Data assimilation activities at CHMI

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Progress summary since last DAWD

- **Optimization** of **aircraft data assimilation** and implementation of Czech Mode-S MRAR data.

- **Migration** from Traditional Alphanumeric Codes (TAC) to the Table Driven Code Forms such as BUFR (TAC2BUFR) has been tackled for SYNOP.

- Various **VarBC initialization** methods were evaluated and new approach proposed to harmonize a bias correction considering daily-mean contributions of a NWP model bias, Mile and Benáček (2016) - **Patrik's talk**.

- **Background covariances for BlendVar system** were investigated and new climatological covariance matrix was proposed that forces 3D-Var to act mainly at smaller scales, see Bučánek and Brožková (2017) - **Antonin's talk**.

Operational ALARO BlendVar

- **BlendVar** upper air analysis

  - **Digital Filter spectral blending (filtering at truncation E87x69) followed by 3D-Var assimilating SYNOP, TEMP, AMDAR, AMV, SEVIRI, Mode-S MRAR CZ**

  - **6h cycle, no DFI in the next +6h assim guess**

  - **space consistent coupling**

  - **incremental DFI initialization of short cut-off production analysis**

- **OI surface** analysis based on SYNOP (T2m, RH2m)

- **Operational setup:**

  - **ALADIN cycle 38t1tr_op6 (ALARO-1)**

  - **domain (dx 4.7km, 529x421 grid points, linear truncation E269x215)**

  - **87 vertical levels, mean orography**

  - **time step 180 s**

  - **3h coupling interval**

  - **00, 06, 12 and 18 UTC forecast to +72/+54h**
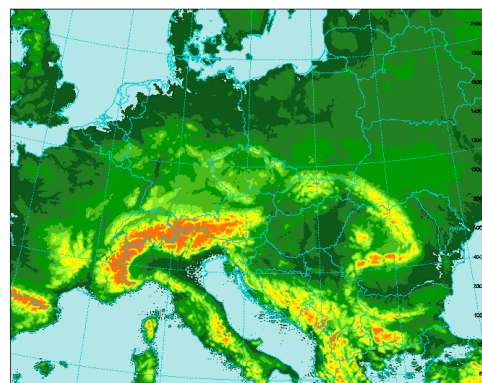
Aircraft data assimilation

- **Optimization of aircraft (AMDAR & Mode-S) data usage**, Benáček (2016)

    - **added Czech Mode-S MRAR data**

    - **reduced horizontal thinning (RFIND_AIREP=25000.)**

    - **increased vertical thinning (RAIREPTHIN=1500., RAIREPPCENTTHIN=0.05)**

    - **increased observation errors (SIGMAO_COEF(2)=2.8)**

- **Parallel suite AKJ** (11 May - 20 June 2017) **since June 2017**

Difference DLAD - ALAD [K]
a) temperature [K]
RMSE
Difference DLAD - ALAD [m/s]
b) wind speed [m/s]
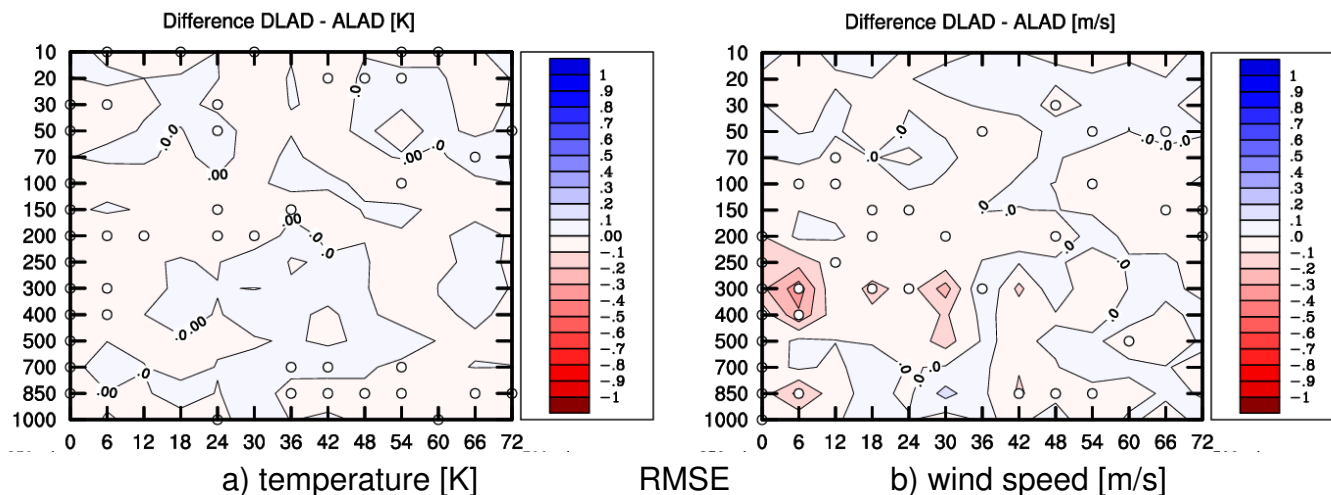
- **Slight positive impact in the first hours of NWP forecast.**

Aircraft data assimilation

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- **Case study** for 2 March 2016 12UTC 6h precipitation forecast for lead time of +6h

REF   EXP   observations

TAC2BUFR migration
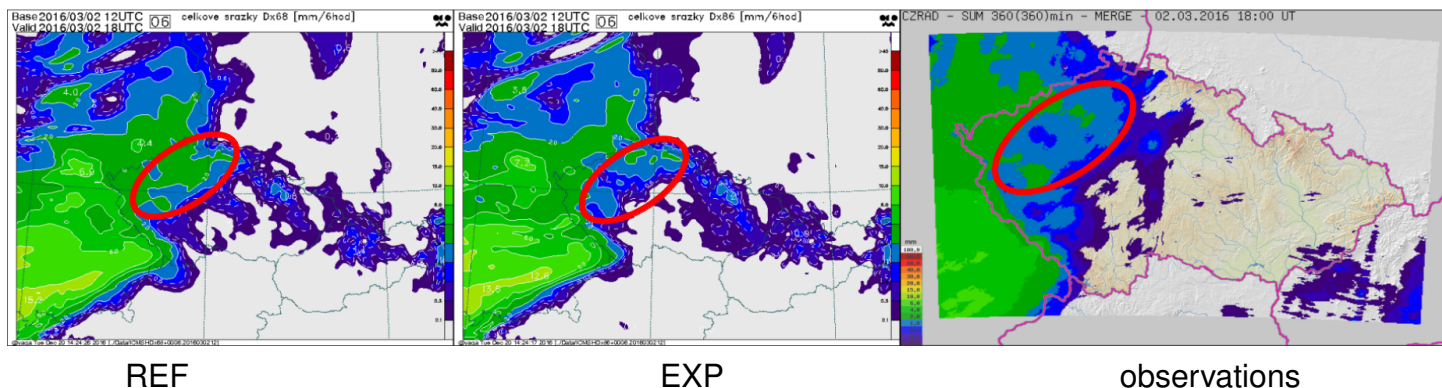
- **BATOR extended for decoding of the WMO AMDAR BUFR** template 311010 v7
    - template of GTS AMDAR data (IUA*EGRR)
    - src on beaufix:trojakova/pack/cy40t1_bf05_amdar_bator.01.IMPI500IFC1310.2x.pack
    - for more details see Monteiro (2017)

- **BUFR SYNOP** handling by BATOR
    - most of European SYNOPs is correctly handled
    - BATOR extended for Tmin,Tmax

- **Remaining issues**
    - station type coding
    - "light and variable" wind
    - geopotential for stations above 500m
    - detailed validations still ongoing !
    - handling of TAC data (Bulgaria,...)
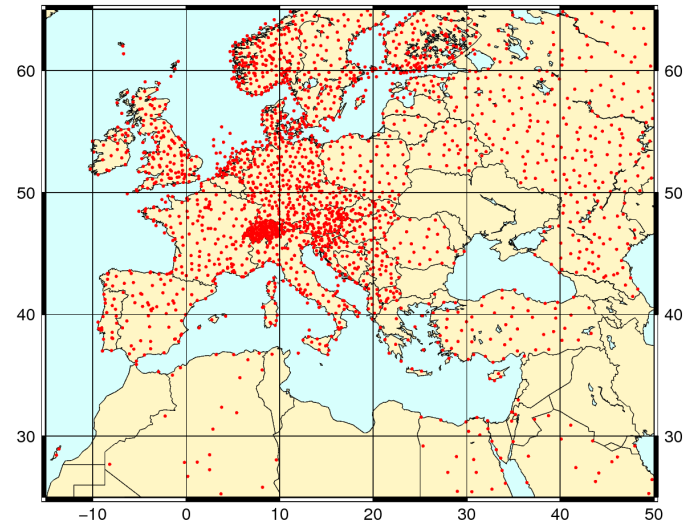
New HPC

- **slow down of development due to porting activities**
- **new HPC**
  - NEC LXC3 series HPC cluster
  - 320 computing nodes connected through high-speed Mellanox EDR InfiniBand
  - node consists of two **Intel Broadwell** CPU (12 cores, 64GB RAM)
  - HPC peak performance is 270.3 teraflops
  - OS CentosOS 7.2 Linux OS
  - more than 1 Petabyte of storage capacity
  - 64 nodes (phase A) already delivered complete installation in early 2018

End

Thank you for your attention !

References

P. Benáček. Tuning of 3DVAR ALADIN-CZ system for aircraft data assimilation. Technical report, CHMI, 2016. http://www.rclace.eu/File/Data_Assimilation/2016/rep_Patrik_ModeS.pdf.

Antonín Bučánek and Radmila Brožková. Background error covariances for a BlendVar assimilation system. *Tellus A Dyn. Meteorol. Oceanogr.*, 69(1):1355718, jan 2017. ISSN 1600-0870. doi: 10.1080/16000870.2017.1355718. URL https://www.tandfonline.com/doi/full/10.1080/16000870.2017.1355718.

M. Mile and P. Benáček. Comparison of different VARBC initialization approaches. Technical report, RC LACE, 2016. http://www.rclace.eu/File/Data_Assimilation/2016/report_varbc_init_final.pdf.

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