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# Status of BlendVar tests with conventional observations

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**DA working days, 14-16 June 2011, Budapest**

# Outline of the talk

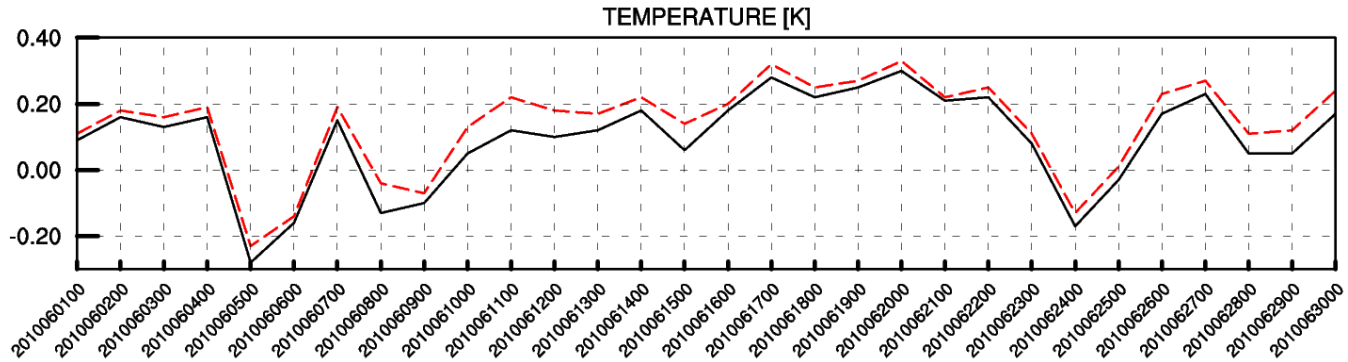
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- correction of results from last DA WD
- further evaluation for June 2010
- conclusions

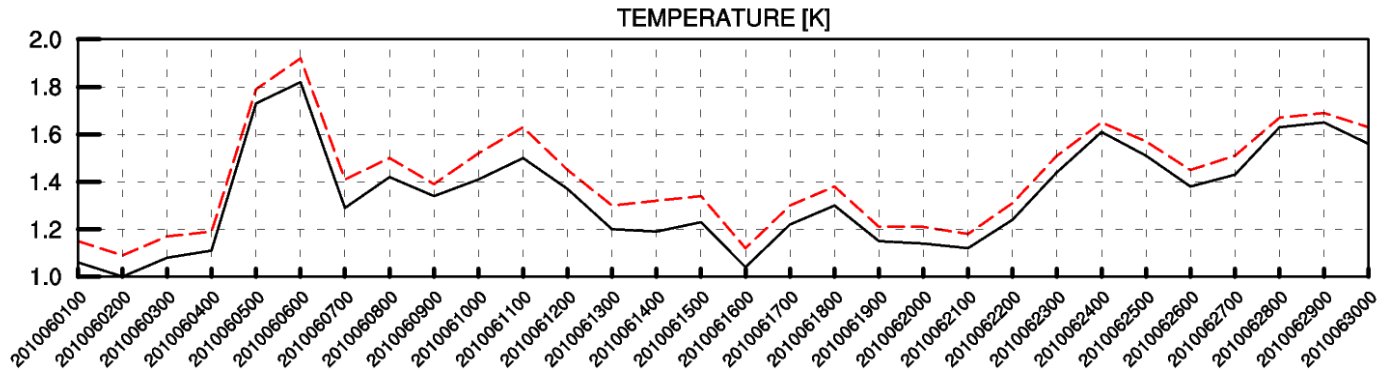
# Corrections (from last September)

- a bug identified in former results (local SYNOP observation were used in the reference experiment, while OPLACE data in BlendVar tests)

BIAS

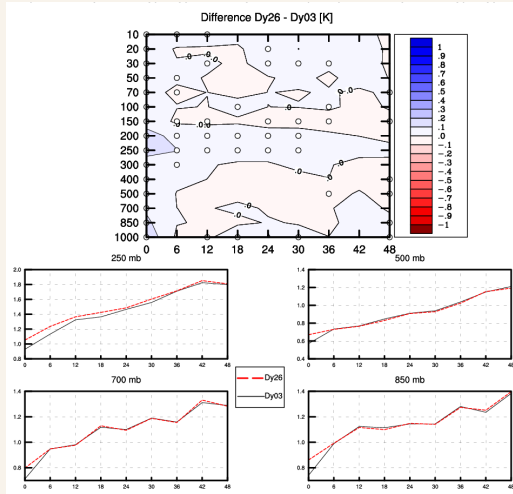


RMSE

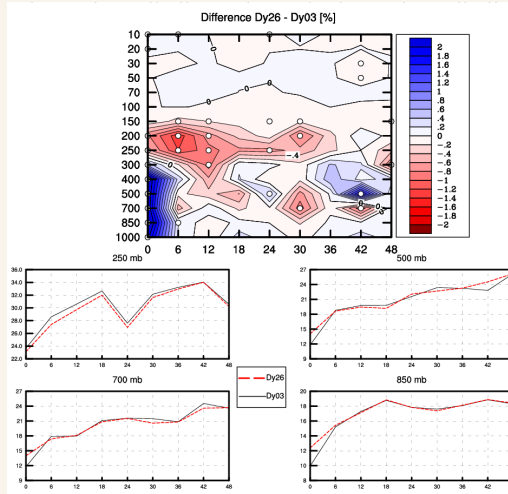


surface CANARI with OPLACE data has larger bias than with local CHMI data  
further investigation needed to understand the reasons

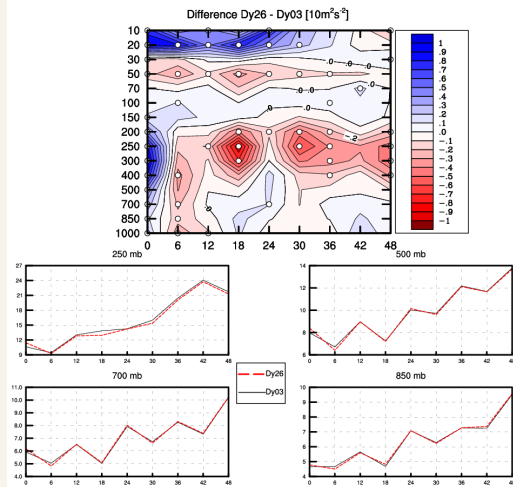
# BlendVAR - June 2010 00 UTC - against obs



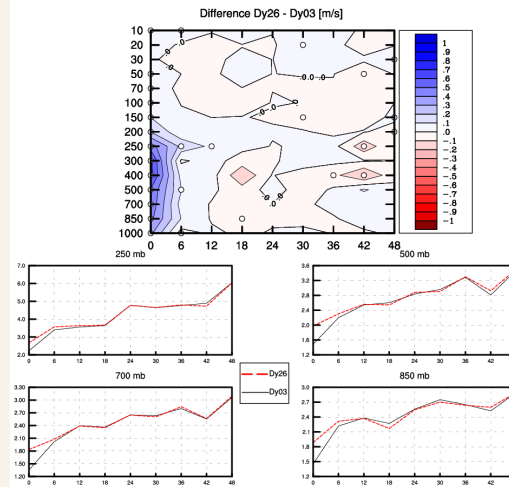
$T$  [0.1K]



$RH$  [0.2%]



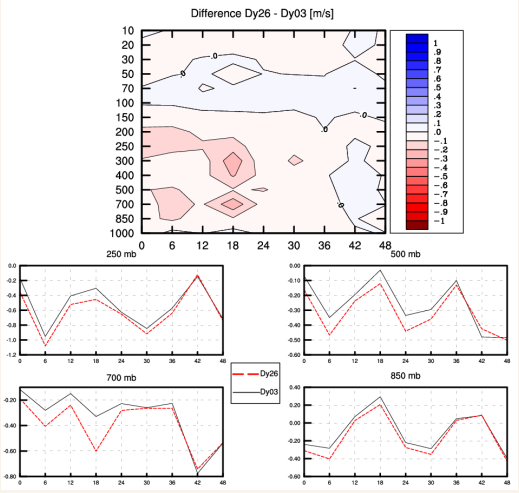
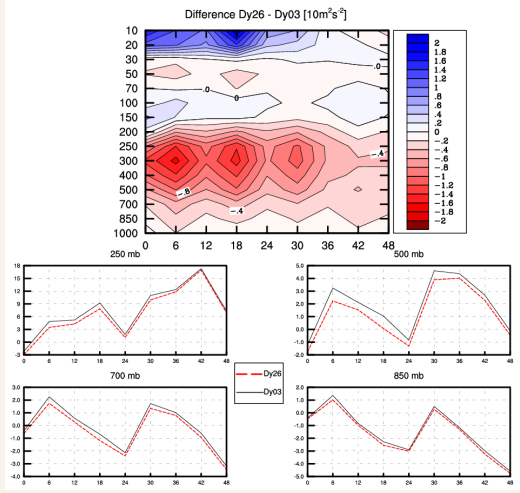
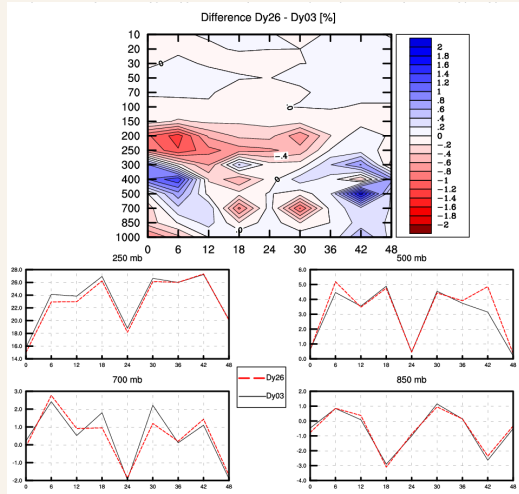
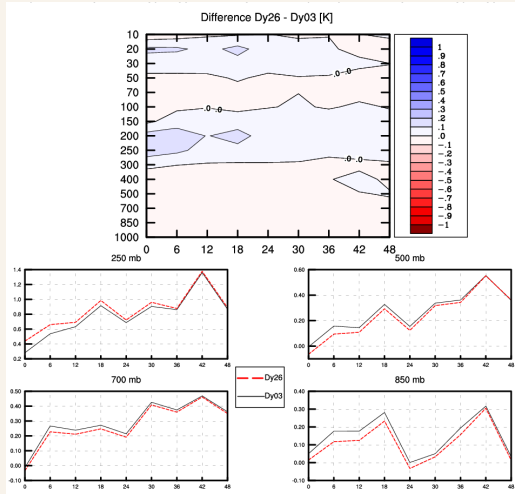
$\phi$  [0.1m]



wind [0.1m/s]

RMSE differences - blue areas denote a positive impact of BlendVar usage

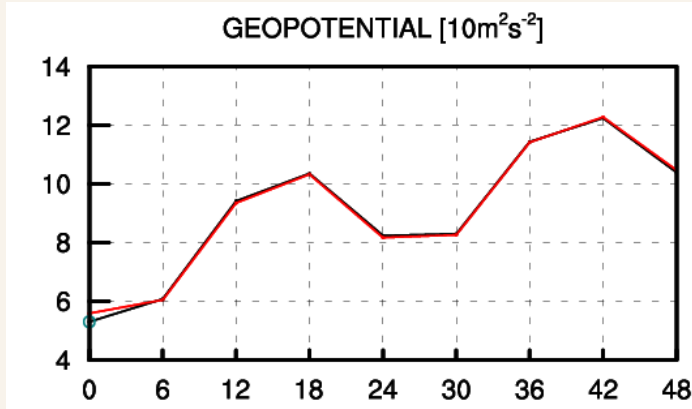
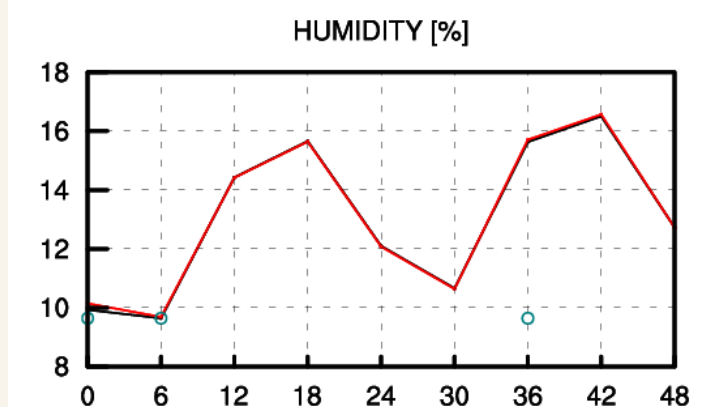
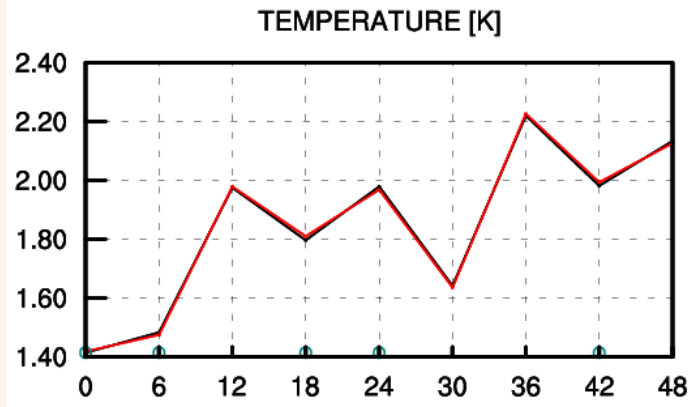
# BlendVAR - June 2010 00 UTC - against obs



**BIAS** differences - blue areas denote a positive differences of the BIAS

# BlendVAR - June 2010 00 UTC - against obs

RMSE of near surface parameters BlendVar in black and blending in red color



## Summary:

a small positive impact mainly for analysis time, noticeable is a degradation for humidity (200 hPa) and for the geopotential after +6H; neutral or very small improvement for near surface parameters

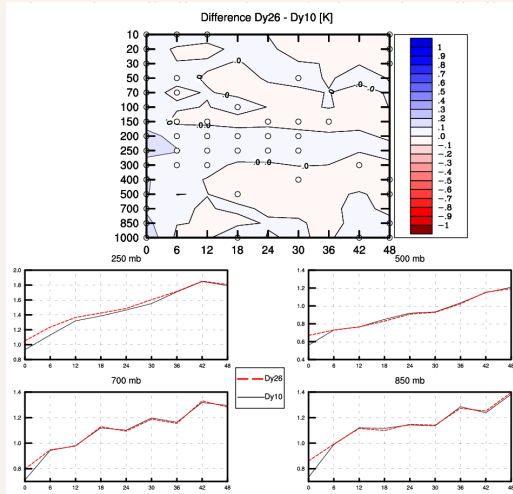
# Further tests (1/2)

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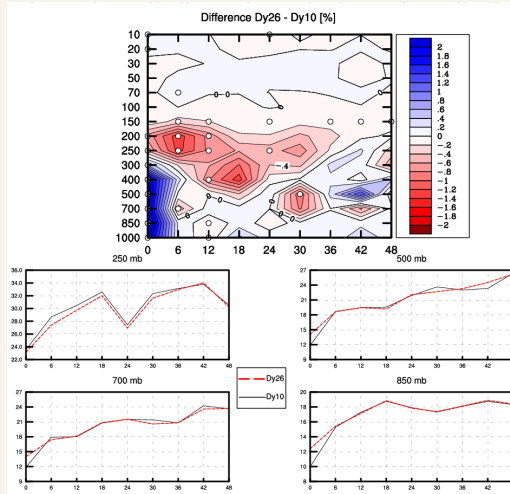
set of experiments was performed in order to investigate the results

- Y03 - BlendVar: DFI blending + 3DVAR SYNOP ( $\phi$ ) and TEMP ( $T, wind, q$ )
- Y10 - BlendVar: DFI blending + 3DVAR SYNOP ( $\phi$ ) and TEMP ( $T, wind, q, \phi$ )
- Y08 - BlendVar: DFI blending + 3DVAR SYNOP ( $\phi$ )
- Y20 - BlendVar: DFI blending + 3DVAR TEMP ( $T, wind$ )
- Y19 - BlendVar: DFI blending + 3DVAR TEMP ( $T$ )
- Y27 - BlendVar: DFI blending + 3DVAR TEMP ( $wind$ )

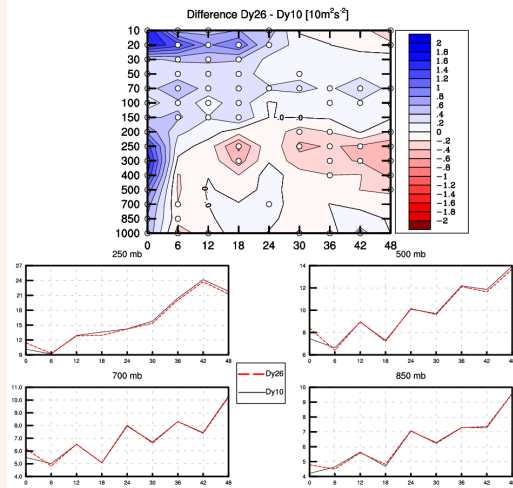
# BlendVAR - TEMP ( $\phi$ ) assimilation added



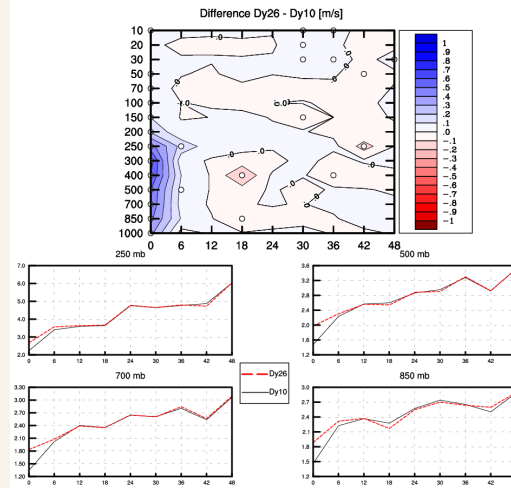
$T$  [0.1K]



$RH$  [0.2%]



$\phi$  [0.1m]

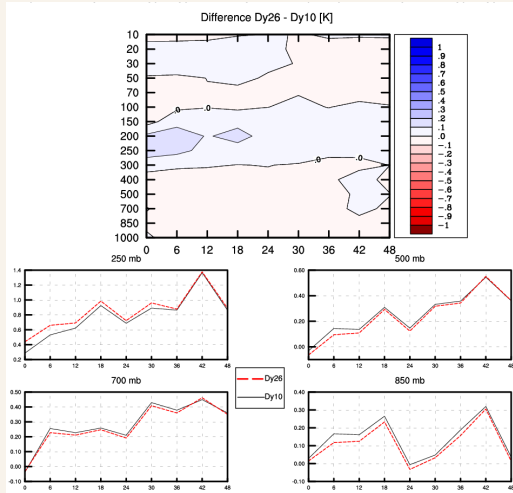


$wind$  [0.1m/s]

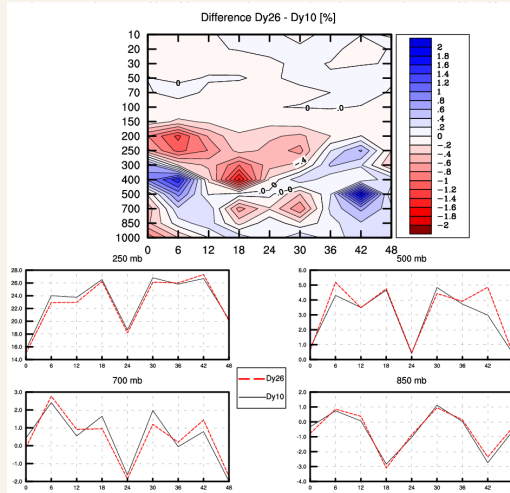
RMSE differences - blue areas denote a positive impact of BlendVar usage



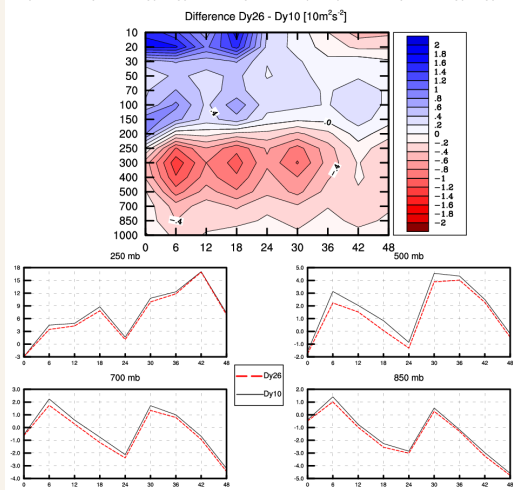
# BlendVAR - TEMP ( $\phi$ ) assimilation added



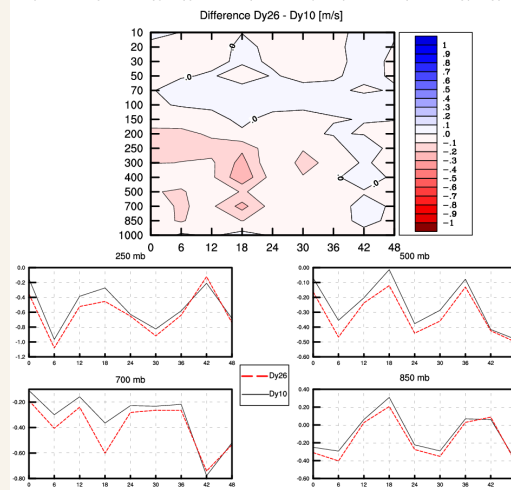
$T$  [0.1K]



$RH$  [0.2%]



$\phi$  [0.2 $m$ ]



wind [0.1m/s]

**BIAS** differences - blue areas denote a positive differences of the BIAS

## Further tests (2/2)

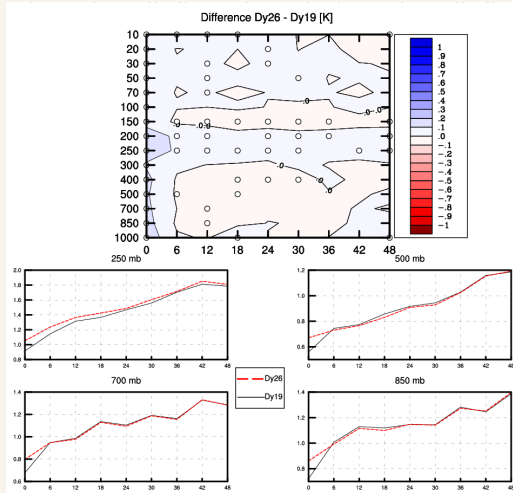
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set of experiments was performed in order to investigate the results

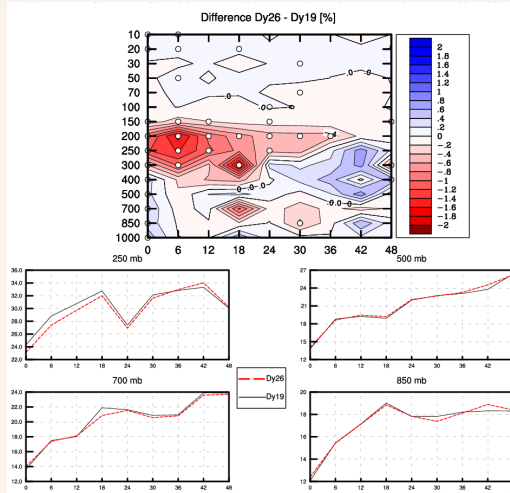
- Y03 - BlendVar: DFI blending + 3DVAR SYNOP ( $\phi$ ) and TEMP ( $T, wind, q$ )
- Y10 - BlendVar: DFI blending + 3DVAR SYNOP ( $\phi$ ) and TEMP ( $T, wind, q, \phi$ )
- Y08 - BlendVar: DFI blending + 3DVAR SYNOP ( $\phi$ )
- Y20 - BlendVar: DFI blending + 3DVAR TEMP ( $T, wind$ )
- Y19 - BlendVar: DFI blending + 3DVAR TEMP ( $T$ )
- Y27 - BlendVar: DFI blending + 3DVAR TEMP ( $wind$ )

# BlendVAR - TEMP ( $T$ ) assimilated only

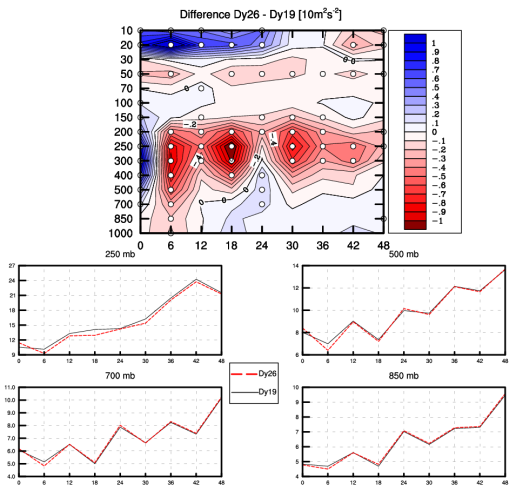
$T$  [0.1K]



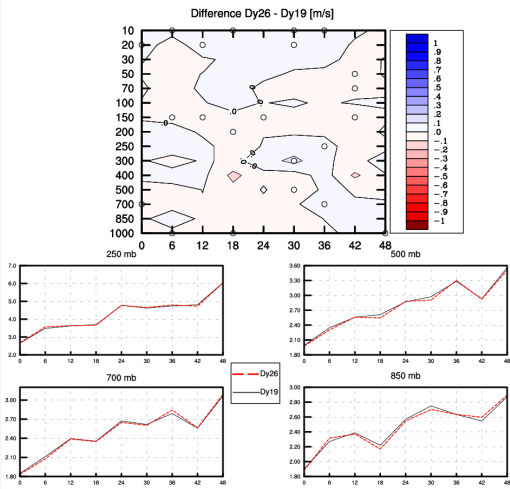
$RH$  [0.2%]



$\phi$  [0.1m]

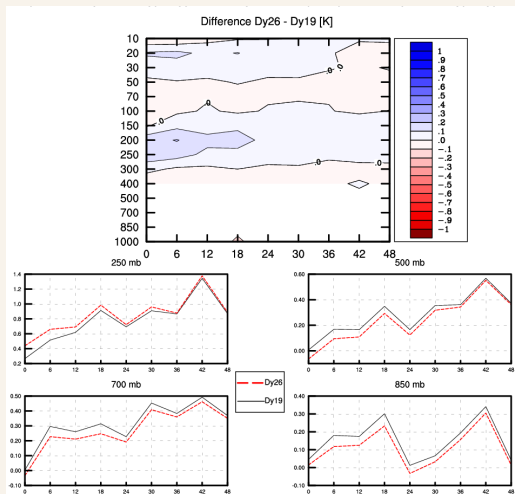


wind [0.1m/s]

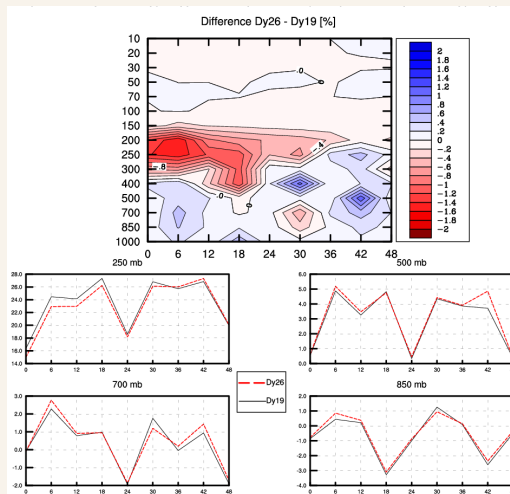


RMSE differences - blue areas denote a positive impact of BlendVar usage

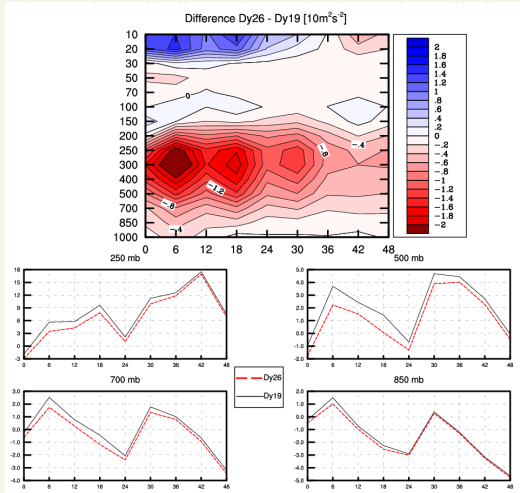
# BlendVAR - TEMP ( $T$ ) assimilated only



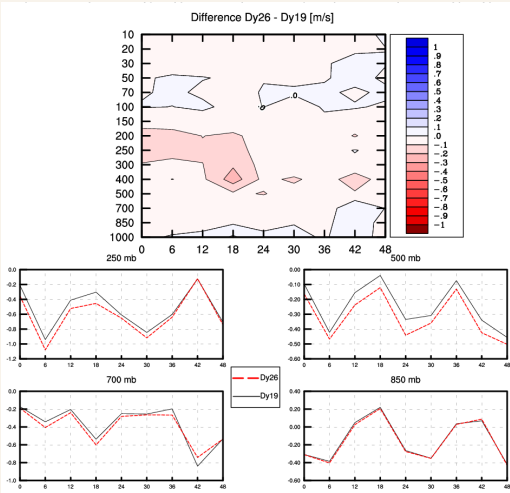
$T$  [0.1K]



$RH$  [0.2%]



$\phi$  [0.2m]



wind [0.1m/s]

**BIAS** differences - blue areas denote a positive differences of the BIAS

# Conclusions

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The results of BlendVar with conventional data assimilated showed a small positive impact mainly for analysis time, but a degradation of humidity (200 hPa) and mainly of geopotential after +6H till +48 needs to be better understood

Any hint is more than welcome :-)

# The End

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**Thank You for Your attention.**

# Further slides

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# Metodology

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- analysis method, so called **BlendVar** configuration, based on Široká (2001) consists of adding 3DVAR analysis after upper-air blending procedure
- usage of observation "step by step"
  - **SYNOP & TEMP**
  - + AMDAR
  - + SEVIRI
  - + ATOVS
  - ...
- to mimic operational use both long cut-off analysis and short cut-off analysis were kept in experiments
- evaluation comprises
  - the objective scores evaluated by VERAL (BIAS, RMSE, STDE) computed from differences between the forecast and observation (SYNOP and TEMP)
  - the significance tests described in Fisher (2001) of RMSE differences



# Reference experiment

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based on ALADIN/CE operational setting - **blending** configuration

- cycle 35t1lentch
- 9km horizontal resolution and 43 vertical levels
- linear truncation E159x143, mean orography
- former LACE domain (309x277 grid points)
- 3h coupling interval, time step 360 s
- surface analysis (performed before upper-air one) is provided by:
  - SST taken from ARPEGE analysis
  - CANARI surface analysis based on SYNOP reports (T2m & RH2m) for land
  - any other land soil variables which are not analyzed (like snow) are initialized from the ALADIN guess with the relaxation to the climatology as implemented within the CANARI configuration
- upper air analysis is provided:
  - by the digital filter spectral blending, long cut-off 6h cycle (filtering at truncation E55x61, no DFI in the next +6h guess integration)
  - digital filter spectral blending + incremental DFI initialization of short cut-off production analysis

# BlendVAR

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consists of adding 3DVAR just after the digital spectral blending - all analysis steps are sequential: surface analysis-blending-3DVAR

- B matrix was computed following the lagged NMC method (from period of October - December 2006)
- REDNMC=1

observation assimilated (data from OPLACE only):

- SYNOP surface reports (geopotential)
- TEMP upper air reports (temperature, wind components, specific humidity)