

# *Assimilation of Aircraft Observations*

- *Observations:*

- *AMDAR, ACARS, AIREP:*

- ~ 15000 (single-level) reports per day, mainly from ~ 4 - 22 UTC*

- *observed quantities: horizontal wind , temperature*

- *vertical resolution at ascents / descents ~ 10 - 50 hPa (depend. on airline)*

- == > generation and assimilation of piecewise vertical profiles*

- *Aim: improvement mainly of the 12- and 18-UTC forecasts runs*

- == > 9-day assimilation experiment with 3 daily forecasts in April / May*

- **Results:**

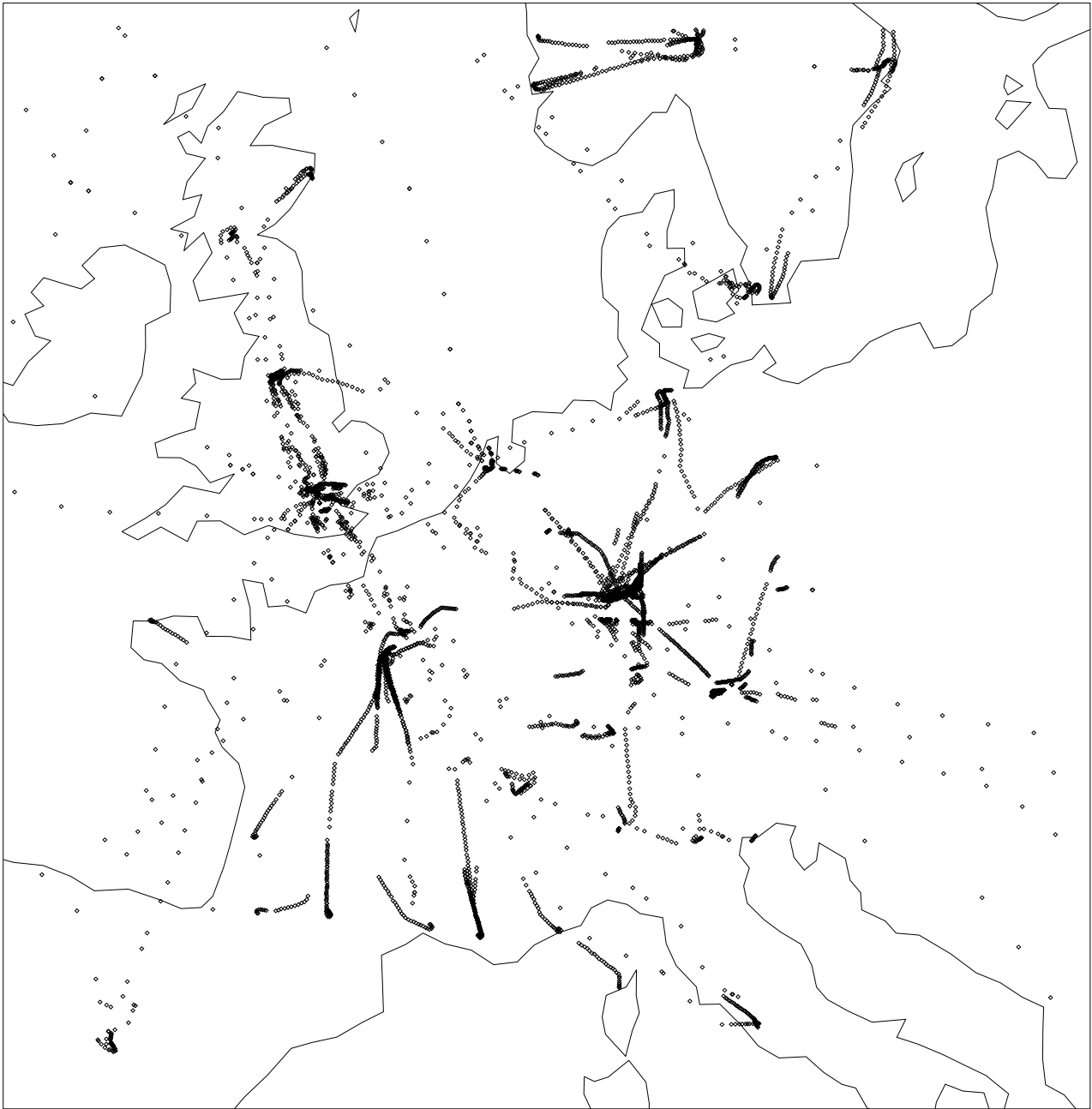
- *spurious convective precipitation, if relative humidity preserved at temperature nudging  
== > preserve specific humidity (at least in the vicinity of convection)*
- *subjective evaluation:*
  - *no significant improvement in precipitation*
  - *only little improvement in analysed total cloud cover*
- *upper-air verification:*
  - *0 -UTC runs: only small improvement in upper troposphere up to +12h*
  - *12- and 18-UTC runs: significant improvement at least up to +24h*

- **Further work required:**

- *data quality control*
- *tuning (incl. humidity balancing)*

**horizontal distribution of aircraft reports:**

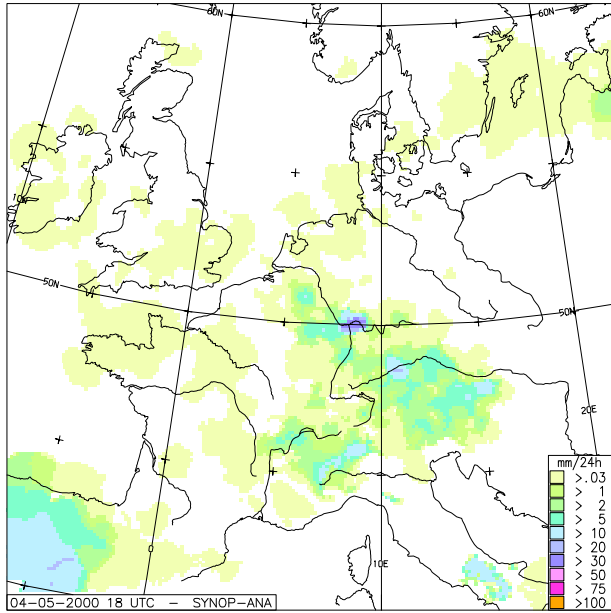
**26-04-2000 , 6 - 12 UTC**



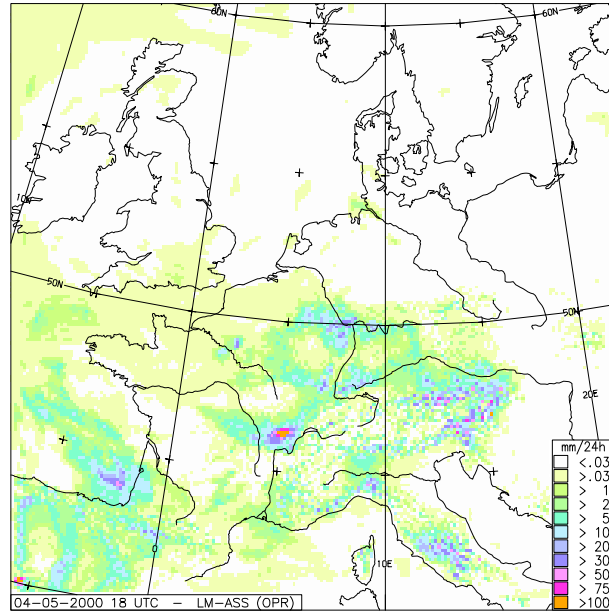
4-hour precipitation: verification period 03-05-2000 18 UTC - 04-05-2000 18 UTC

analyses

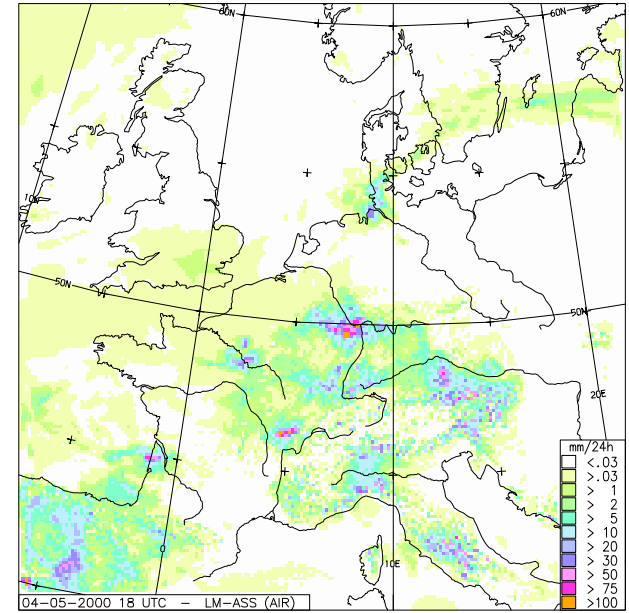
SYNOP obs



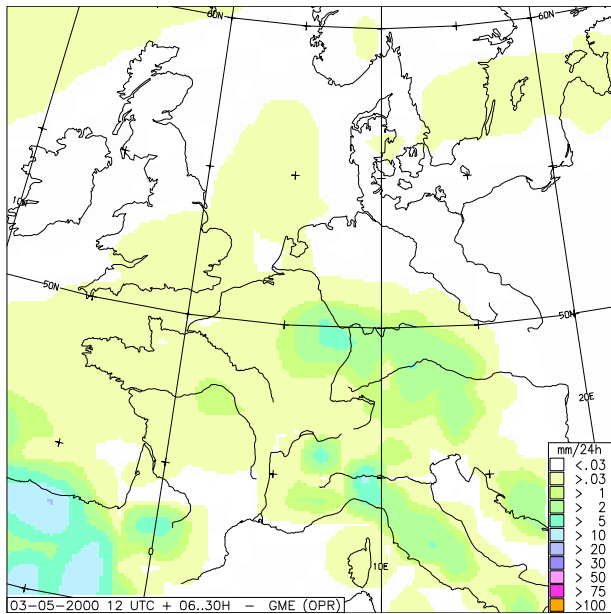
LM without aircraft obs



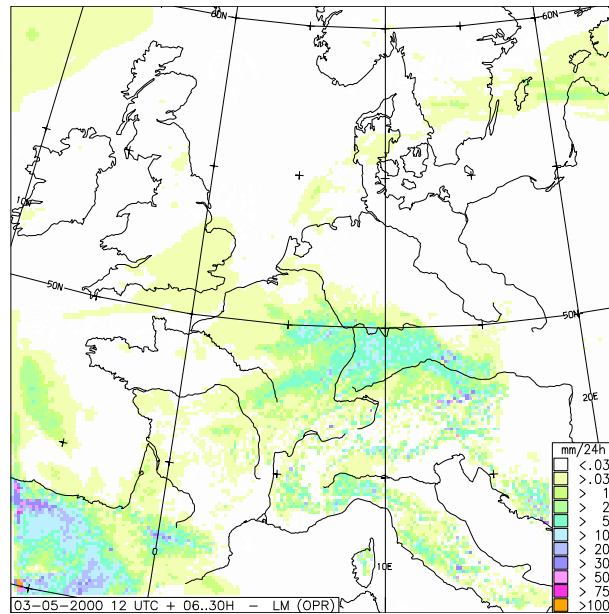
LM with aircraft obs



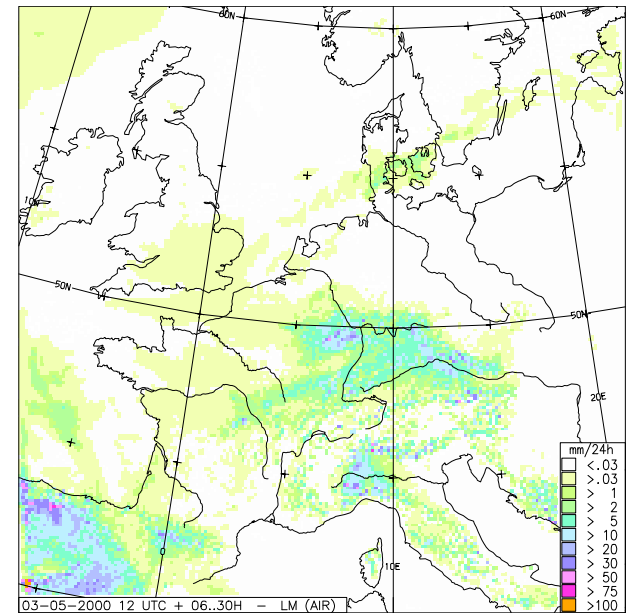
GME



LM without aircraft obs



LM with aircraft obs



6 - 30 h forecasts

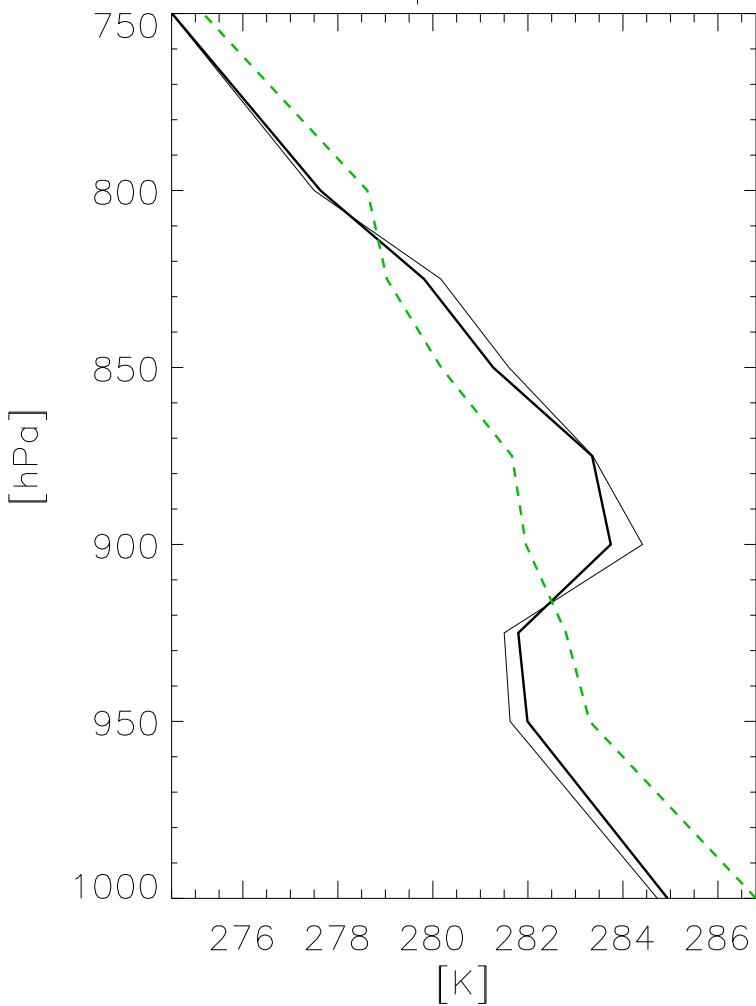
**temperature profiles: 03-05-2000 18 UTC - 04-05-2000 00 UTC**

**black thin solid:**  
**green dashed:**  
**black thick solid:**

**aircraft observations**  
**6-12h LM forecast**  
**LM assimilation (with aircraft obs)**

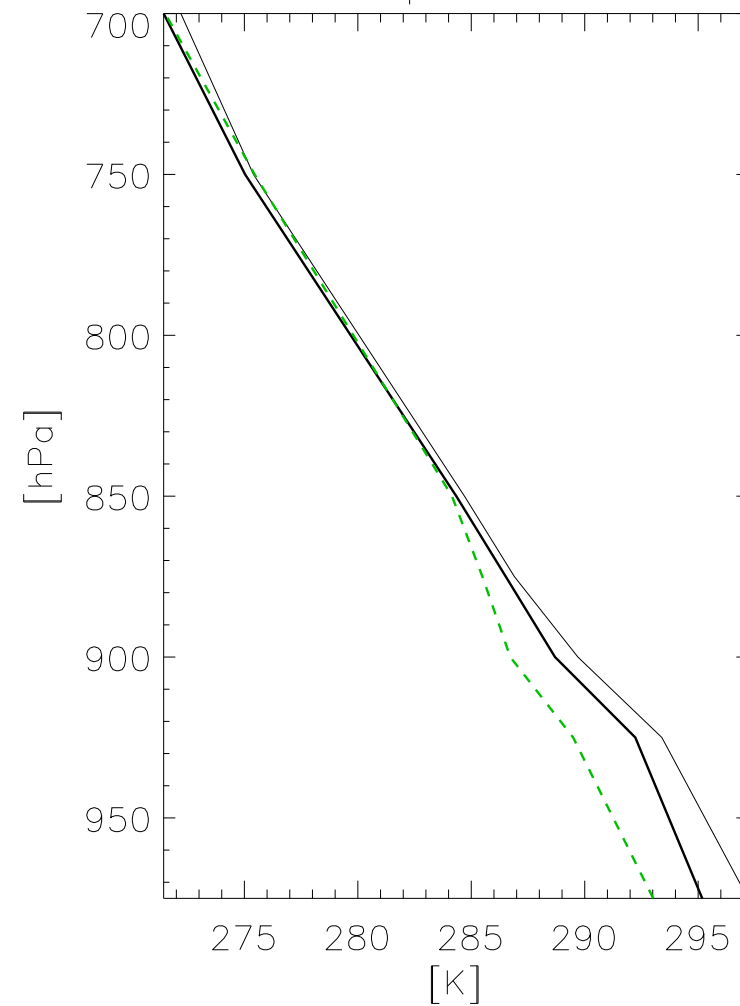
**around Paris**

temperature



**around Bordeaux**

temperature



4-hour precipitation: verification period 03-05-2000 18 UTC - 04-05-2000 18 UTC

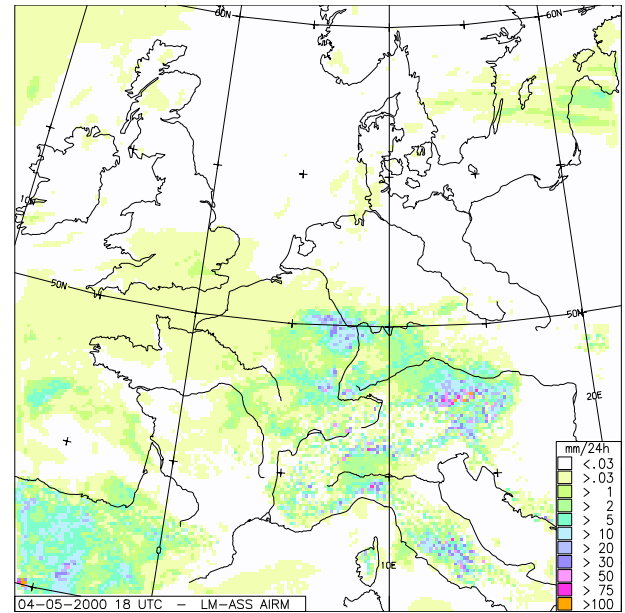
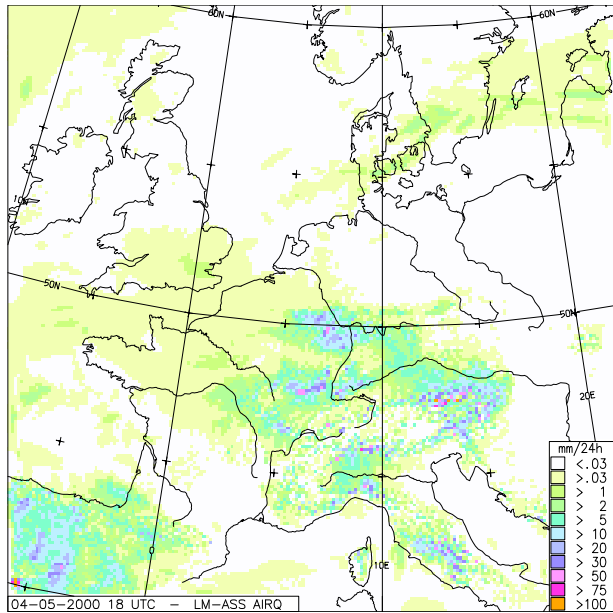
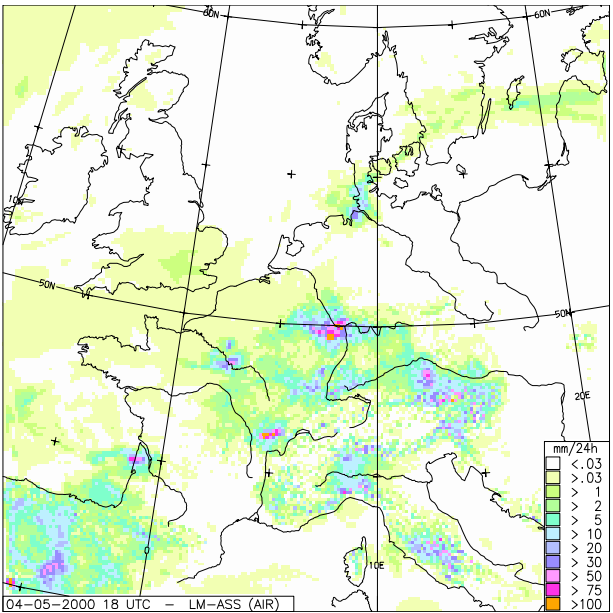
LM with aircraft data - balancing of humidity when nudging temperature:

relative humidity preserved

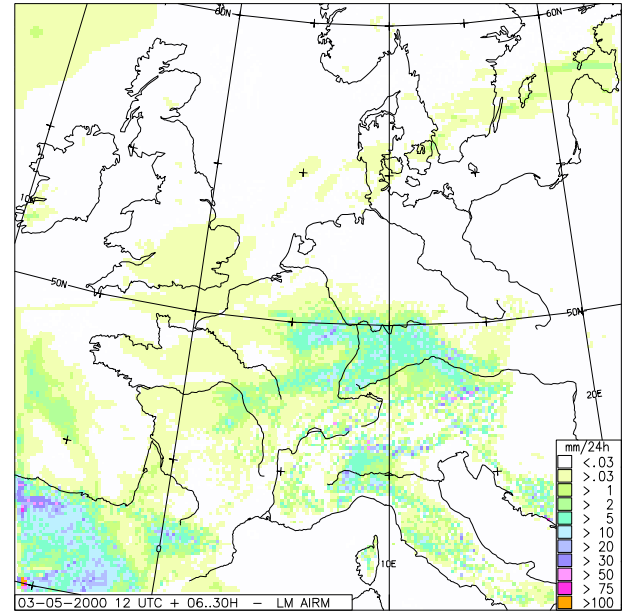
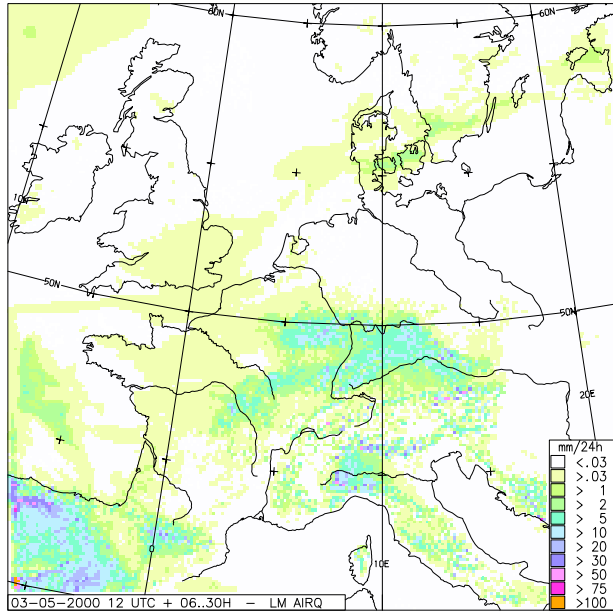
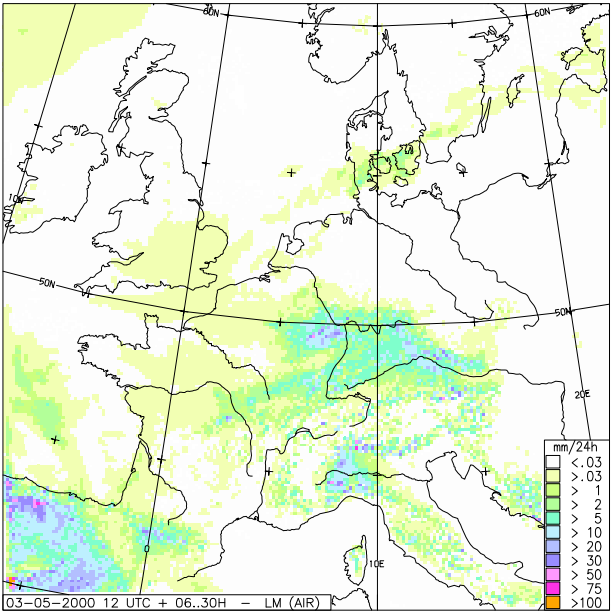
specific humidity preserved

dependent on convective precip

analyses



6 - 30 h forecasts



Verification against 'inner-domain' TEMPs & PILOTs: 28-04-2000 00 UTC - 05-05-2000 00 UTC

without aircraft obs:

+12h: brown dot-dash-dotted

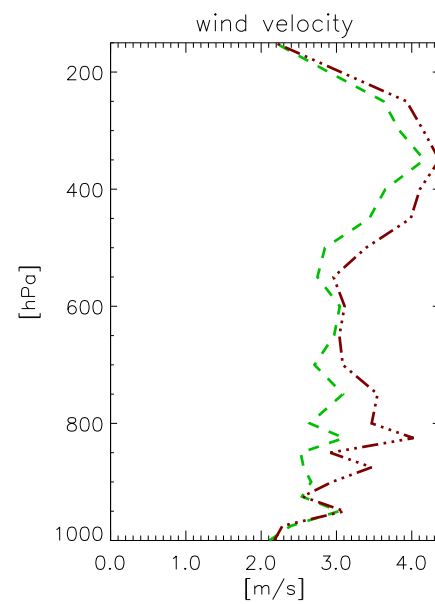
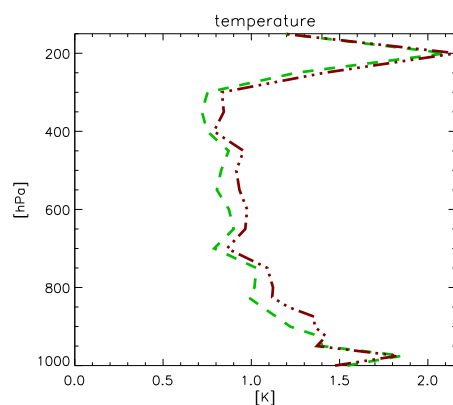
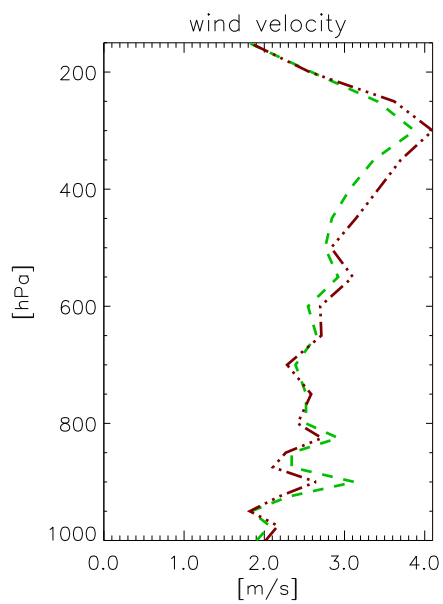
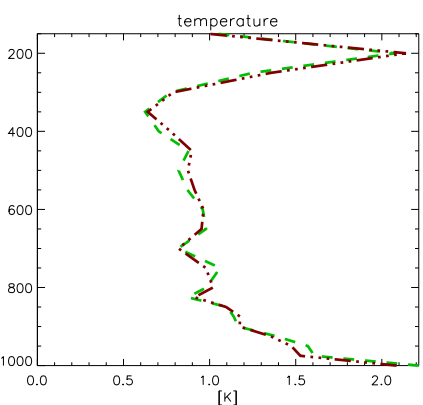
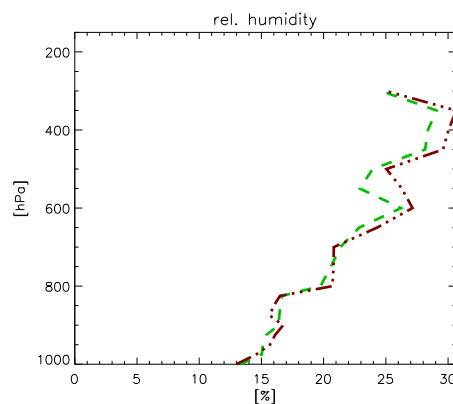
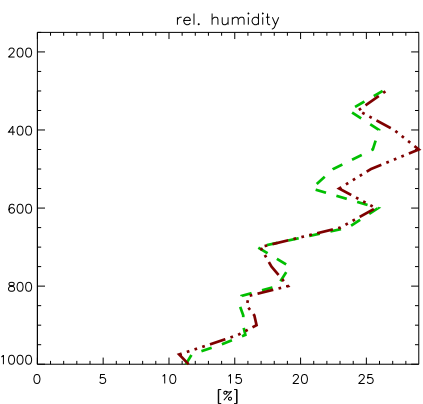
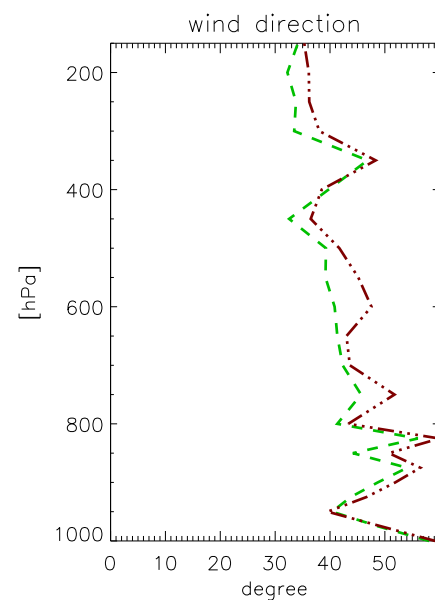
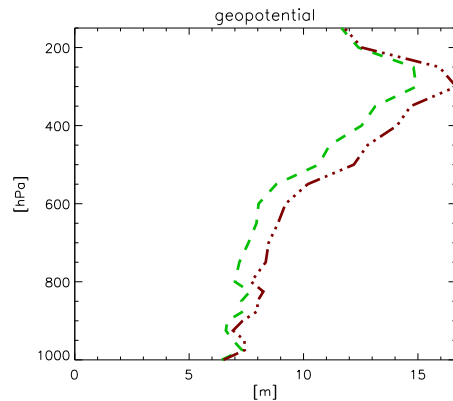
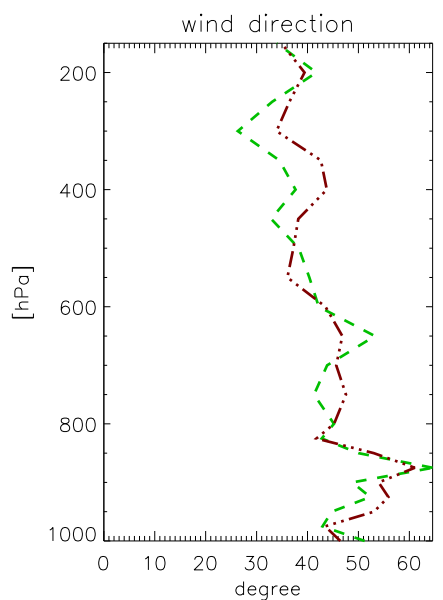
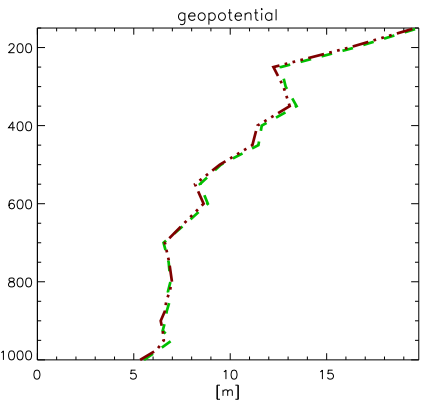
with aircraft obs:

+12h: green dashed

0-UTC LM runs

RMSE

12-UTC LM runs



Verification against 'inner-domain' TEMPs & PILOTs: 28-04-2000 00 UTC - 05-05-2000 00 UTC

without aircraft obs:

+24h: blue dotted

with aircraft obs:

+24h: yellow dot-dash-dotted

0-UTC LM runs

RMSE

12-UTC LM runs

