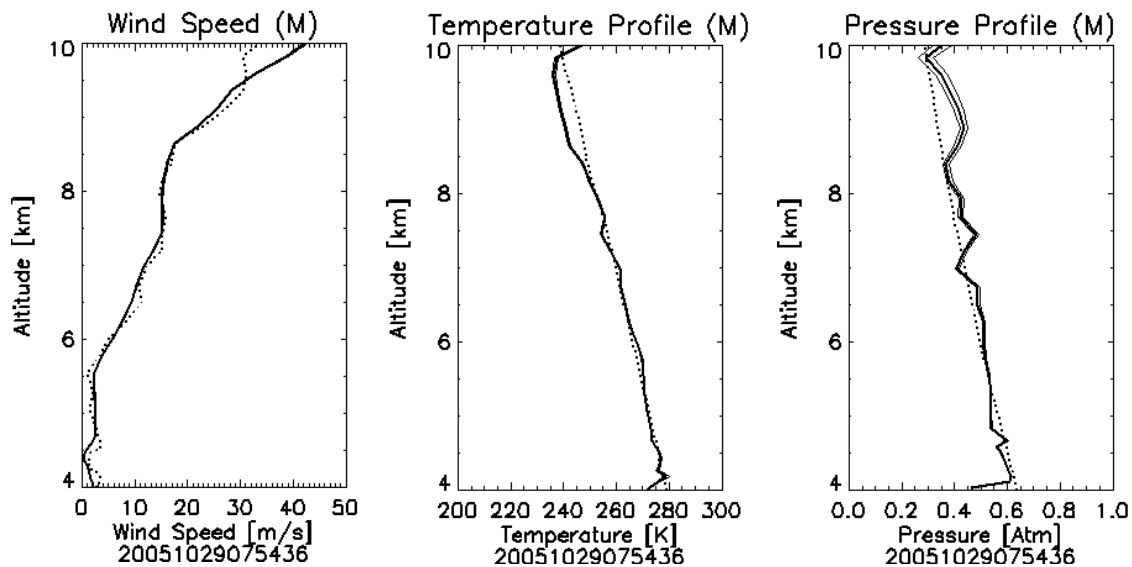


Figure 2: Three plots showing altitude profiles for GroundWinds (Hawaii). The measurements are from the molecular channel, with rawinsonde data represented by dotted lines.

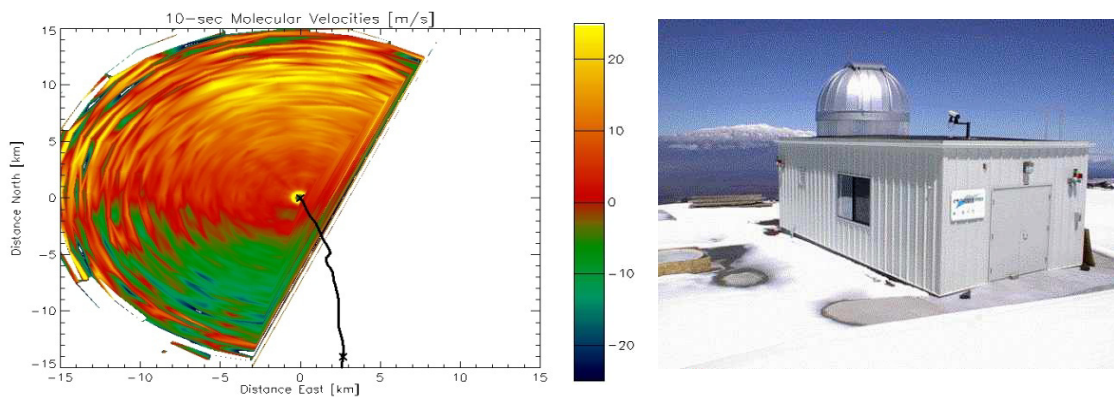


Figure 3: Conical wind profiling from GroundWinds Hawaii. The rawinsonde path is indicated with the black line.

Data inter-comparison field campaigns have been conducted to demonstrate the capability of the GroundWinds Lidar, to measure vertical profiles of the line-of-sight (LOS) winds and compare the measured radial wind velocity to other Doppler Lidars operated coincidentally in space and time, under a variety of atmospheric conditions. GPS-tracked rawinsondes, which are widely regarded as a standard against which other wind observations can be judged, were also used during the campaigns to provide baseline wind profiles and ancillary meteorological data. A September 2000 New Hampshire campaign involved comparison with NASA's Goddard Lidar Observatory for Winds (GLOW) and NOAA's Environmental Technology Laboratory (ETL) mini Master Oscillator Power Amplifier (mini-MOPA) as shown in Figure 4¹. The mini-MOPA returned again in October 2003 to verify the GWNH performance and quantify improvements that had been implemented in the GWNH system.

¹James G Yoe et al. "GroundWinds 2000 field campaign: demonstration of new Doppler LIDAR technology and wind LIDAR data inter-comparison. LIDAR Remote Sensing for Industry and Environment Monitoring III, Upendra N. Singh et al Editors Proceedings of SPIE Vol. 4893 2003.



Figure 4 Co-located Lidars: GLOW, mini-MOPA, GroundWinds NH - September 2000 Inter-comparison Campaign

Mini-MOPA data provided useful comparisons for low-level GroundWinds data. GWNH wind profiles generally compare well to those of mini-MOPA and rawindsonde data. Figure 5 illustrates results of this inter-comparison.

Wind Profile Comparisons

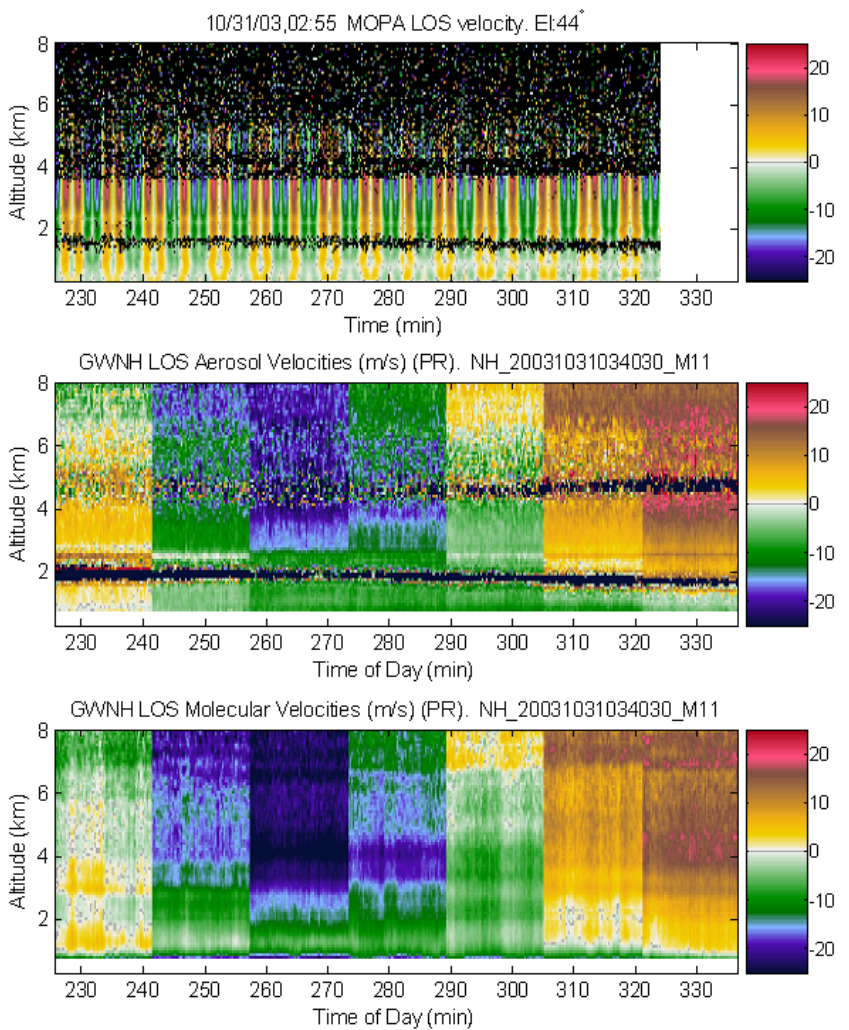
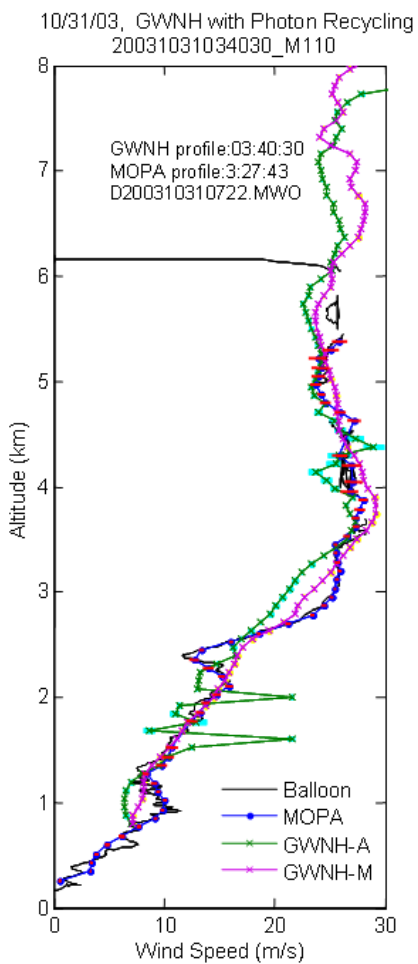


Figure 5 October 2003 GroundWinds and mini-MOPA wind velocity comparison

A time varying data set from the GroundWinds Hawaii system is shown in Figure 6 along with the calculated wind errors.

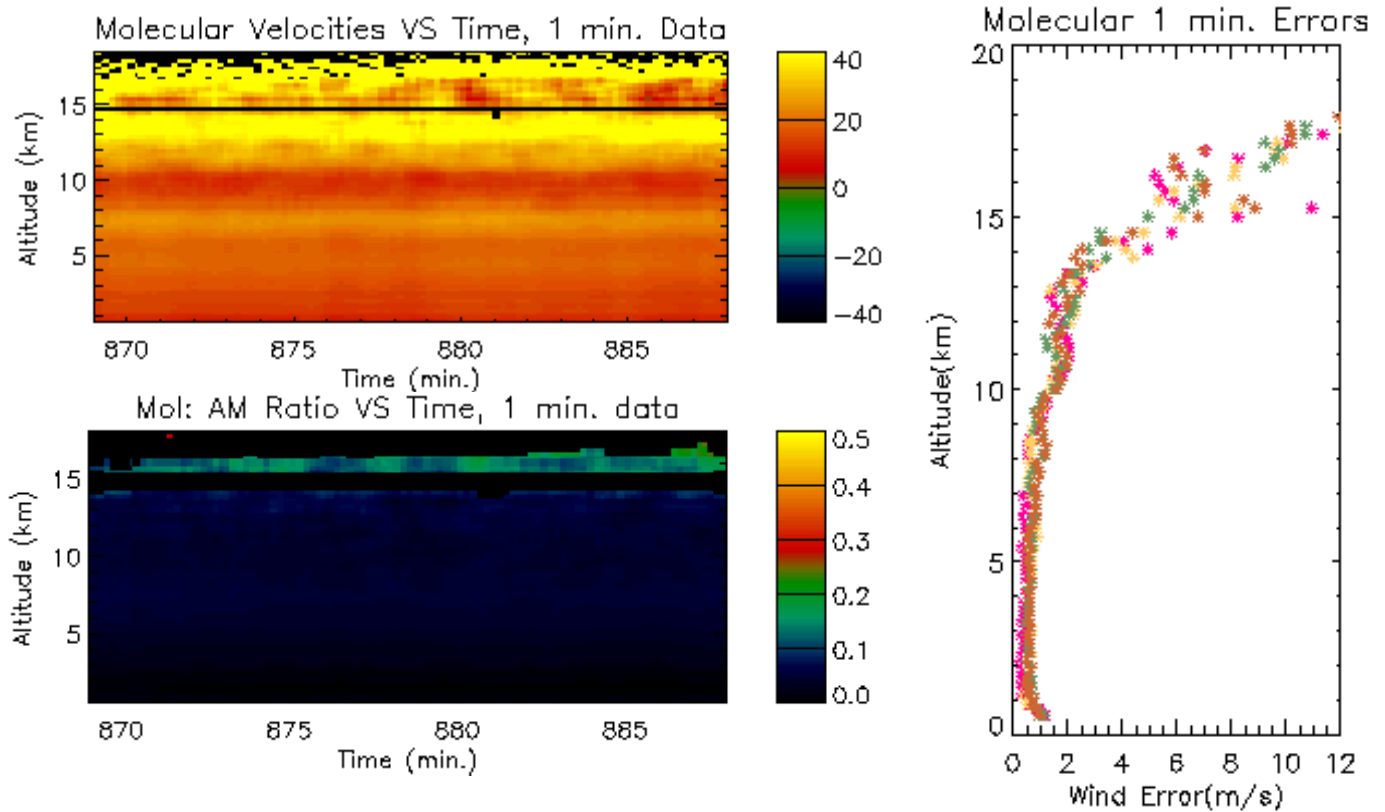
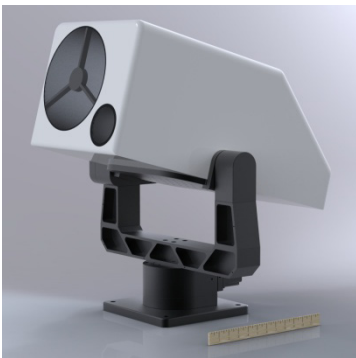


Figure 6 GroundWinds Hawaii velocity measurements, Aerosol-Molecular scattering ratios and wind errors. (Molecular Channel)

Contact Us!

Our products will be available soon for short-range as well as long-range applications. Please contact us to learn how OptoAtmospherics' Lidar products can improve your site assessment, operational wind farm, and turbine needs. Also let us know if you are interested in licensing or partnership opportunities.



Investor Contact:

Peter Tchoryk, Jr.
(734) 564-7438

ptchoryk@optoatmospherics.com

Product Contact:

Charles Richey
(734) 975-8777 x112

crichey@optoatmospherics.com

1777 Highland Dr., Suite B
Ann Arbor, MI 48108

www.OptoAtmospherics.com

