Regional Cooperation for
Limited Area Modeling in Central Europe

LACE
nwp central europe

Status of data assimilation in Slovenia - 2017

Benedikt Strajnar

DHMZ   SHMÚ   ARSO METEO Slovenia   OMSZ   ZAMG   ROMANIA ANM

Outline

- Overview of operational suite
  - Upgrade to cy40
- Implementation and test of additional observations
- GPS data assimilation
- 2-way ocean-atmosphere coupling
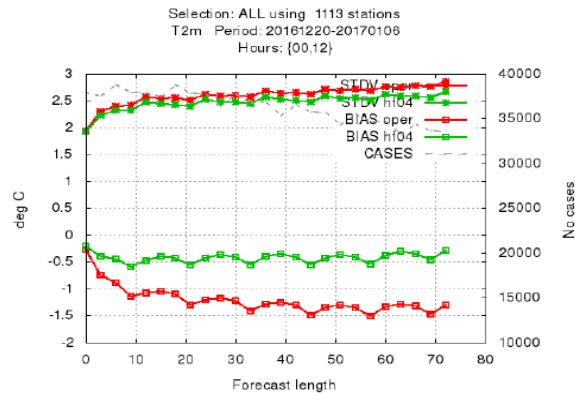- Conclusions & plans

Operational suite

▸ ALARO-v1B cy40t1

▸ 4.4 km, 87 levels

▸ 3h 3D-Var + Canari

▸ 8 runs per day (72/36h)

▸ Observations

  ▸ Conventional + Mode-S

  ▸ Sat.: Seviri, NOAA 19, Metop A,B

▸ New B matrix based on cy40

▸ Upgrade of HPC
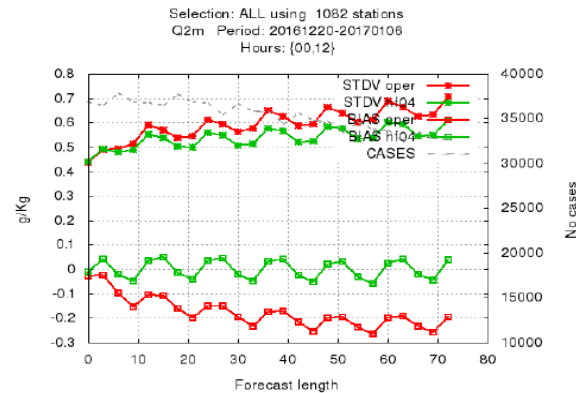
  ▸ 11 nodes (380CPUs)

  ▸ 2TB RAM, 500 TB disk
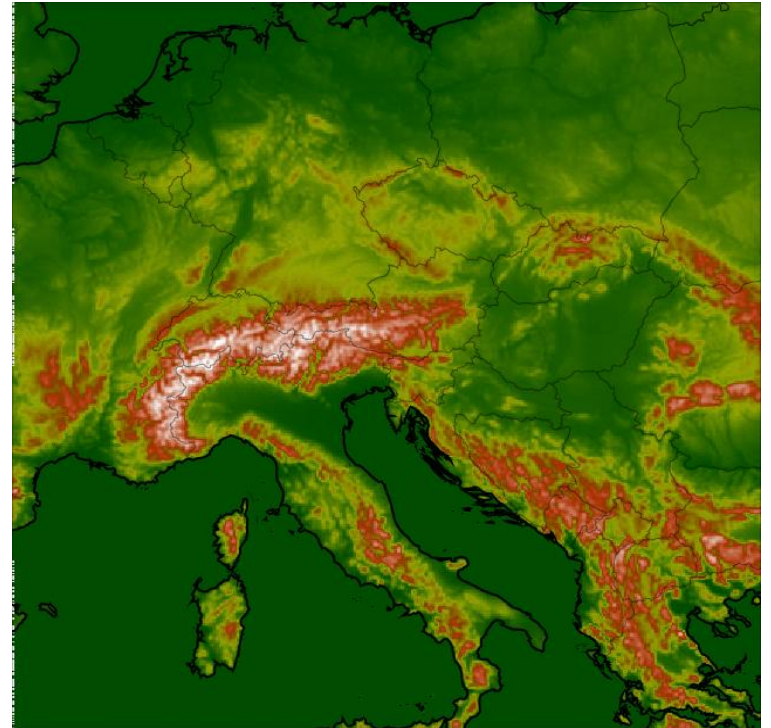
Upgrade from cy38 to cy40

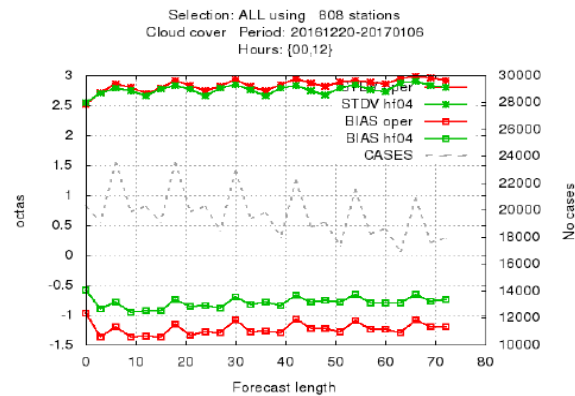▸ Major improvements of surface scores, small upper-air impact except cloud cover

temperature
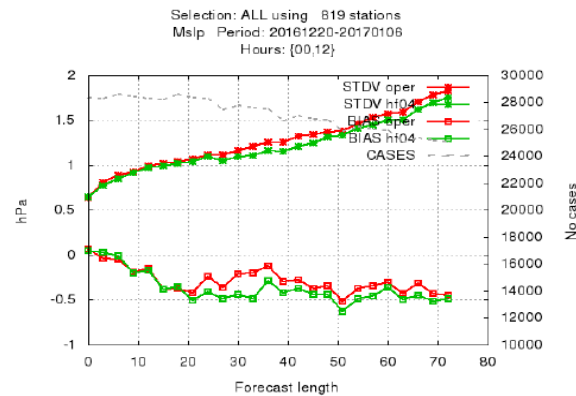
humidity

cloud cover

pressure

Additional upper-air observations- OSEs

▸ New observations implemented

  ▸ Ascat ocean winds

  ▸ Hrwind atmospheric motion vectors

  ▸ Wind profilers

  ▸ AMDAR humidity observations

  ▸ Mode-S EHS

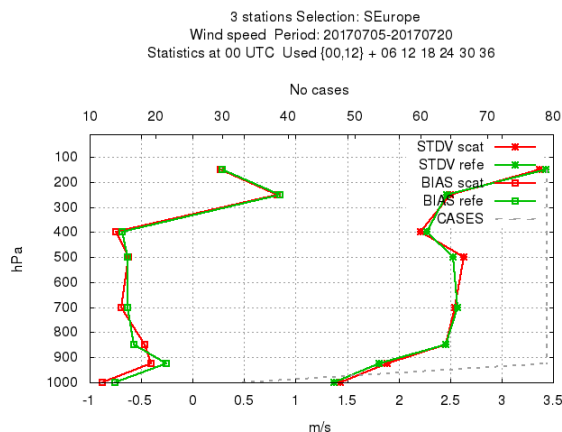▸ 15 day observation impact experiments (June 2017)

Ascat ocean winds

- ▶ 12.5 km „coastal" product
- ▶ Imapct on scores (S Europe)
  - ▶ SYNOP: neutral impact
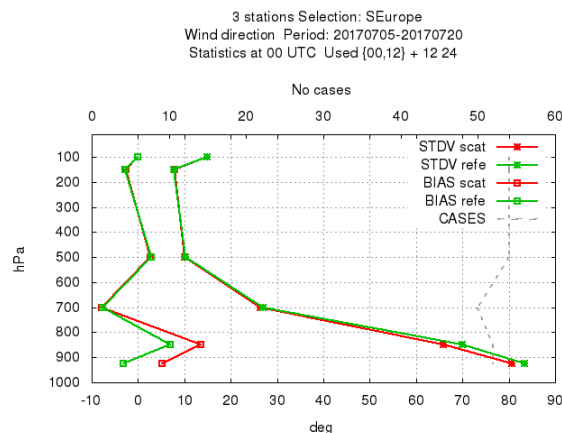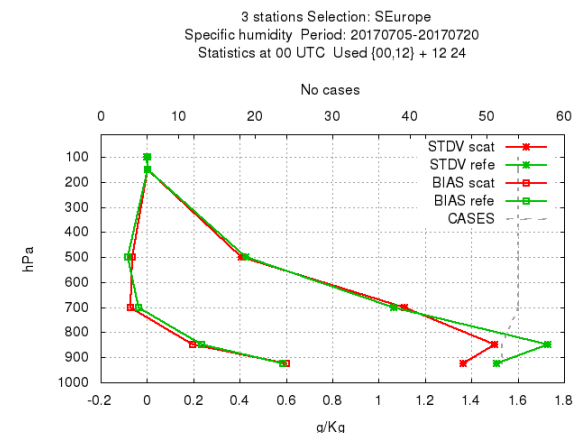 - ▶ TEMP: slightly positive temperature and humidity, mixed wind
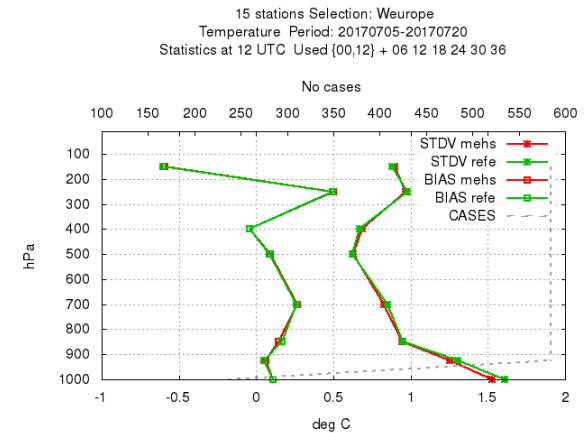

Temperature
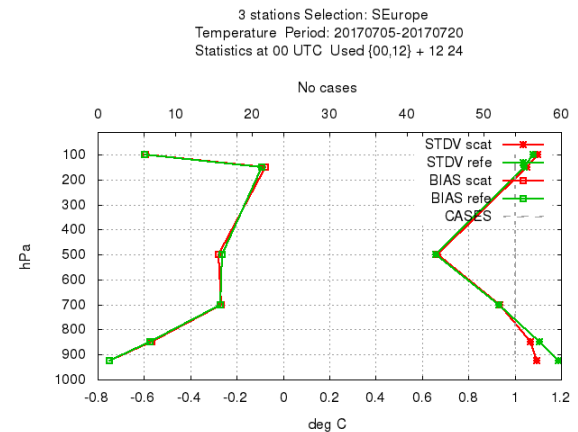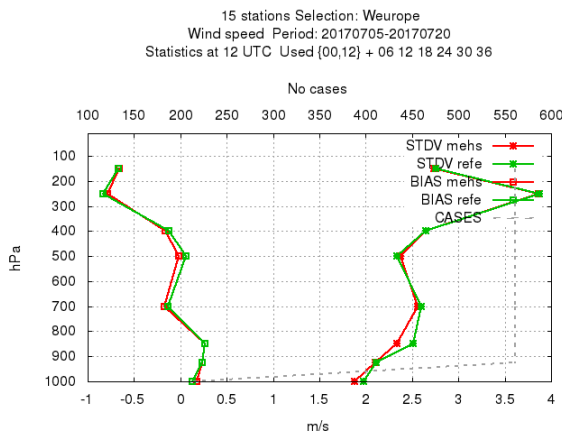

Wind speed

Wind direction

Specific humidity

Mode-S EHS

▶ Using all data (25 km thinning)

▶ Imapct on scores (W Europe)

  ▶ SYNOP: neutral impct

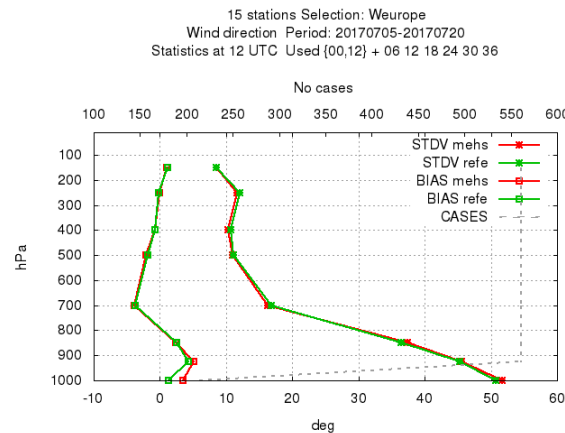 ▶ TEMP: slight improvement in
    wind speed and temperature

Temperature
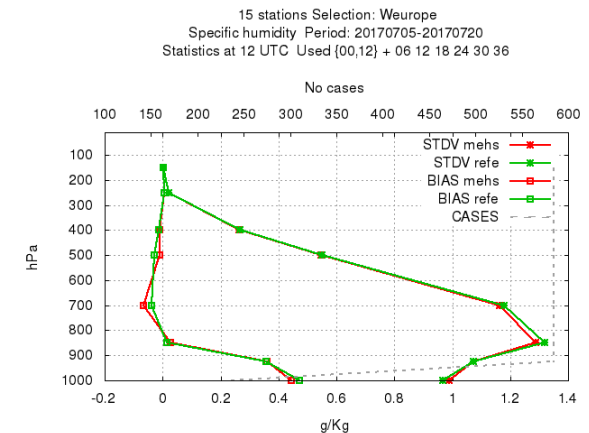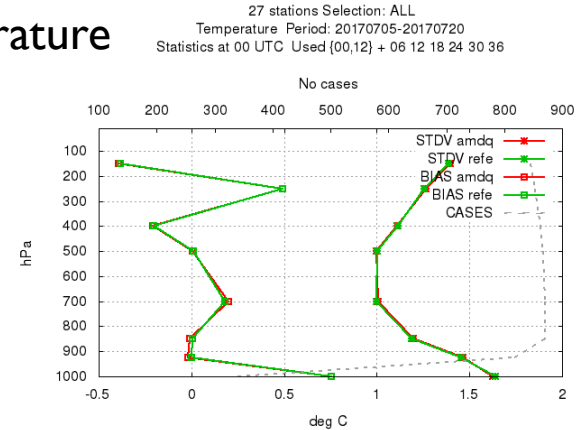

Wind speed

Wind direction

Specific humidity
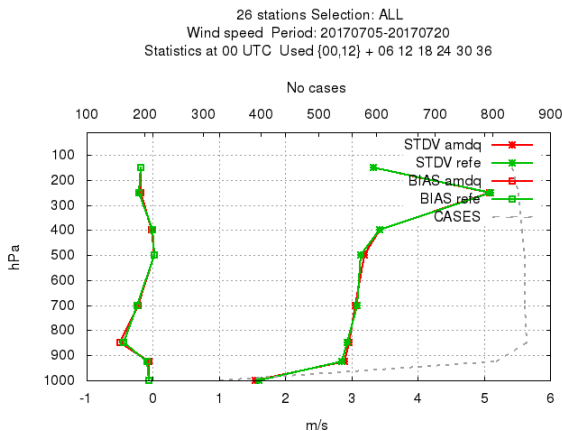
AMDAR humidity

▸ Impact on scores

  ▸ SYNOP: neutral impact

  ▸ TEMP: slight degradation for humidity
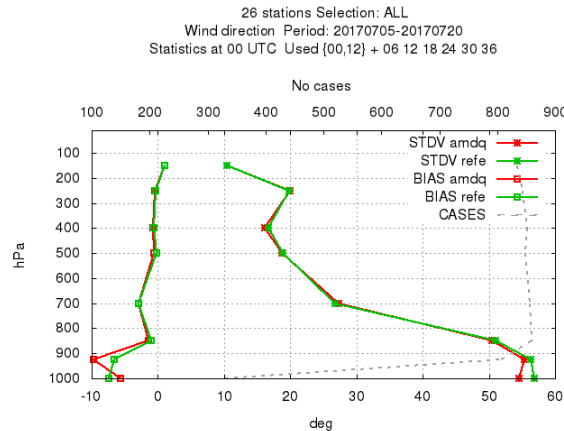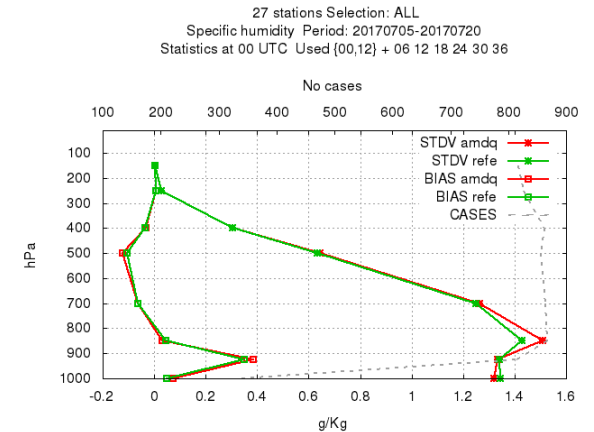
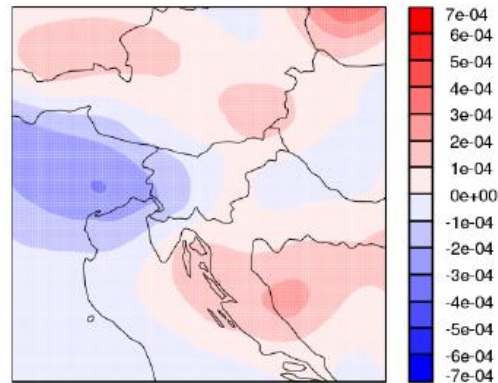Temperature

Wind speed

Wind direction
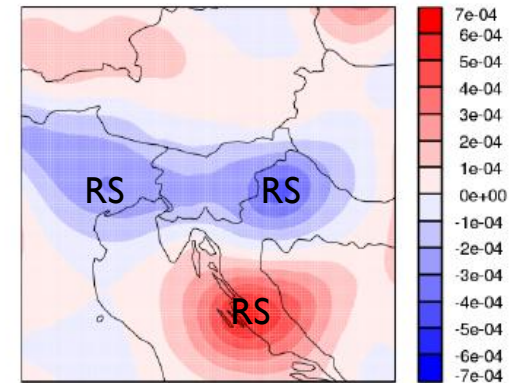

Specific humidity

Assimilation of local GPS data

- Local GPS data provides reasonable upper-air scores
- However, a degradation of surface bias persists
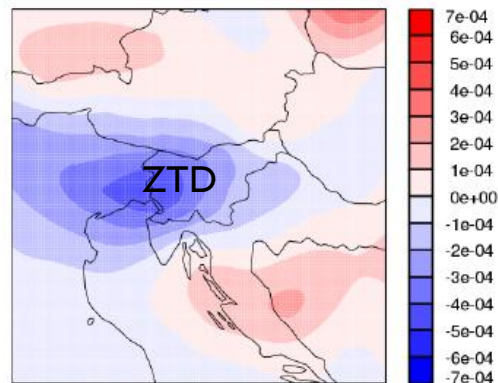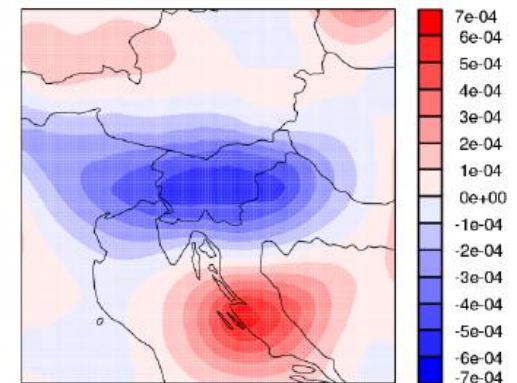
Model level 50/87

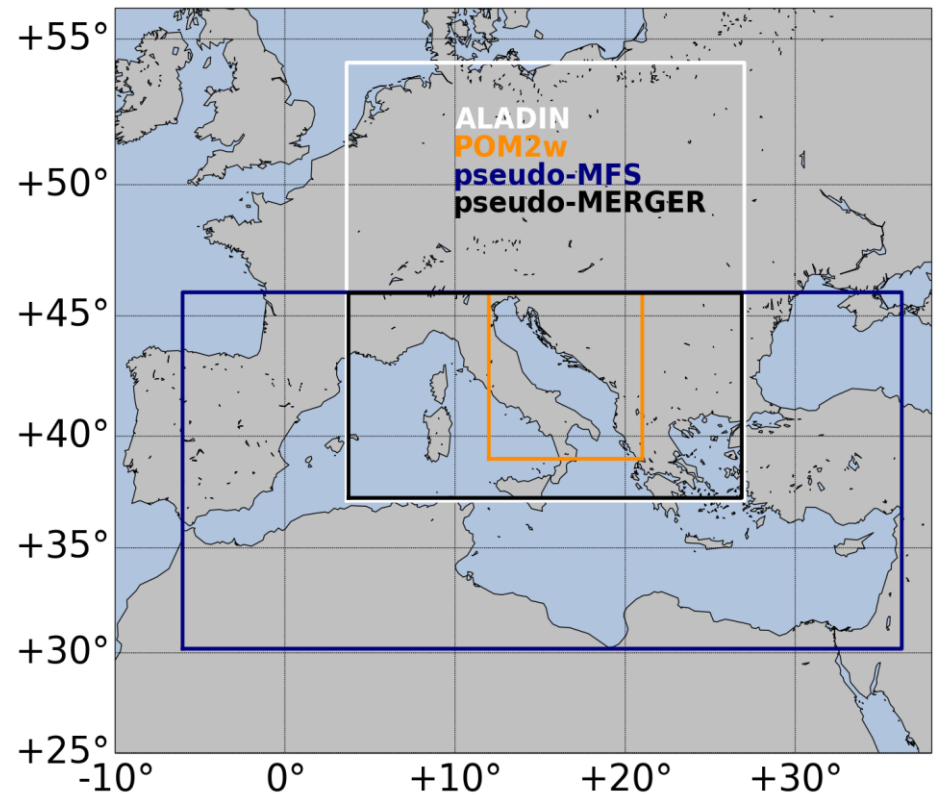Synop,SAT,AMDAR

Synop,SAT,AMDAR + sonde

Synop,SAT,AMDAR + GPS

Synop,SAT,AMDAR + sonde + GPS

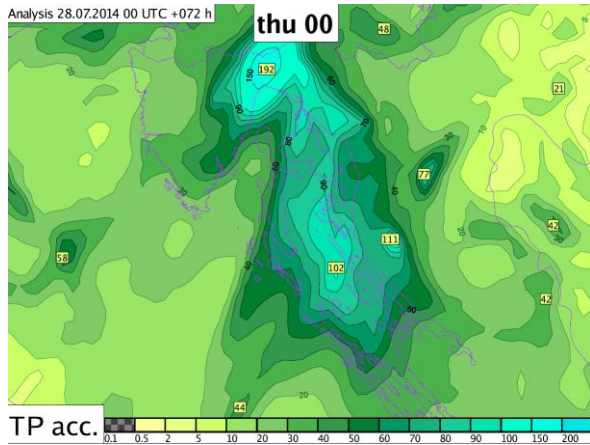# Ocean-atmosphere coupling - impact on precipitation

▸ Coupling of ALADIN, POM (Adriatic) and MFS (outside Adriatic)

▸ Sensitivity of precipitation forecast over Adratic on SST and coupling evaluated in 6 setups

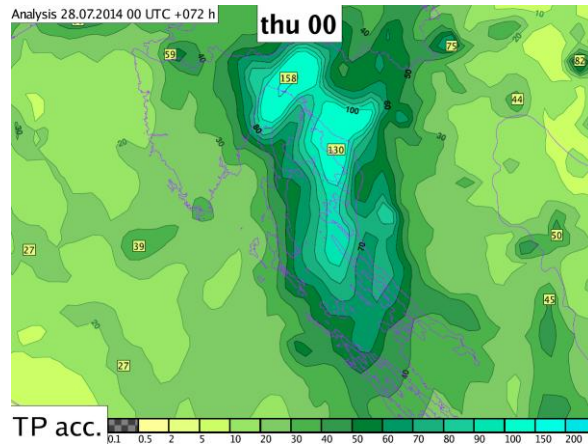▸ Most impact found in the case of slow, smaller scale systems
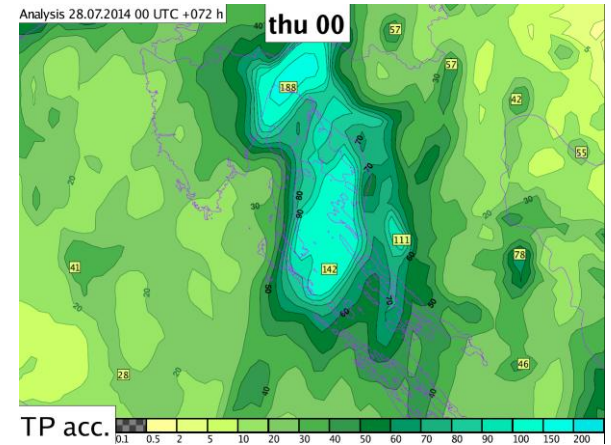
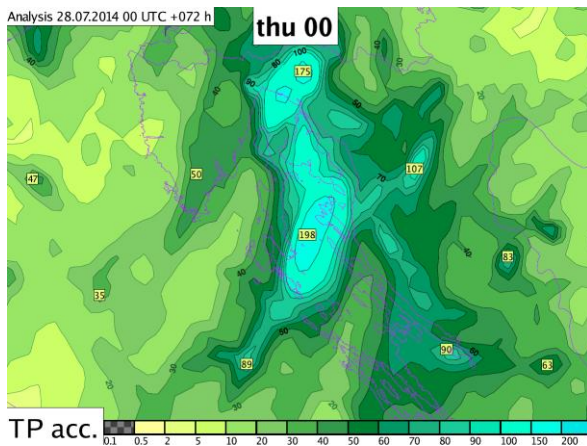# Ocean-atmosphere coupling - impact on precipitation

OPER SST

MFS SST

POM+MFS SST

Coupled prod

Coupled assim

Coupled assim + prod

ARSO METEO Slovenia

ZAMG

ROMANIA ANM
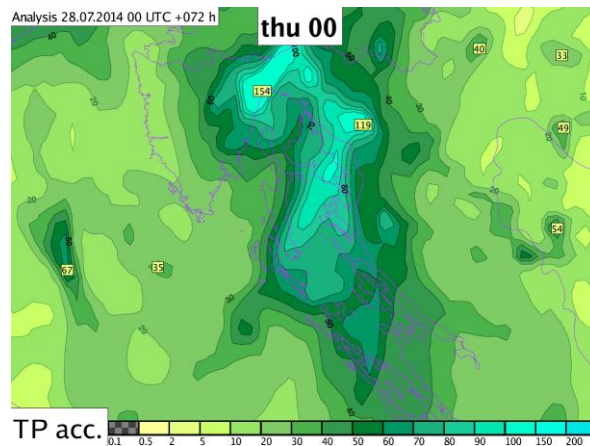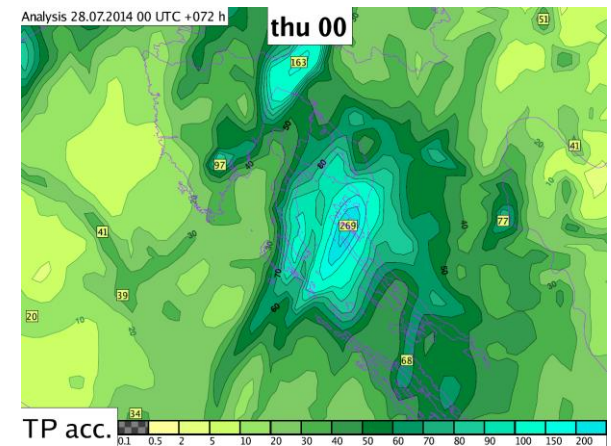
New local observations – delays in cell phone

▸ Data for a few cases to estimate potential for nowcasting and NWP

Nem jeleníthető meg a kép. Lehet, hogy nincs elegendő memória a megnyitásához, de az sem kizárt, hogy sérült a kép. Indítsa újra a számítógépet, és nyissa meg újból a fájlt. Ha továbbra is a piros x ikon jelenik meg, törölje a képet, és szúrja be ismét.

Conclusions & Plans for 2017/18

▸ Ready to use more observations after specific validation (Mode-S EHS and Ascat first).
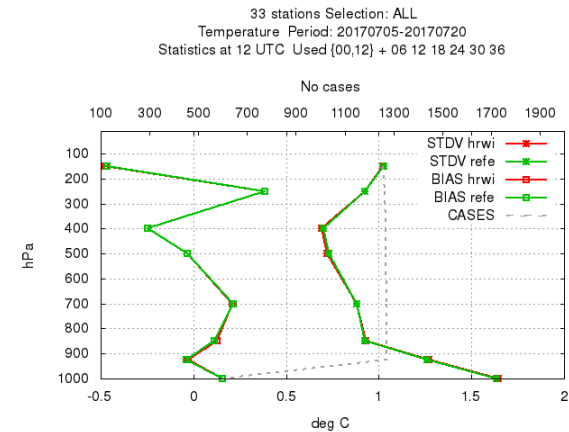
▸ Increase manpower on radar assimilation.

▸ Tests with other observations.

▸ Runs with DA at higher resolution, sub-km experiments for nowcasting.
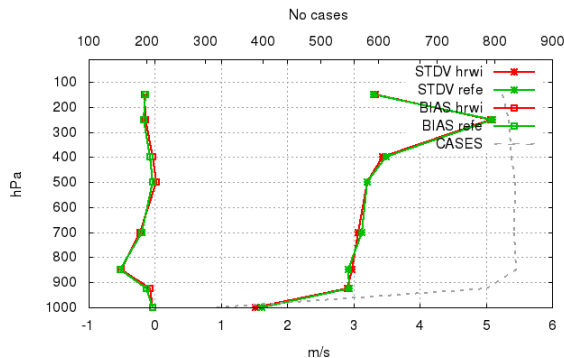
High resolution winds

- ▸ Verified over the whole domain
  - ▸ SYNOP: neutral impact
  - ▸ TEMP: neutral impact

Temperature

33 stations Selection: ALL
Temperature Period: 20170705-20170720
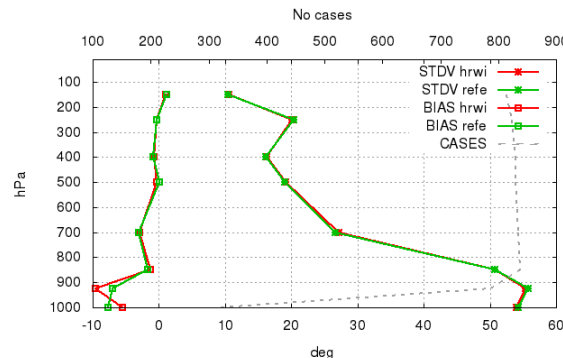Statistics at 12 UTC Used {00,12} + 06 12 18 24 30 36

Wind speed

26 stations Selection: ALL
Wind speed Period: 20170705-20170720
Statistics at 00 UTC Used {00,12} + 06 12 18 24 30 36
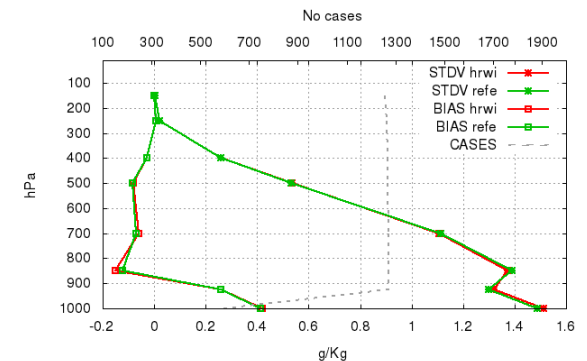

Wind direction

26 stations Selection: ALL
Wind direction Period: 20170705-20170720
Statistics at 00 UTC Used {00,12} + 06 12 18 24 30 36

Specific humidity

33 stations Selection: ALL
Specific humidity Period: 20170705-20170720
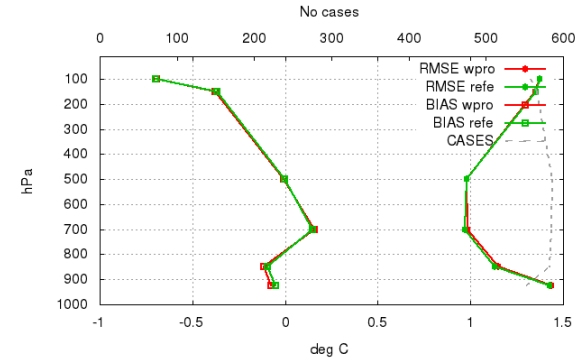Statistics at 12 UTC Used {00,12} + 06 12 18 24 30 36

Wind profilers

- ▶ Imapct on scores
  - ▶ SYNOP: neutral impact
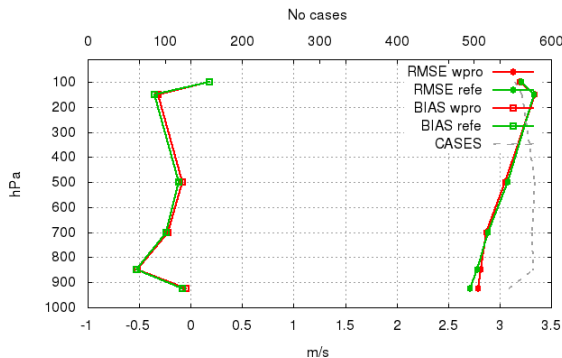 - ▶ TEMP: rather neutral to slight degradation

Temperature

27 stations Selection: ALL
Temperature Period: 20170705-20170720
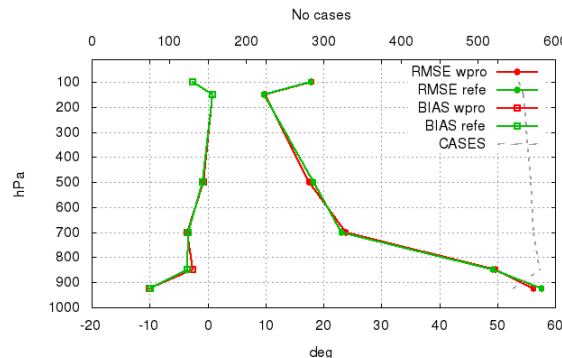Statistics at 00 UTC Used {00,12} + 06 12 18 24 30

Wind speed

26 stations Selection: ALL
Wind speed Period: 20170705-20170720
Statistics at 00 UTC Used {00,12} + 06 12 18 24 30

Wind direction

26 stations Selection: ALL
Wind direction Period: 20170705-20170720
Statistics at 00 UTC Used {00,12} + 06 12 18 24 30

Specific humidity

27 stations Selection: ALL
Specific humidity Period: 20170705-20170720
Statistics at 00 UTC Used {00,12} + 06 12 18 24 30