Summary

Nudging of Wind Profiler Data

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Real-time data from 14 wind profilers are available within the LM domain. In addition, temperature profiles are provided at 2 stations from RASS or SODAR instruments. Monitoring for each individual station has been performed for 9 to 30 April 2002. The purpose has been to identify the stations, which deliver data of (clearly) inferior quality compared to radiosonde or aircraft data. The use of such data is expected to deteriorate rather than improve the analyses and forecasts on average, given the relatively high density of high-quality in-situ observations of upper-air wind and temperature (profiles) within the LM domain.

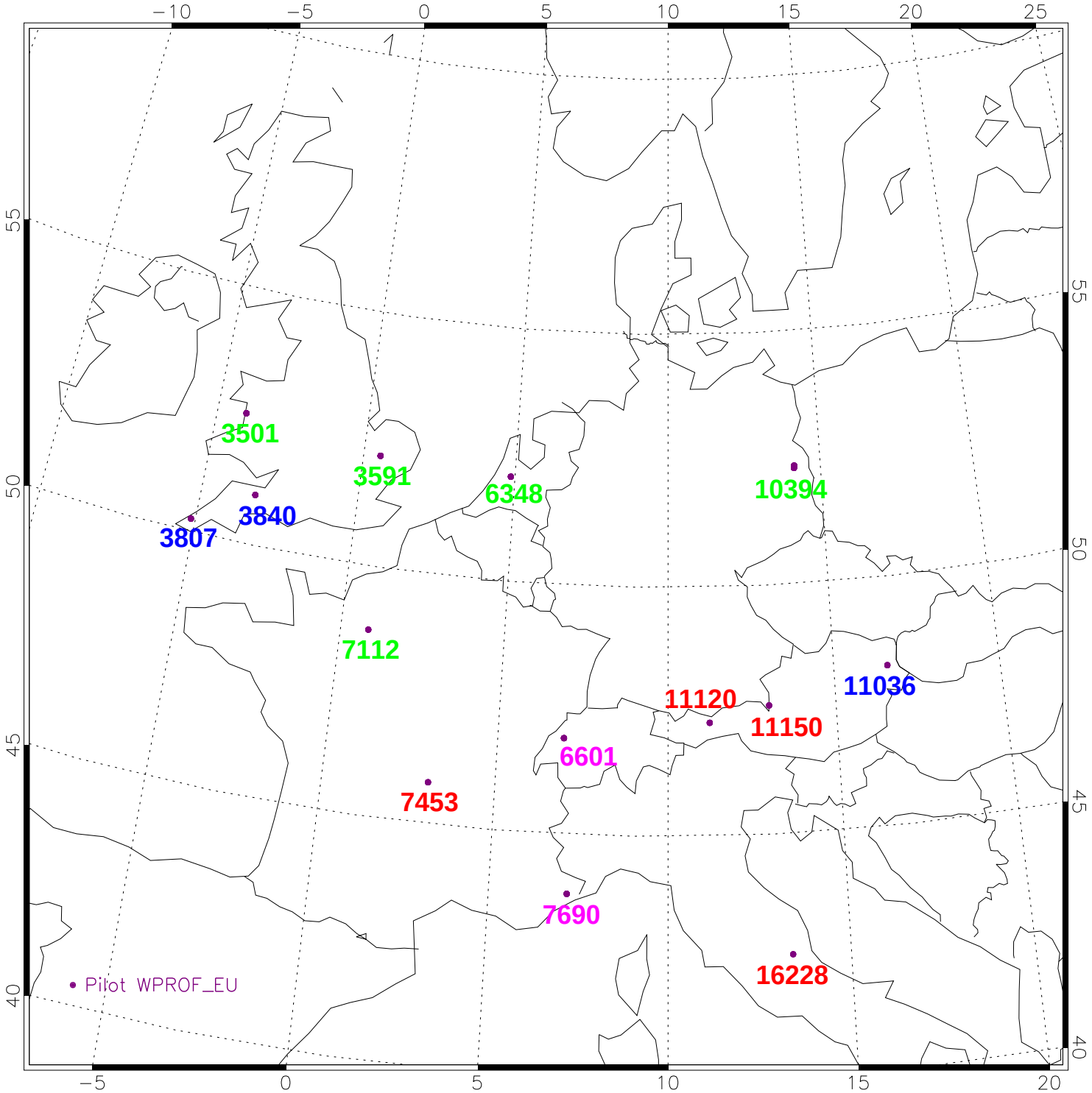
The temperature profilers exhibit a negative bias of at least 1 K and are therefore put on the blacklist. Out of the 14 wind profilers, 4 are considered bad (Clermont-Ferrand, Innsbruck, Salzburg, Preturo: blacklisted), 2 rather bad (Payerne, Nice: partly used in a first period, fully blacklisted later on), 3 mostly good (Camborne, Dunkeswell, Vienna: some vertical parts blacklisted in the second period), and 5 good (always used in the experiment).

In a 16-day parallel assimilation cycle and forecast experiment with three daily forecasts, the impact of assimilation of the (non-blacklisted) wind profiler data is neutral in the TEMP verification excluding one day. At that day, three successive 18 - 30 hour forecasts verify significantly better in the environs of a nearly stationary upper-level cyclone. This results from a decrease of a moderate displacement of the cyclone center within that forecast range. With respect to precipitation, the impact on this and the other individual cases is at most moderate, and there are at least as many negative as positive cases.

To conclude, it appears that some improvement can be expected in very rare cases. Otherwise, the impact is almost neutral with a very weak negative rather than positive tendency. Therefore, and since their use would require a continuous monitoring effort, there is no plan to assimilate these data operationally in the near future. The results and conclusion might be different if either the data quality is improved, or the radiosonde network is degraded over the continent.

distribution of wind profiler stations

April 2002

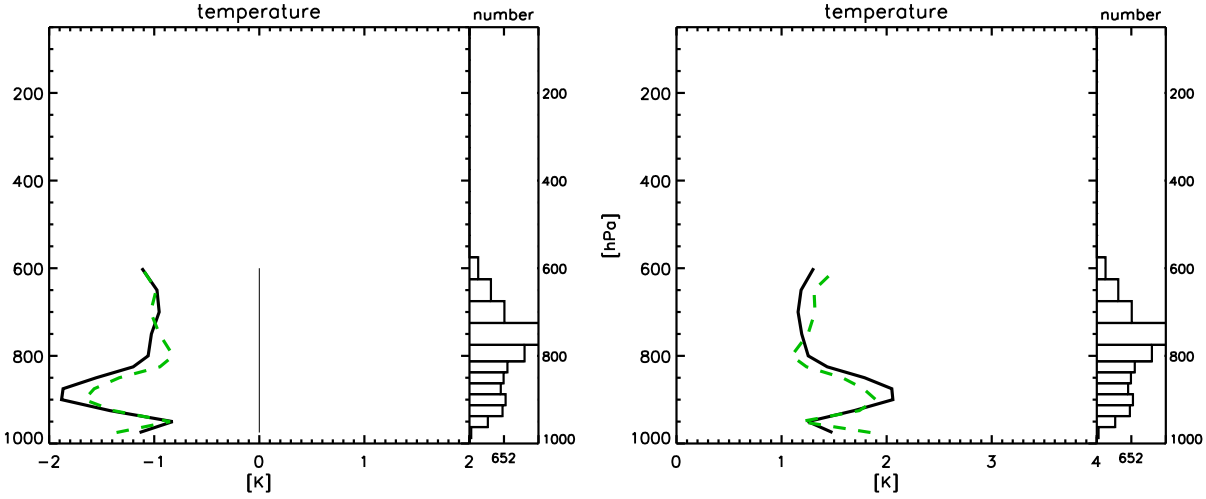


monitoring of RASS temperature profilers

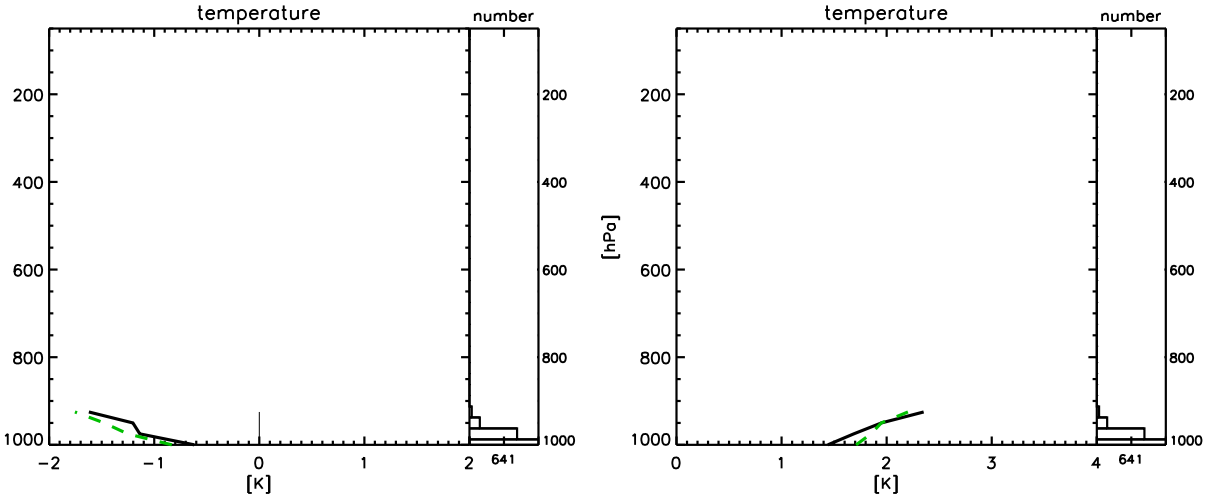
by verification of operational LM analyses (——) and 12-h forecasts (– – –)
against the 6 - 12 UTC data from 09-04 - 30-04-2002

BIAS **RMSE**

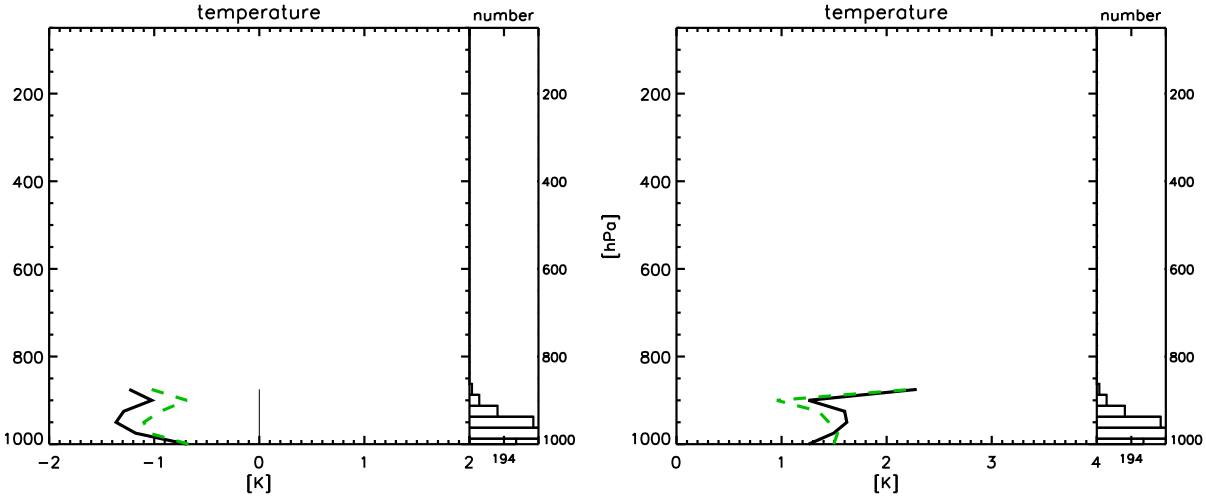
10394 : RASS Lindenberg D



10391 : SODAR Lindenberg D



06348 : RASS Cabauw NL

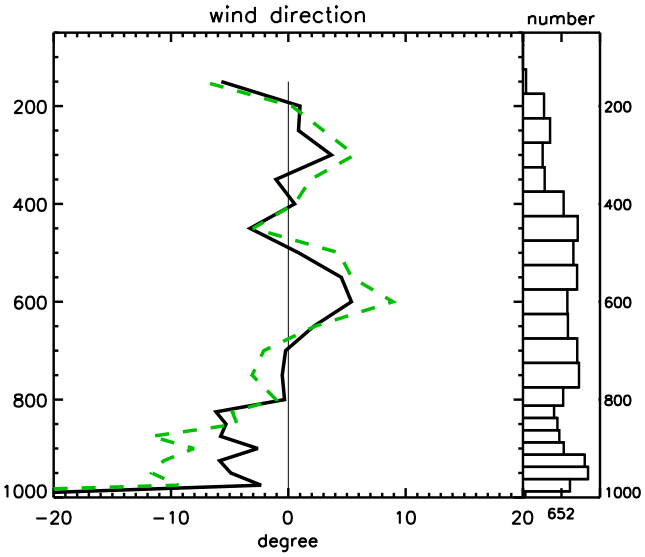


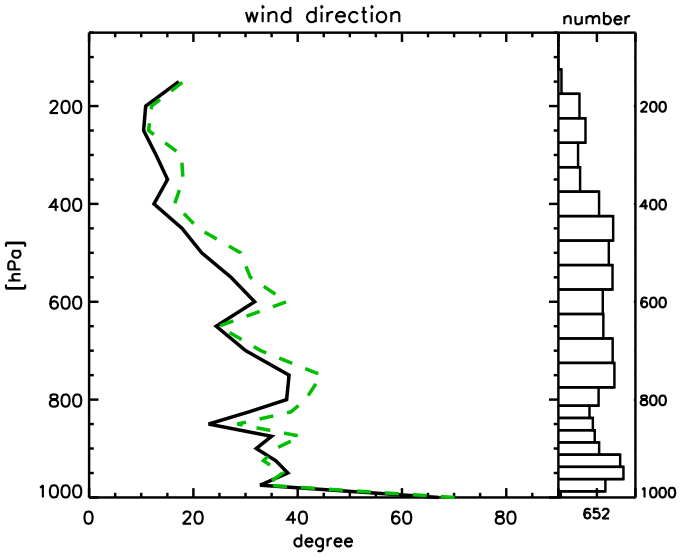
monitoring of a wind profiler

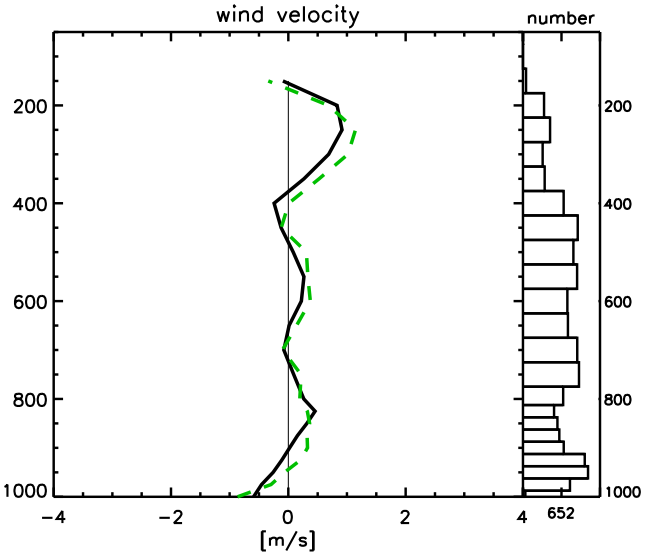
by verification of operational LM analyses (——) and 12-h forecasts (- - -)
against the 6 - 12 UTC data from 09-04 - 30-04-2002

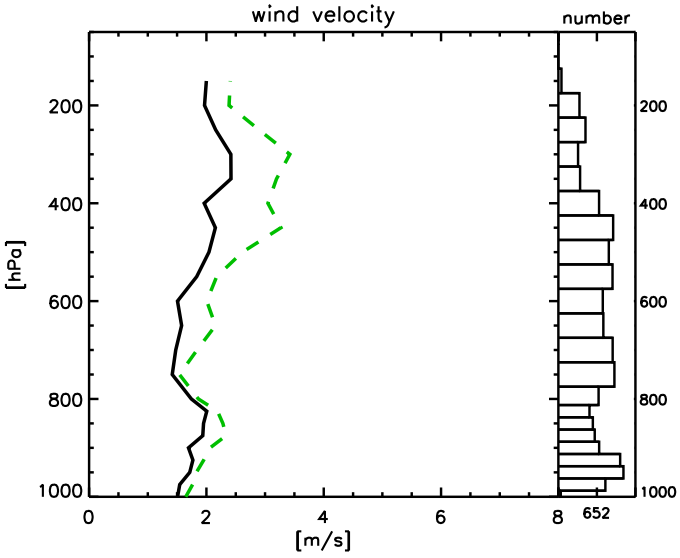
BIAS **RMSE**

10394 : Lindenberg D







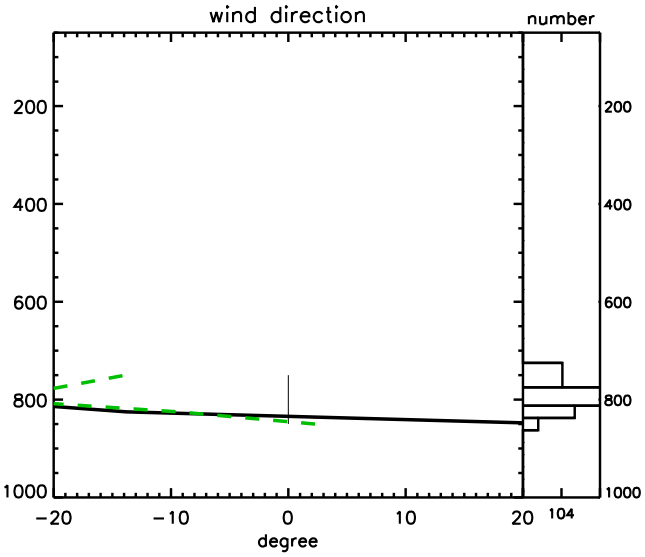


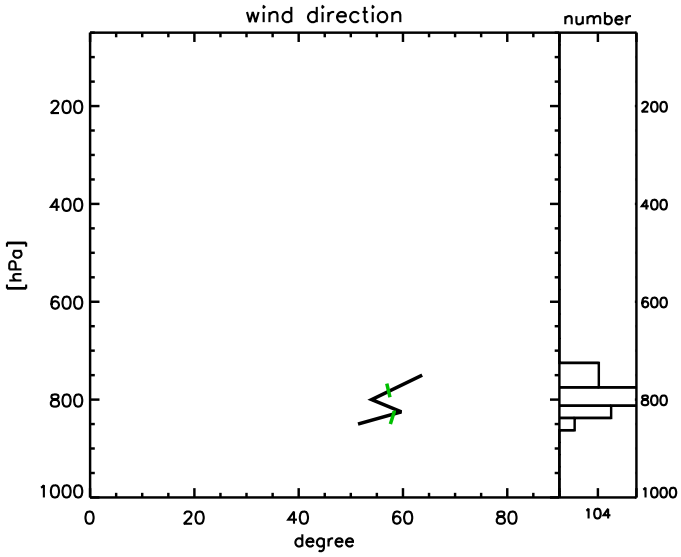
monitoring of a wind profiler

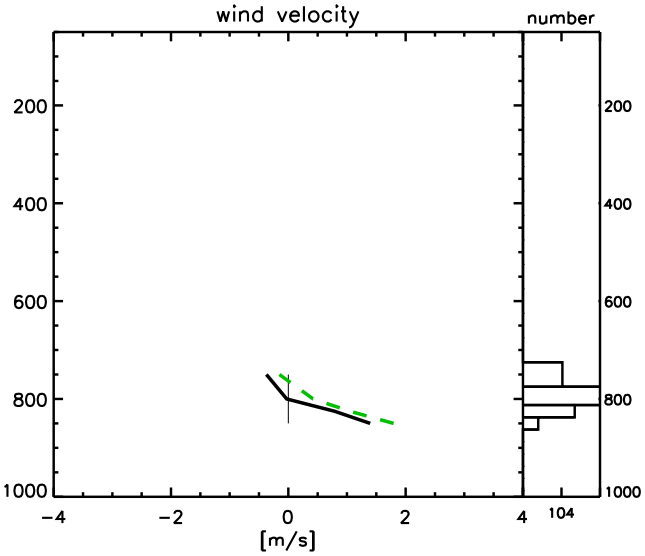
by verification of operational LM analyses (——) and 12-h forecasts (- - -)
against the 6 - 12 UTC data from 09-04 - 30-04-2002

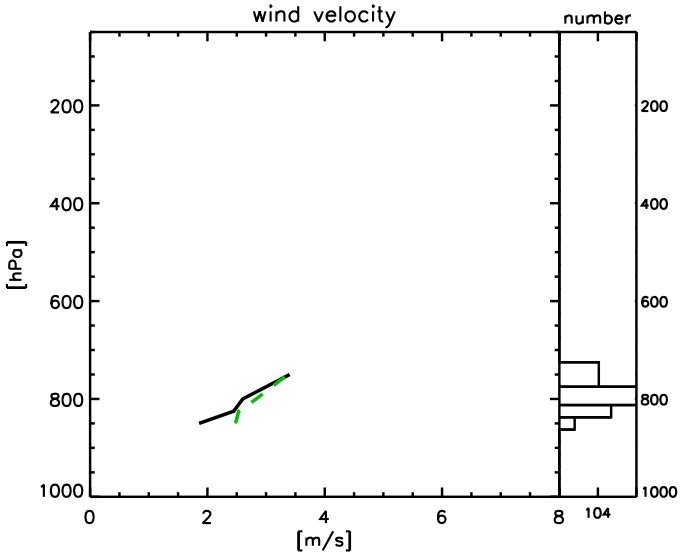
BIAS **RMSE**

11150 : Salzburg A







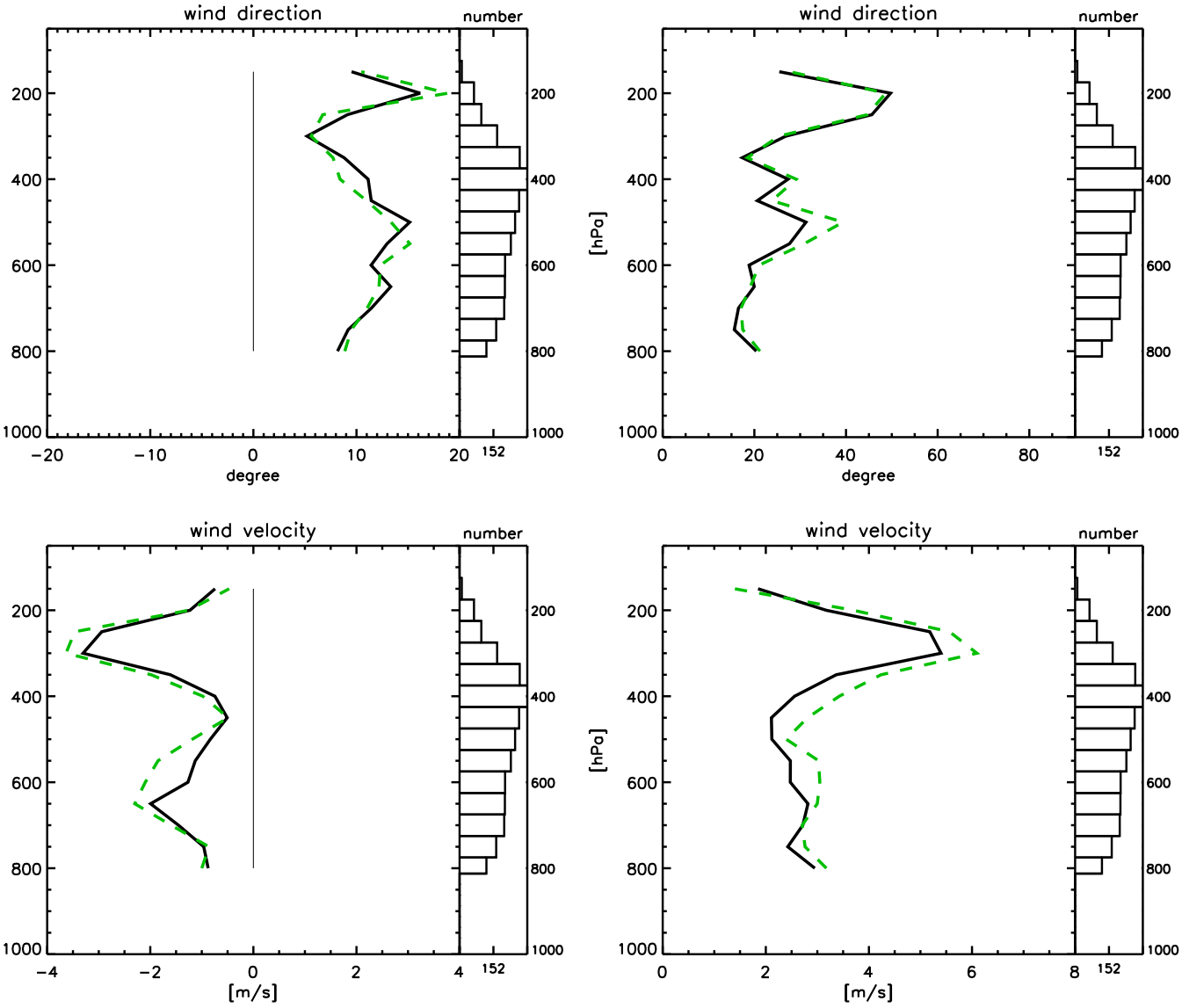


monitoring of a wind profiler

by verification of operational LM analyses (——) and 12-h forecasts (- - -)
against the 6 - 12 UTC data from 09-04 - 30-04-2002

BIAS **RMSE**

07453 : Clermont-Ferrand F

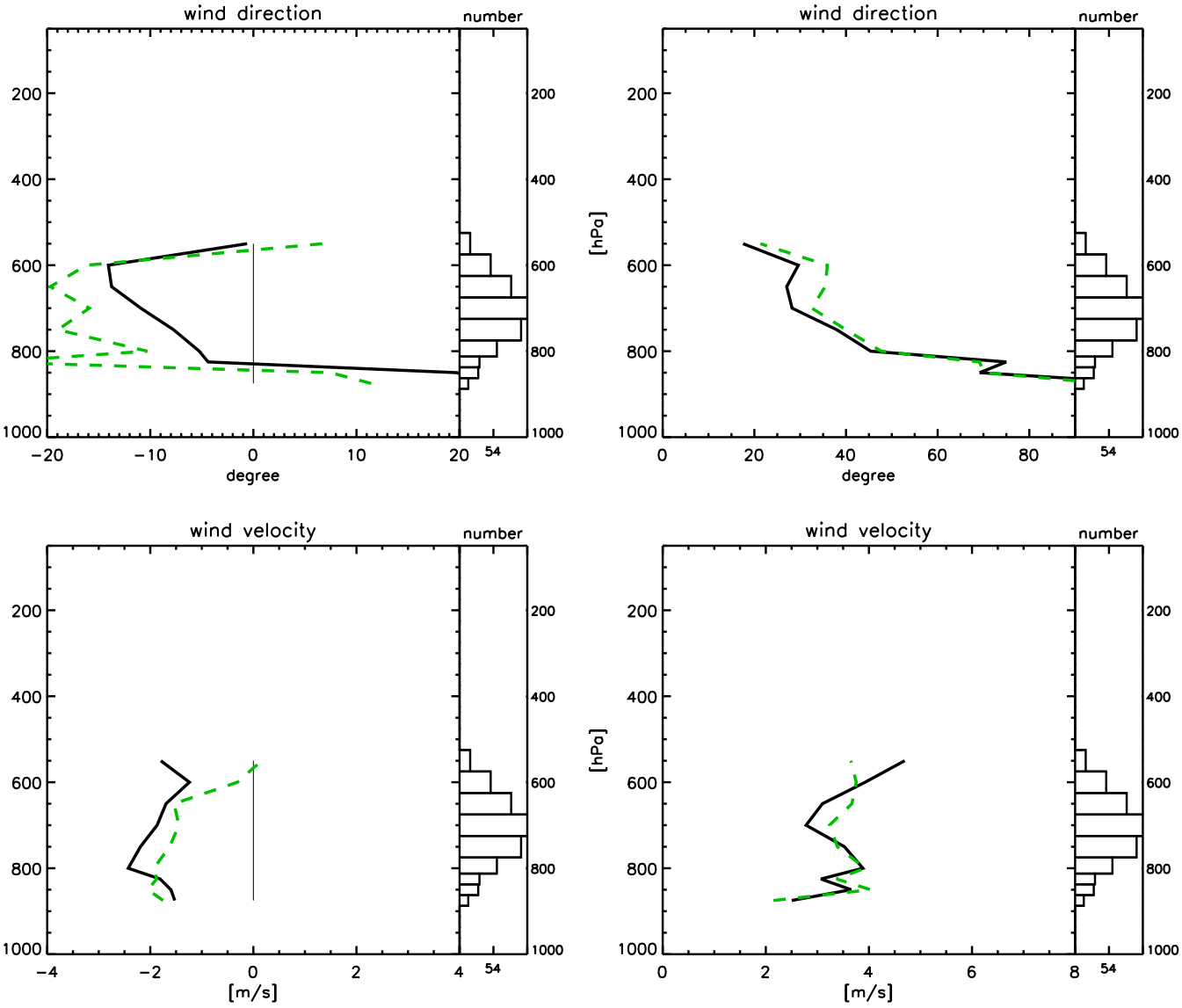


monitoring of a wind profiler

by verification of operational LM analyses (——) and 12-h forecasts (- - -)
against the 6 - 12 UTC data from 09-04 - 30-04-2002

BIAS **RMSE**

16228 : Preturo I

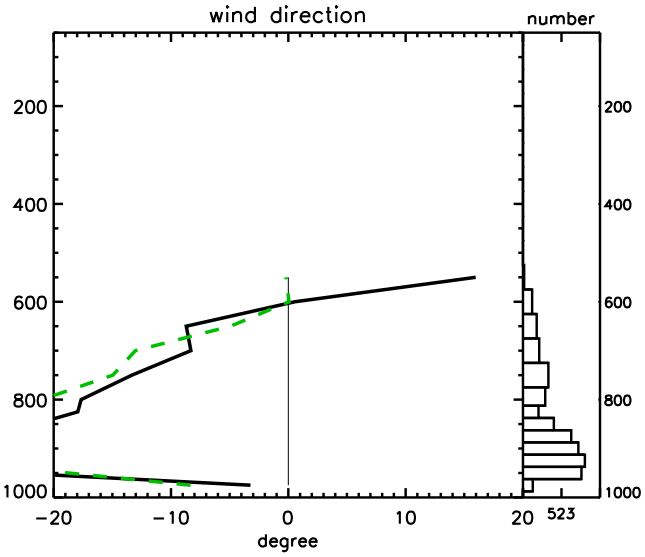


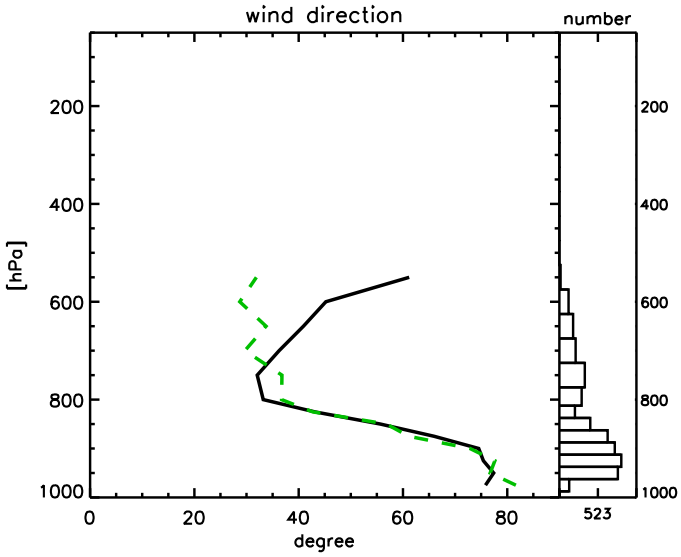
monitoring of a wind profiler

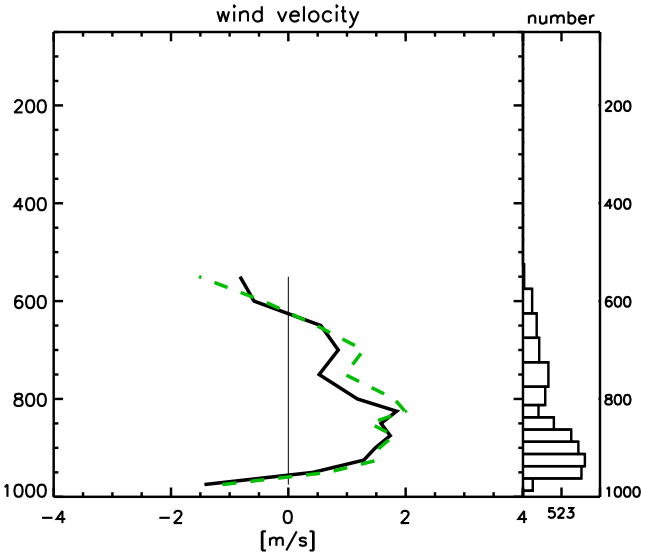
by verification of operational LM analyses (——) and 12-h forecasts (- - -)
against all its data from 11-04 - 26-04-2002

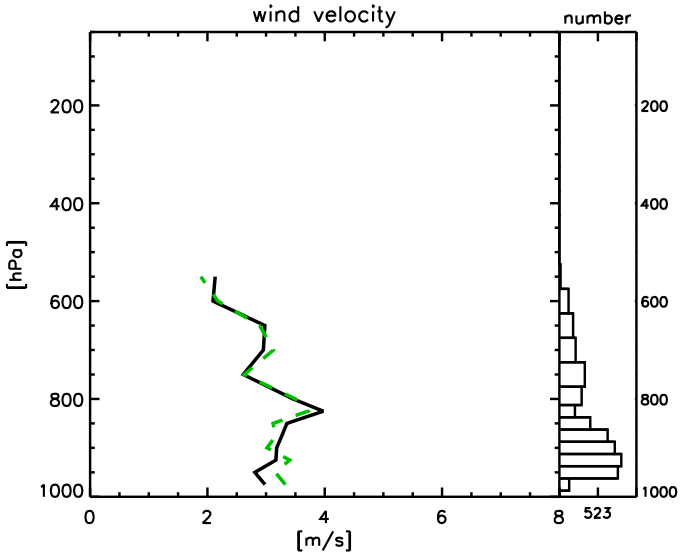
BIAS **RMSE**

06601 : Payerne CH







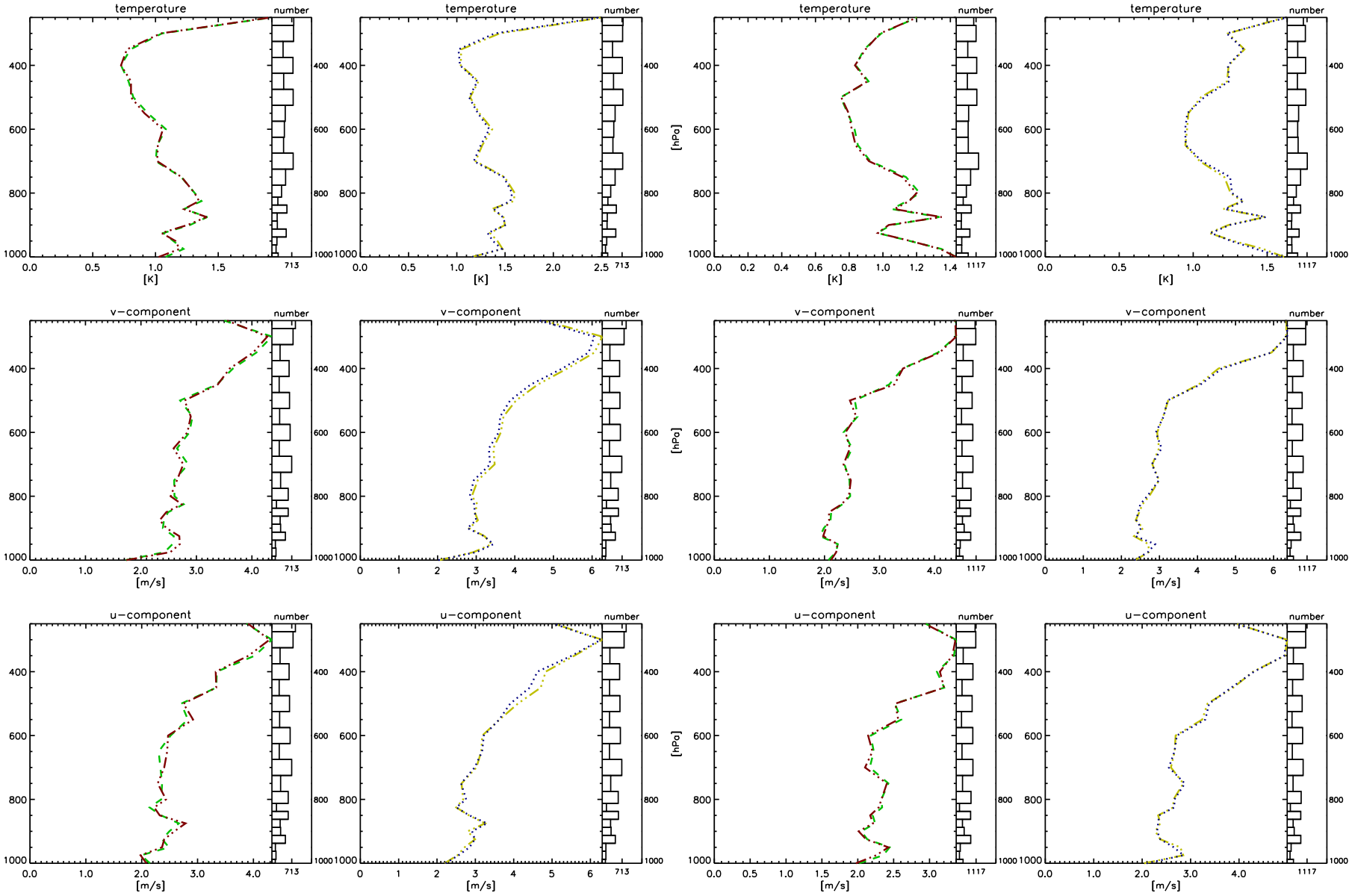


verification against TEMPs & PILOTs

+12 h — without wind profiler observations — with wind profiler observations — *+24 h*

11-04, 12 UTC - 16-04-2002, 0 UTC — *17-04, 0 UTC - 26-04-2002, 12 UTC*

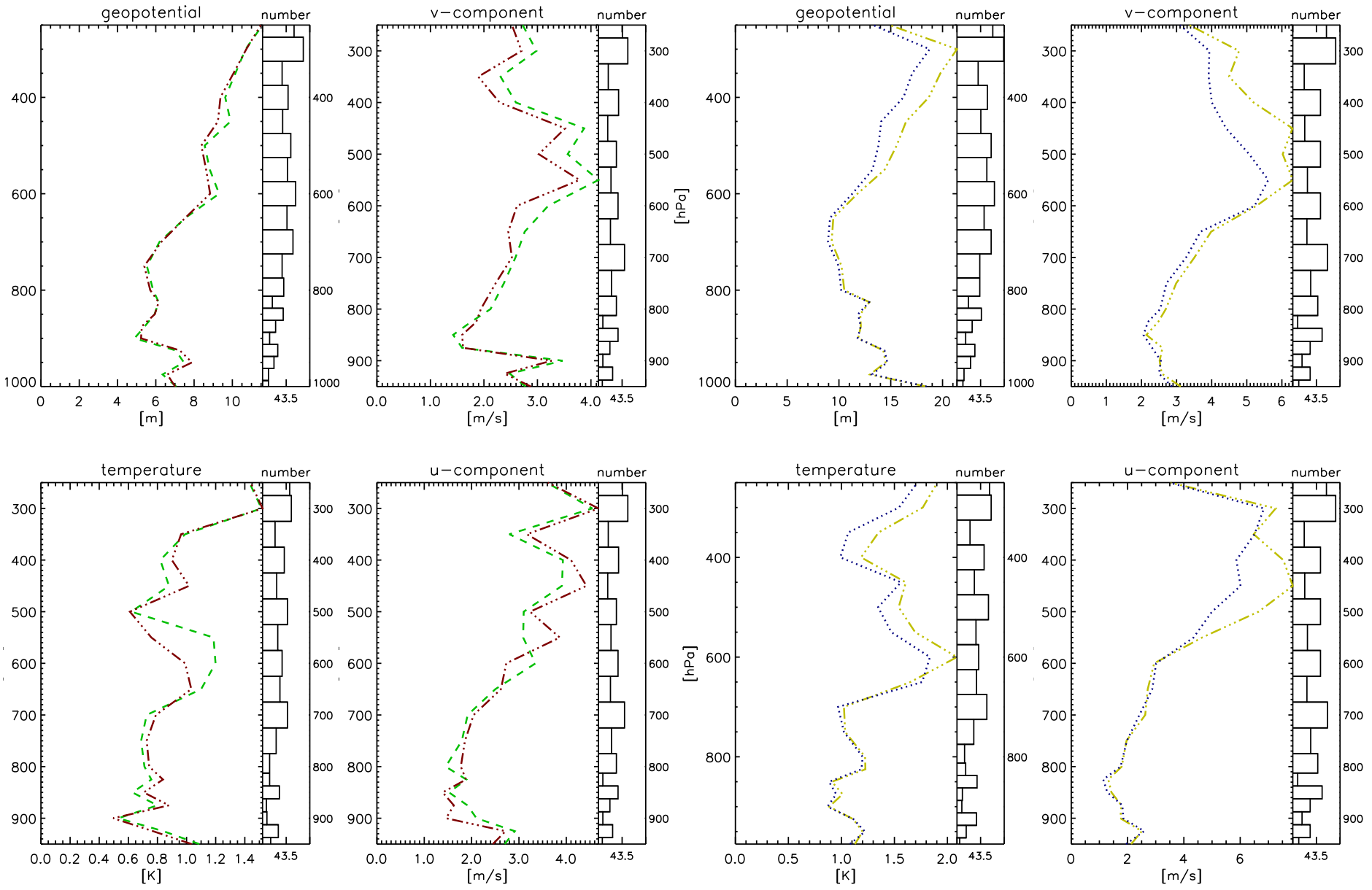
'inner-domain' — RMSE — near active profilers : 48° - 55° north



verification against TEMPs & PILOTs valid for 15-04-2002, 12 - 24 UTC
near a cyclone : 3°-13° longitude; 46°-52° latitude

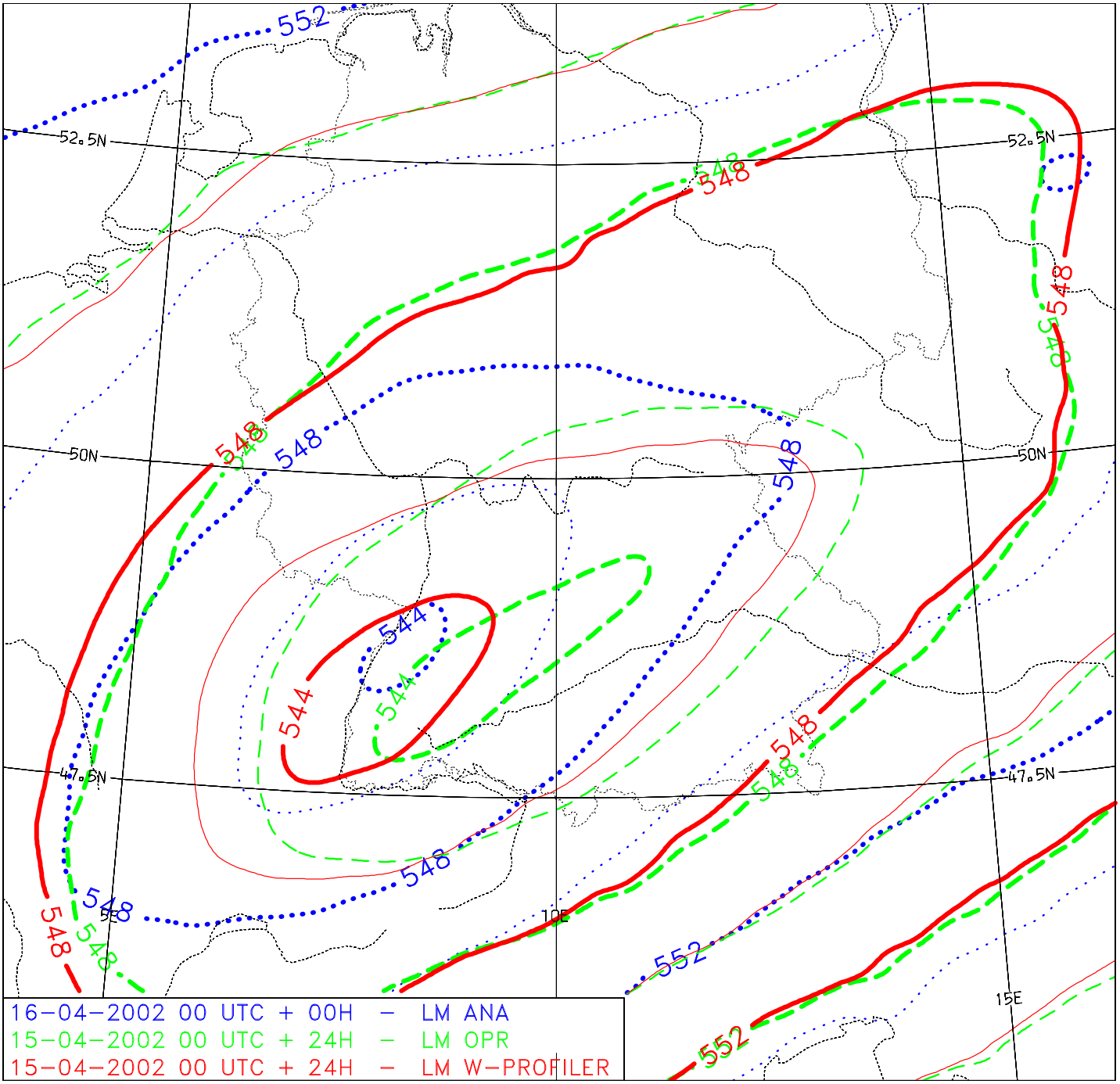
+12 h without wind profiler observations / with wind profiler observations ***+24 h***

RMSE



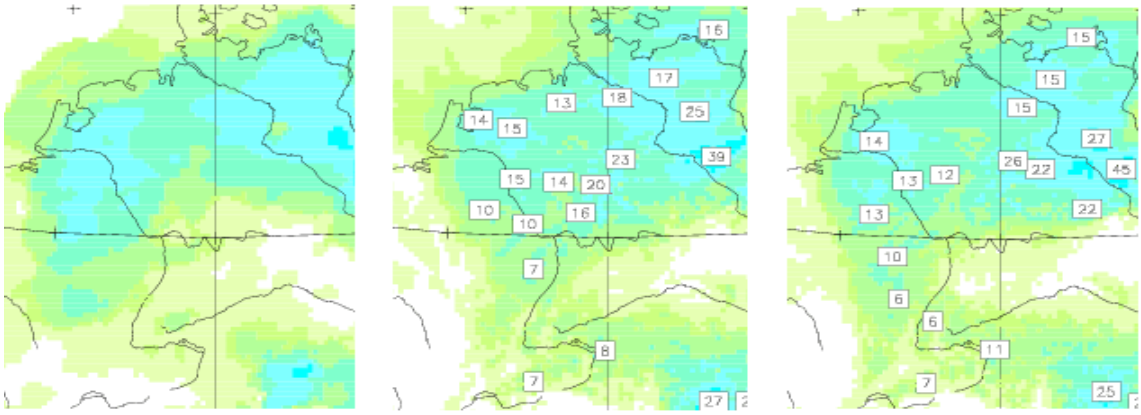
500 hPa geopotential height [10 m] valid for 16−04−2002 , 0 UTC

dotted : verifying LM analysis
dashed : 24−h LM forecast **without** use of **wind profiler** data
solid : 24−h LM forecast **w i t h** use of **wind profiler** data



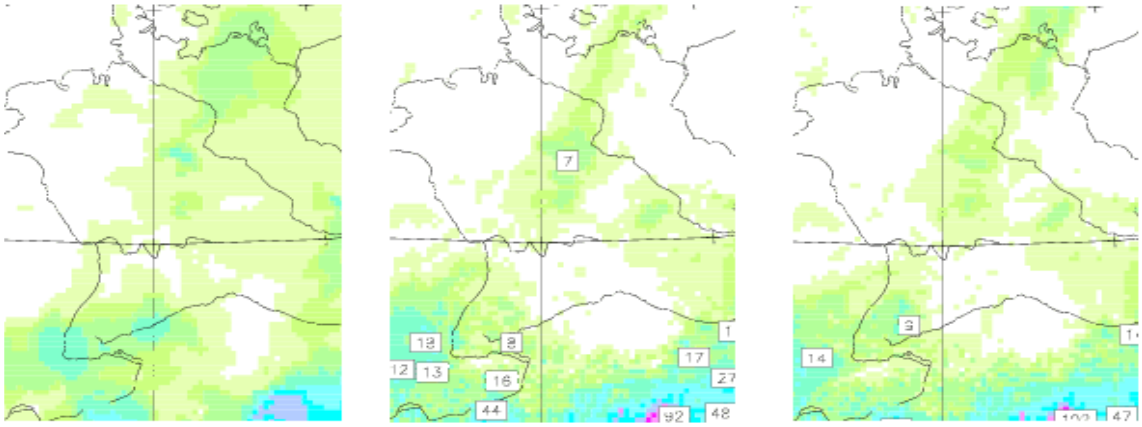
6 – 30 h LM forecasts of precipitation valid for 16–04–2002 , 6 UTC

SYNOP analysis **LM without wind profilers** **LM with wind profilers**



6 – 30 h LM forecasts of precipitation valid for 13–04–2002 , 6 UTC

SYNOP analysis **LM without wind profilers** **LM with wind profilers**



6 – 30 h LM forecasts of precipitation valid for 18–04–2002 , 6 UTC

SYNOP analysis **LM without wind profilers** **LM with wind profilers**