Royal Netherlands
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Realistic L2B wind processor testing based on high resolution optical backscatter data.

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In preparation for the ADM Aeolus mission a realistic simulation and processing software chain has been prepared to test during development of several ground segment software components. An example Continuous Mode result based on LITE and ECMWF NWP data is shown.

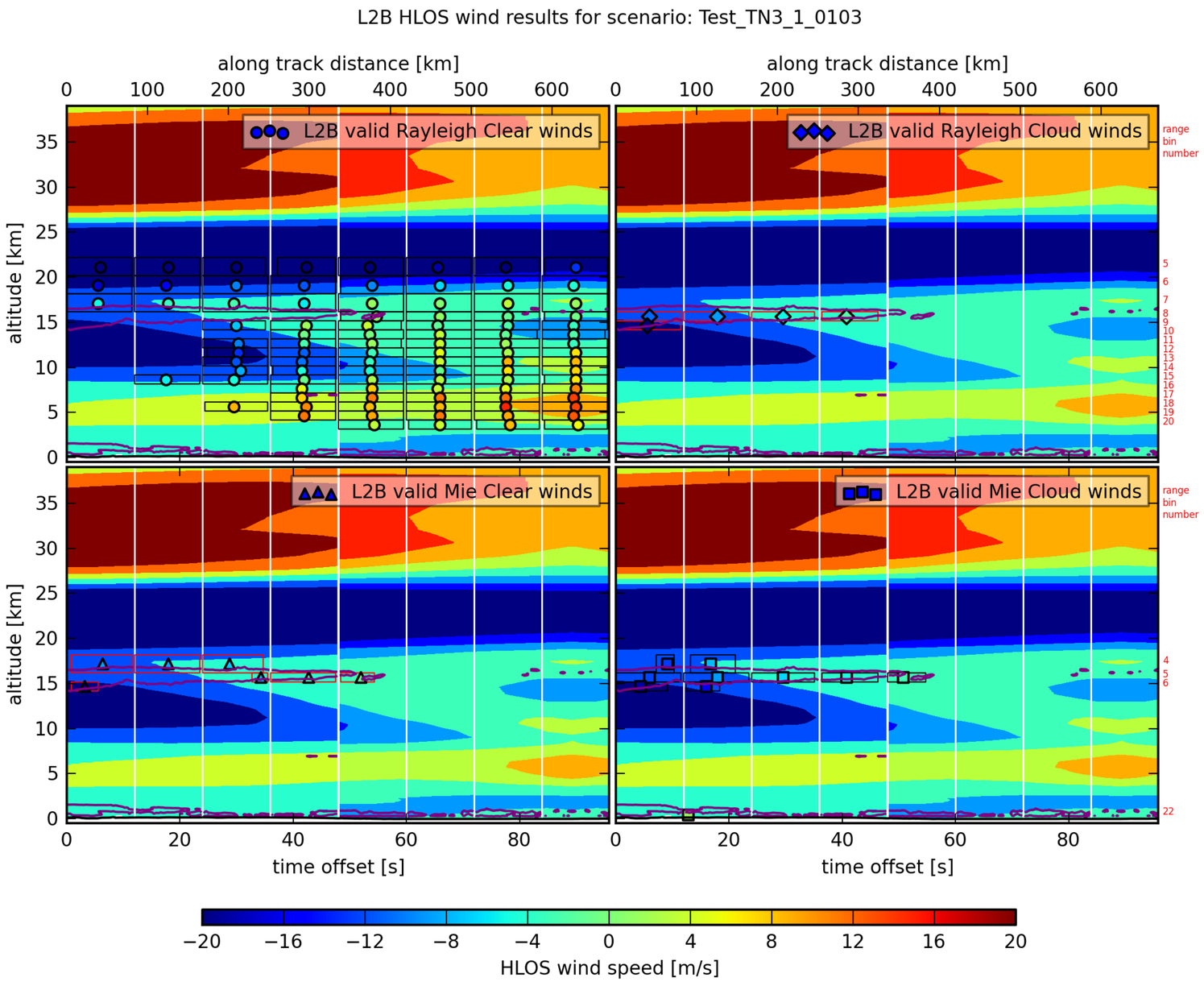

Figure 1 *Simulated L2B wind results based on LITE measurements from 10-Sep-1994 above Indonesia.*

1. Purpose

The purpose of this testing effort is to:

- test proper functioning of L1bP and L2bP
- estimate the quality of the retrieved wind
- gain experience from using this software
- ensure calibration steps are in place

Necessary ingredients before starting this work:

1. a realistic high res. atmospheric database
2. a lidar (hardware and atmosphere) simulator
3. the actual L1B and L2B processing software
4. verification software

2. Atmospheric database

Our simulations are based on:

- the ECMWF operational NWP model: wind components u,v, temperature T, pressure p.
- special studies have been performed to look at enhancing the data resolution both in the vertical and horizontal directions.
- short stretches of LITE data (800 km) and longer stretches of CALIPSO data (half orbit, night time only, 20.000 km)
- a surface albedo map (from TOMS, 360 nm)
- a digital elevation model (GETASSE30; 30 min. resolution)

These are considered "truth" in our simulations.

3. Software

Software packages used in this work:

- a lidar simulator (E2S), provided by ESA
- the L1bP software , provided by ESA
- the L2bP software, written by the L2B team (ECMWF, KNMI, MF).
- dedicated verification software, written by the L2B team in python.

5. Results

A LITE testcase partially covered by a high tropical cirrus cloud is shown in figure 1. The effect of classification in clear and cloudy cases is clearly visible. Overall results are good but small biasses remain (see Fig.2).

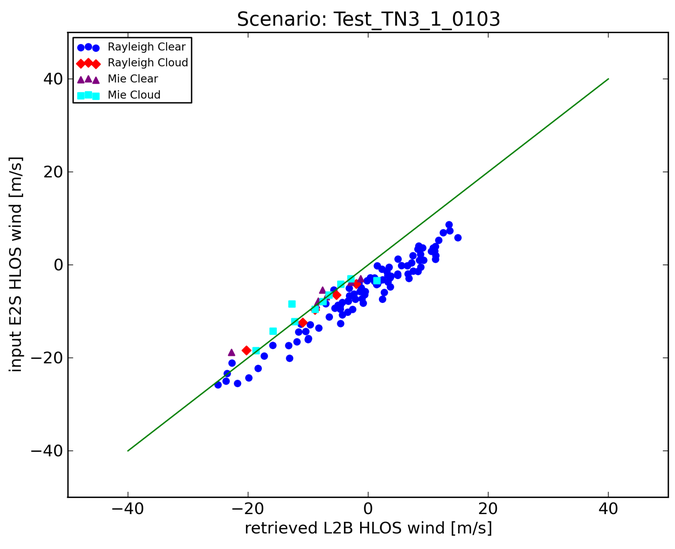

Figure 2 *Scatterplot of the data in Fig. 1*

Conclusions

Many simple academic and more realistic scenarios have been simulated with the full chain of processors. It was found that the statistical wind retrieval quality can be enhanced by selection of good data with high SNR. This can be used to achieve the statistical wind error requirements set on this mission (1,2 or 3 m/s std of the LOS wind error depending on the altitude). However, calibration problems usually cause biases that are systematic and maybe correlated vertically. A backup method using NWP model data to correct these biases should be implemented. In a next step calibration processors will be included in the simulation chain as well.

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