

Interactive comment on “Relevance of a kite-based calibration for a water vapour Raman lidar” by J. Totems and P. Chazette

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We thank the reviewer for his favorable comments and judicious remarks. Our replies are below his comments in the following:

Specific comments:

Title: “Relevance of” could be dropped. Of course, the contents of a scientific paper are relevant. Maybe “Calibration of water vapour Raman lidar with a kite-based humidity sensor”

We thank the reviewer for this proposition. We have changed the title accordingly.

Abstract, line 9: “below the full overlap range” is unclear. Maybe “allowed to determine

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the overlap function and calibration factor simultaneously”.

We have replaced this part of the sentence.

Section 2.1, figure 1: I think it would be interesting to include a zoom to the experimental region which shows the lidar site and the sites of the other instruments with orography and a kilometer scale. For me, the large map could be deleted as the discussed comparisons are anyway not related to such a large region.

We think the largest map is important both to locate the area in the Mediterranean and the origins of the sampled air masses. We added arrows to that effect and chose to keep it. But indeed a zoom on the island for its orography and the location of the sites is much more useful and we replaced the insert. The modified Figure 1 is attached. Please forgive the bad quality which seems only due to the PDF generation by AMT which requires a compressed PNG file.

Page 10585: The details of how $\Delta\tau(z)$ was determined are unclear to me. Please provide additional details, e.g., on the assumptions. Are there references for this approach?

We developed this point with a reference, as follows: “Correction factor $\Delta\tau(z)$ is the difference of total optical thickness between wavelengths 387 nm and 407 nm, which has to be estimated from the aerosol channel and the Angström coefficient of the aerosols obtained from the AERONET sunphotometer, as explained in Chazette et al. (2014a) (thus avoiding a bias of up to 10% above 4 km amsl, as estimated from our uncorrected signals)”

Section3: Can you tell/estimate how close the kite was to the lidar beam during the three flights?

We expanded the first sentence explaining the flight methodology to answer that question: “Three flights were performed to assess calibration function $C(z)$, during which the kite remained at a distance between 60 and 300 m from the laser beam”.

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Section 4.1, figure 4: I suggest showing also a profile of the mean difference between lidar and radiosonde data.

Instead of the previous figure 5 showing intercomparison results with Palma radiosoundings, which were suppressed following the next remark, we put the following figure giving the mean and RMS deviations between Menorca lidar and radiosonde, with some averaging over altitude for clarity. The figure is attached. Please forgive the bad quality which seems only due to the PDF generation by AMT which requires a compressed PNG file.

Section 4.2: 135 km distance is just much too far to allow for a comparison of water vapor in the lower troposphere, especially in heterogeneous terrain. This is no new message. So this part should just be deleted.

We agree that this part of study did not have the same level of relevance as the rest of the article. Therefore we deleted it and just made the following mention: "For completeness, we also compared the lidar profiles to the operational meteorology radiosoundings performed twice daily at Palma de Majorca ($39^{\circ} 34' N$, $2^{\circ} 39' E$, 135 km ESE of Cap d'en Font). The results are not shown here because the observed moderate value of correlation (~ 0.6 - 0.7) in the middle free troposphere, and even worse in the boundary layer, were mostly due to the long baseline between the lidar and Palma. The NWP model reanalyses remain necessary to interpolate the radiosounding data at the location of the lidar." We thus kept the comparison between the lidar and ECMWF/IFS reanalyses.

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 10577, 2015.

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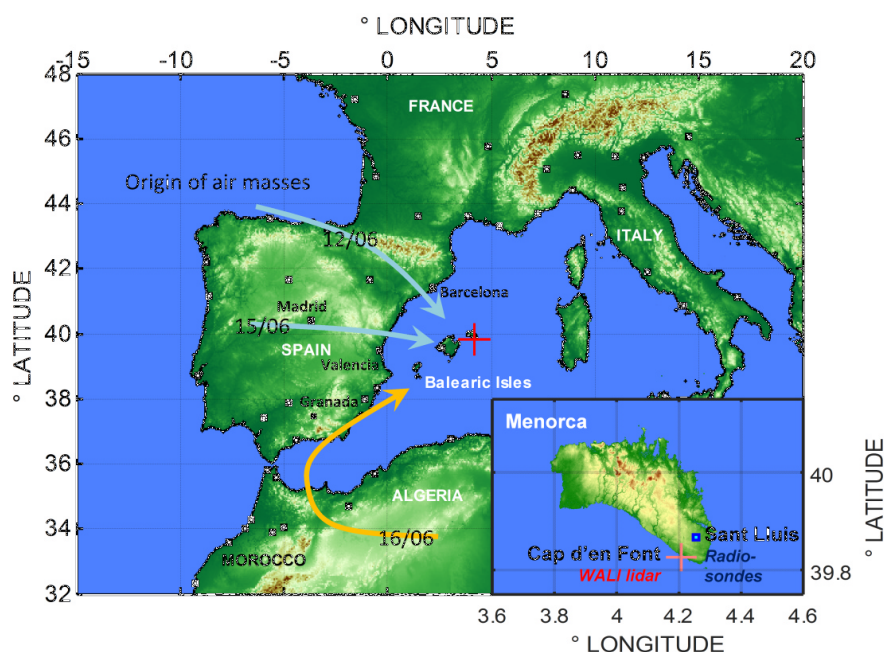


Fig. 1. New figure 1. Excuse bad quality due to PNG format

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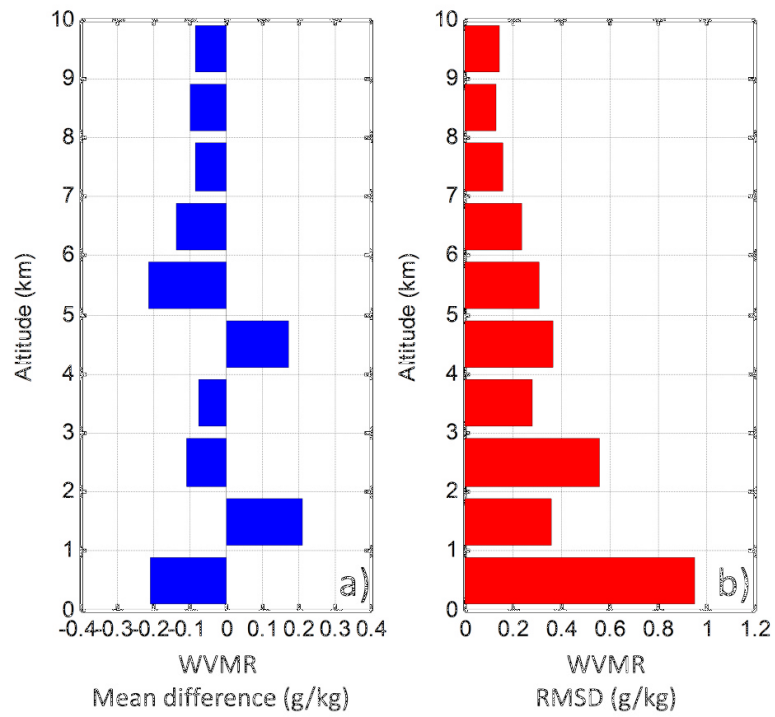


Fig. 2. New figure 5. Excuse bad quality due to PNG format