NWP Related Activities in TURKEY

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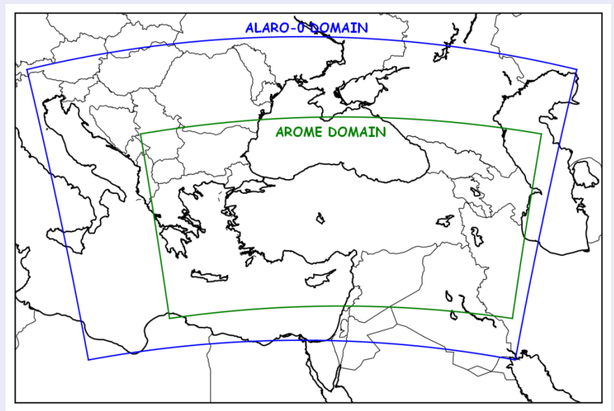
Operational Configurations

ALARO-TURKEY

Current operational suite:
Model version: cy40T1bf5

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

Pre-operational suite:
Model version: cy38t1

Model Geometry:
- 2.5 km horizontal resolution
- 512 X 1000 grid points
- 60 vertical model levels
- Linear spectral truncation
- Lambert projection

Forecast settings
- Digital filter initialization
- 60 sec time-step
- Hourly post-processing
- 1 run per day at 00 UTC up to 48 hourly forecast
- Coupling with ARPEGE LBC files at every 3 hours

HPC Systems at TSMS

SGI Altix 4700

- 512 core based Intel Itanium2 each at 1.67 GHz.
- Total Peak performance 3.4 TFlops
- Total memory 1 TB
- 2 Login, 2 Services Nodes and 3 Xeon based postprocessing Nodes
- 30 TB Disk Storage

SGI UV 2000

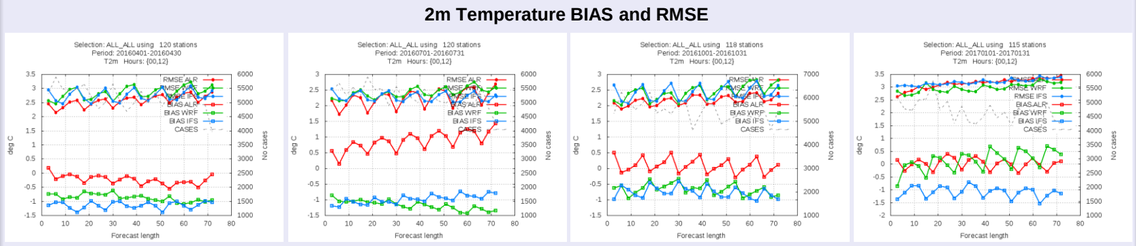
- 256 core based Intel Xeon E5 each at 2.4 GHz.
- Total Peak performance 2.5 TFlops
- Total memory 1 TB
- 10TB SAS, 30TB SATA Disk

Verification & Validation

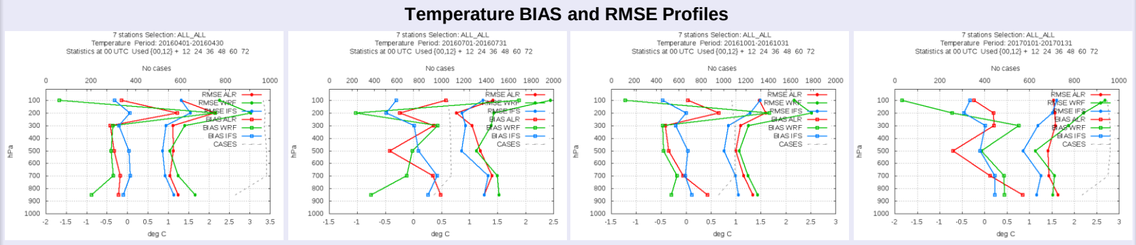
TSMS run both ALARO-1(cy40t1) and WRF model at local systems. WRF and ECMWF model outputs are also added to Harmonie Verification Tools at 00-12 GMT for monthly comparisons and verifications.

April 2016 | **July 2016** | **October 2016** | **January 2017**

2m Temperature BIAS and RMSE



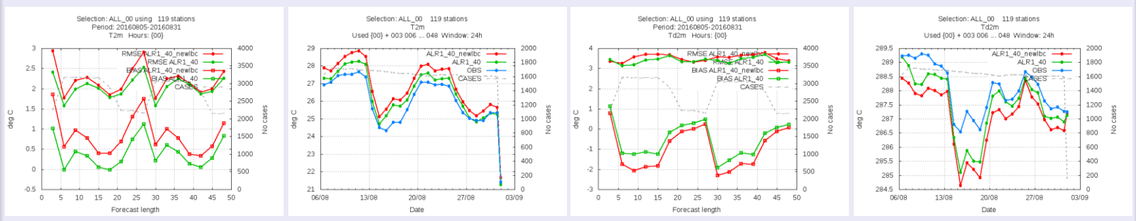
Temperature BIAS and RMSE Profiles



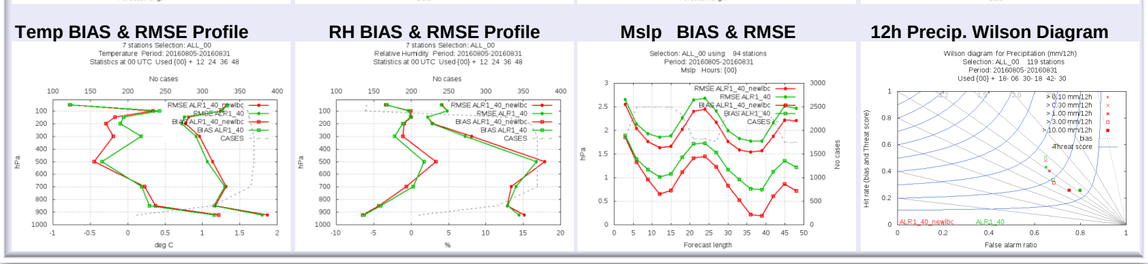
Tests on LBC produced by SURFEX & ISBA

TSMS compared ALARO-1 model outputs which were run with new LBC (produced by SURFEX) and old LBC (produced by ISBA) for the period of 5-31 August 2016. New LBC has worse score for 2m temperature (depends on orography). For other surface parameter they have similar trends on scores.

2m Temp BIAS & RMSE | **2m Temp Time Series** | **2m DewT BIAS & RMSE** | **2m DewT Time Series**



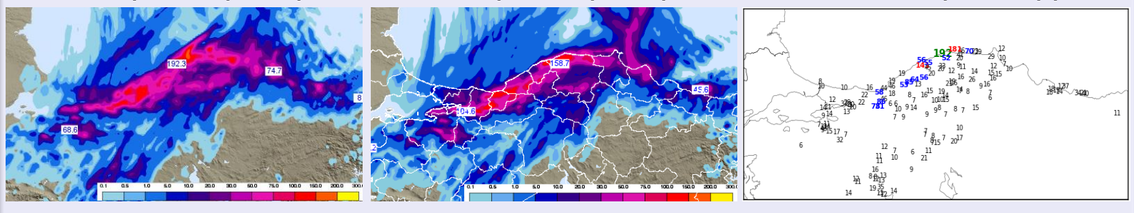
Temp BIAS & RMSE Profile | **RH BIAS & RMSE Profile** | **Mslp BIAS & RMSE** | **12h Precip. Wilson Diagram**



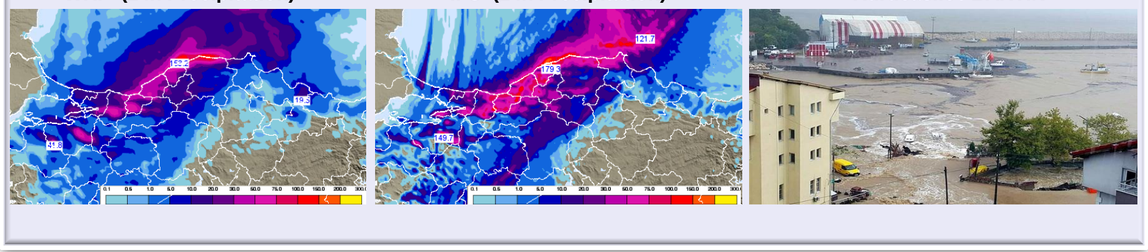
Case Study impact on LBC Produced by Surfex & ISBA

On August 13th 2016, flashflood event occured in Bartın which placed northern Turkey and it caused significant damaged to the township of Kurucasile. Both three models are relatively good at estimating the precipitation area and amounts.

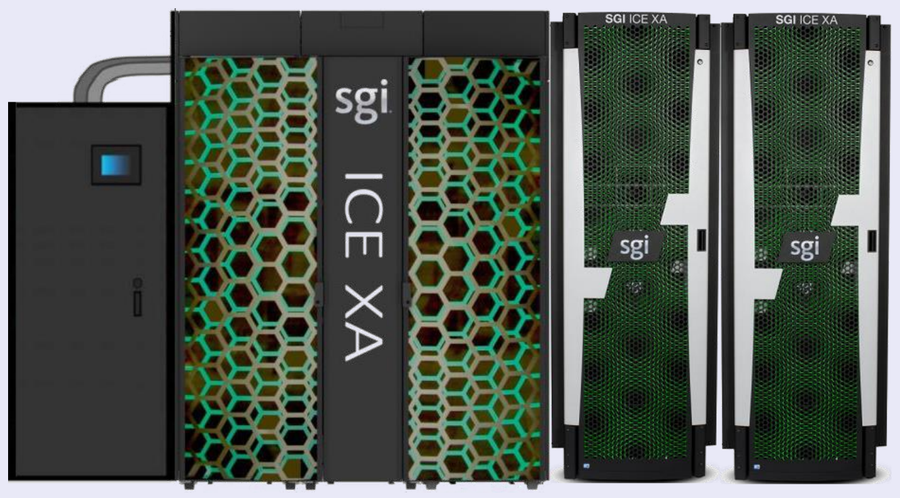
ALR/Surfex (24h Precipitation) | **ALR/ISBA (24h Precipitation)** | **OBSERVATIONS (24h Precip.)**



WRF (24h Precipitation) | **IFS (24h Precipitation)** | **Kurucasile / BARTIN**



New HPC at TSMS



TSMS has been completed HPC tender on December 2016 to replace the old HPC system by the new one (SGI ICE XA). The installation will be started at TURKSAT Headquarter on April 2017.

SGI ICE XA (Water cooled) System
- 288 nodes, E5-2690v4 Broadwell, 2.6GHz, 14 Cores (4032 Core), 192GB DDR4 RAM per node
- ~167 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

Weather Forecasts Along Sea Route and Marina (Turk-Marine Weatherwise)

This application is developed for planning seaway travels, having a safe journey and transports. It composed by interpreting and processing the outputs of METU-3(*) wave model and WRF using php, java and highcharts. Weather and sea forecasts are available up to 5 days. The application covers the whole Mediterranean, Aegean, Marmara, Black and Caspian Sea and updated two times in a day.

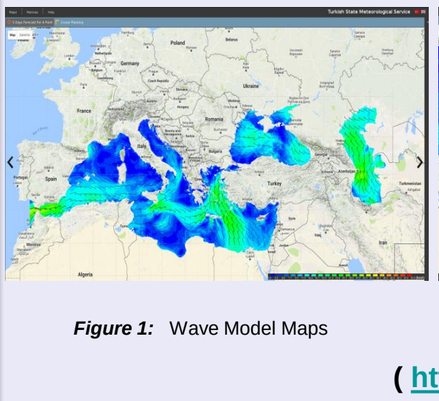


Figure 1: Wave Model Maps

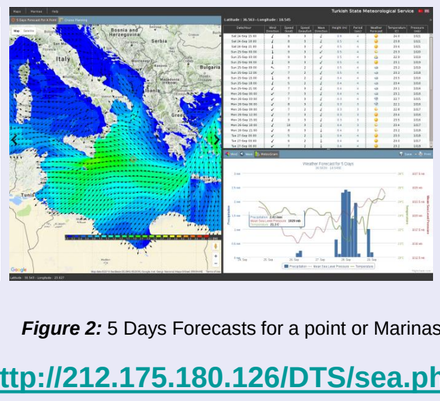


Figure 2: 5 Days Forecasts for a point or Marinas

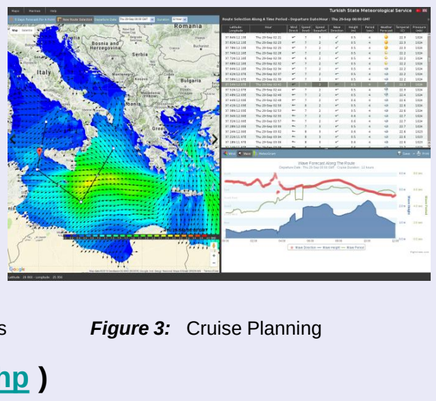


Figure 3: Cruise Planning

(http://212.175.180.126/DTS/sea.php)

Maps: Users can reach 10m wind speed/direction, wave height/direction and wave period forecast maps with zoom option on google based map.

5 Days Forecasts for a Point and **Marinas**: User can see 5 daily wave and weather forecasts as text or graphical representation by clicking a point on google maps or selecting pre-defined marinas and harbors of countries on Marinas link. User can drop the selected point on the map.

Cruise Planning: After selecting departure date and travel period, user can define a route by clicking points on the map. The application generates the weather conditions on the sea route. User can modify the route on the google map. After the modifications weather parameters such as 10m. wind, wave, 2m temperature, mean sea level pressure, 3 hourly precipitations are re-calculated and represented as graphical and text on the page.

(*) METU-3 is a wave model which developed by **M**iddle **E**ast **T**echnical **U**niversity under NATO-TU Waves Project in 1995. 10 meter u and v components are using as initial and boundary conditions

Ankara, April 2017