

Validation of wind profiles retrieved by the new Long-Range Windcube with Wind Profiler Radar and Radiosonde measurements at the Lindenberg GRUAN site

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ASI6: Atmospheric measurements from local to regional scale: The role of field experiments

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The wind field is one of the most important atmospheric parameter. Its accurate knowledge is crucial for the improvement of Numerical Weather Prediction (NWP) models. Moreover, in the tropical regions the wind and mass fields are uncoupled due to weak or absent Coriolis force. This means that the wind observations are necessary to obtain an accurate tropical wind analysis.

→ OTKIN et al. (Assimilation of Surface-Based Boundary Layer Profiler Observations during a Cool-Season Weather Event Using an Observing System Simulation Experiment. Part I: Analysis Impact. Monthly Weather Review, August 2011):

"The best analysis overall was achieved when DWL wind profiles and temperature and moisture observations ... were assimilated simultaneously, which illustrates that both mass and momentum observations are necessary to improve the analysis accuracy".





MOL-RAO Lindenberg:

Experiences of techniques and signal processing, assessment and operational use of new active ground-based remote-sensing systems like windprofiler radar, sodar and cloudradar.

Leosphere (France):

Doppler Wind Lidar systems, developed by LEOSPHERE, are being largely deployed worldwide for applications in the wind energy industry.

Based on the operating experience an extended version (up to 5 km range in horizontal configuration) is now available.

Such a new equipment however needs to be validated with independent operational instruments in order to be used as an operational meteorological instrument.



Windcube is a Plug and Play Instrument





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Windcube WLS200: Intercomparison period DOY 110-130 19/04/2011 - 10/05/2011

Windcube WLS70: Intercomparison period DOY 157-179 06/06/2011 – 29/06/2011







- Data exchange MOL-RAO $\leftarrow \rightarrow$ Leosphere

at MOL-RAO:

- validated against
 - the 482 Mhz Windprofiler,
 - daily launched radiosoundings,
 - and NWP models outputs
- Intercomparisons
 - For all measurements at the same time (model and radiosonde interpolated)
 - Daily time series
 - Illustrated profiles
 - Summarized differences \rightarrow
 - Days
 - Periods







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Windspeed, winddirection, u, v, w, RMS vector difference





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Results 1











Advantages of two independent systems:





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Conclusions

Summary:

WLS200 (Windspeed): + no Bias, small RMS-Differences

- Data gaps in warm periods
- Parasitic lasing disturbs certain heights

WLS70 (Windspeed):

+ less data gaps in warm periods

- (+ no Parasitic lasing (?))
- Bias + 0.5 m/s

+ Windcubes with advantages in CBL

We need (1)consistent further development (2) permanent inter comparisons





Future work:

-Intercomparisons

 (1) Wind Lidar system, developed by Halo Photonics ← → Lindenberg Measurements (since 8 August)

(2) Windcube WLS200 + Halo Photonics $\leftarrow \rightarrow$ Lindenberg Measurements

in October 2011





Thanks for your attention!