NWP Related Activities in TURKEY

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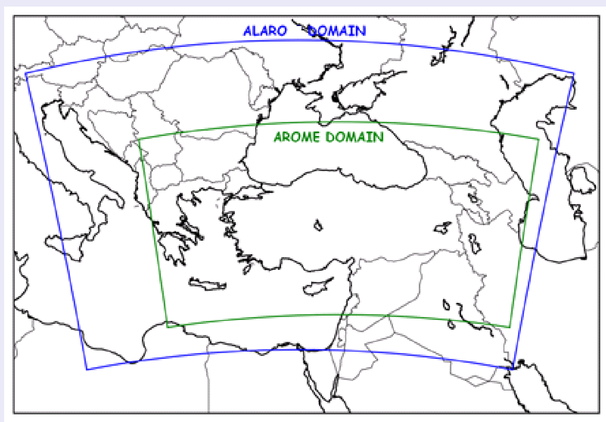
Operational Configurations

ALARO-TURKEY

Current operational suite:
Model version: cy40T1bf7

Model geometry:
- 4.5 km horizontal resolution
- 450 X 720 grid points
- 60 vertical model levels
- Linear spectral truncation
- Lambert projection

Forecast settings
- Digital filter initialization
- 180 sec time-step
- Hourly post-processing
- 4 runs per day at 00, 06, 12 UTC (up to t+72) and 18 UTC (up to t+60).
- Coupling with ARPEGE LBC files at every 3 hours



AROME-TURKEY

Current operational suite:
Model version: cy41t1

Model Geometry:
- 1.7 km horizontal resolution
- 629 X 1589 grid points
- 60 vertical model levels
- Linear spectral truncation
- Lambert projection

Forecast settings
- Digital filter initialization
- 60 sec time-step
- Hourly post-processing
- 4 run per day at 00,06,12,18 UTC up to 48 hourly forecast
- Hourly coupling with ALARO1

PARALLEL SUITE

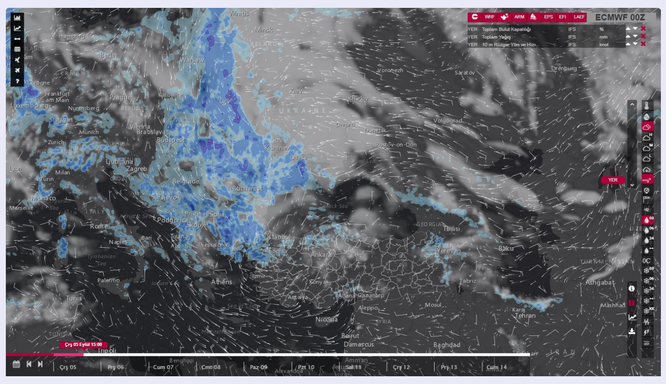
ALARO-TURKEY (+3DVar) Model version: cy40t1bf7

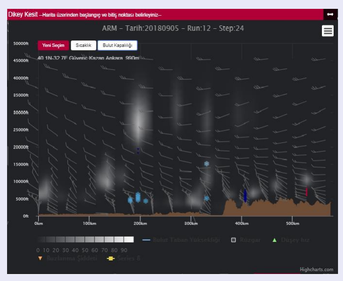
Model Geometry : Same as operational
Forecast settings: Same as operational
Assimilation settings:
- 6 hour assimilation cycle
- 3DVar + Canari OI Main
- Ensemble B matrix
- Digital filter initialization
- Coupling with ECMWF& ARPEGE LBC coupling at every 3 hours

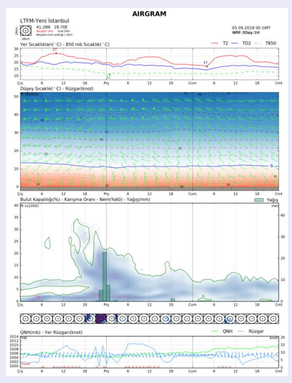
Observation usage:
- Synop/Ship GTS + Local AWS (T, Rh, Z)
- Temp (T, u, v, q)
- Amdar (T, u, v) 1 hour time-window
- MSG(Seviri)
- NOAA18-19/MetopA/ MetopB (AmsuA-AmsuB/MHS) Radiance
- AMV (u,v)

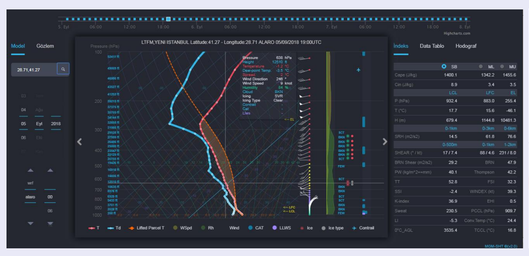
Interactive Web Pages

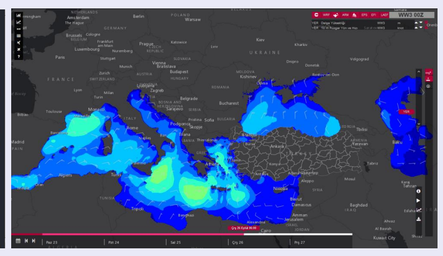
Turkish Aladiners designing a new interactive visualization tools for forecasters using python, php and java based on google maps. Users can select models such as IFS, Eps Alaro, Arome, Wrf, Laef, WW3 and their runs, display multi parameters and zoom in/out on the map. Also meteograms, and vertical profiles can be generated for any grid point. According to need of national aviation, cross-section tool and airgrams designed for forecasters. Users can select their own route by clicking on the map and generate aviation airgrams. Visualization tool allows forecasters to reach old model runs and computer resources are used more efficiently.

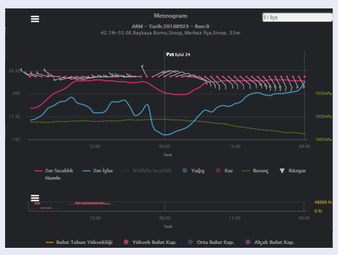












HPC Systems at TSMS

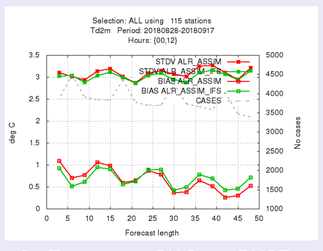
SGI ICE XA (Water cooled) System
- 288 nodes, E5-2690v4 Broadwell, 2.6GHz, 14 Cores (Total 4032 Core), 192GB DDR4 RAM per node
- ~168 Tflops peak performance
- OmniPath (100 Gbps),
- Enhanced Hypercube Interconnect Topology
- Altair PBS Pro
- SLES 12
- Intel Parallel Studio XE Cluster Edition
- SGI Lustre System ; 350TB disk storage

(Installed at Turksat Headquarter)

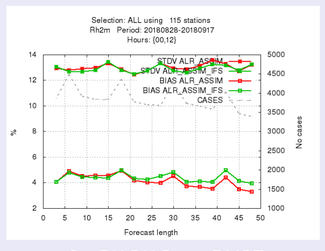
SGI UV 2000
- 256 core based Intel Xeon E5 each at 2.4 GHz.
- Total Peak performance 2.5 Tflops
- Total memory 1 TB
- 10TB SAS, 30TB SATA Disk

3DVar Experiments (IFS Lbc & ARPEGE Lbc)

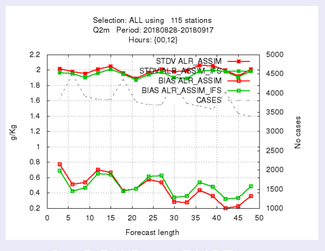
ALARO Turkey has 4.5 horizontal resolution and 60 vertical levels. In the assimilation system synop, temp, amdar, radiance and amv data is assimilated. For surface analysis CANARI is run. To analyze the effect of lbc data two experiments were conducted namely ALR_ASSIM and ALR_ASSIM _IFS. The only difference between the experiment is that ALR_ASSIM uses lbc data from ARPEGE and ALR_ASSIM_IFS is using lbc from IFS. Previously a new B matrix was calculated from ARPEGE global Ensemble Prediction System (PEARP) and a tuning experiment was set for background error calculations of ALARO Turkey configuration using TuneBR tool. REDNMC value was set to 0.6 (1.3 was the previous value) regarding the tuning results. The verification of the experiments was calculated by using Harm4verif verification package. ALR_ASSIM_IFS configuration shows better results for mslp, Td2m, Rh2m and Q2m for the first half of the forecast length. However ALR_ASSIM experiment showing better scores for the second half of the forecast length. For the vertical profile, there is no significant improvement in the scores. The results of the experiments are as follows:



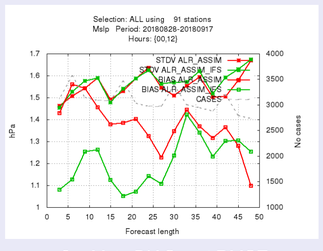
2m Temperature BIAS and RMSE



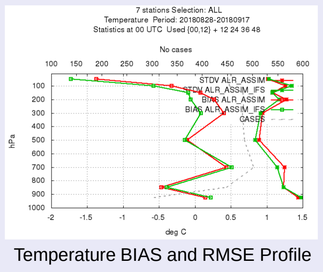
2m RH BIAS and RMSE



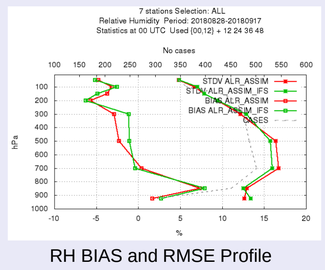
2m Q BIAS and RMSE



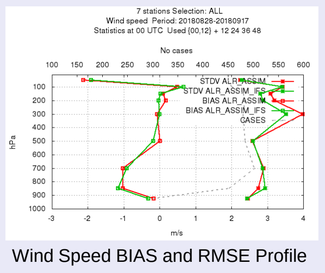
2m Mslp BIAS and RMSE



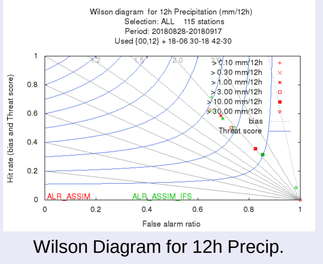
Temperature BIAS and RMSE Profile



RH BIAS and RMSE Profile



Wind Speed BIAS and RMSE Profile



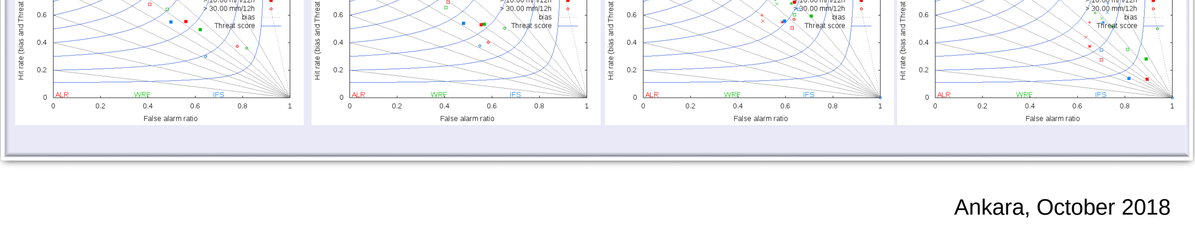
Wilson Diagram for 12h Precip.

Comparisons & Verification (ALARO-1 ECMWF WRF)

TSMS run both ALARO-1(cy40t1) and WRF model at local systems. WRF and ECMWF model outputs are also added to Harmonie Verification Tools at 00-12 GMT for monthly comparisons and verifications. 120 Turkish synoptic and 7 radio-sonde stations used for verifications.

October 2017 | **January 2018** | **April 2018** | **July 2018**

2m Temperature BIAS and RMSE



2m Dew Temperature BIAS and RMSE

Temperature BIAS and RMSE Profiles

Wilson Diagrams for 12h Precipitation

Ankara, October 2018