

# **NWP Related Activities in TURKEY**

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METEOROLOJ METEOROLOJ

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# **Operational Configurations**

### ALARO-1 TURKEY

Current operational suite: Model version: cy40T1bf05

#### Model geometry:

- 4.5 km horizontal resolution
- 450 X 720 grid points
- 60 vertical model levels
- Quadratic 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

#### <u>SGI UV 2000</u>

- 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

#### Comparison & Verifications (ALARO-0 ALARO-1 ECMWF WRF)

TSMS run ALARO-0(cy38) and ALARO-1(cy40) and WRF at 00 GMT for yearly period between Oct-2015 and Sep-2016. WRF and ECMWF model outputs added to Harmonie Verification Tools for comparisons. 120 Turkish synoptic and 7 radio-sonde stations used for verifications.



#### 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<sup>(\*)</sup> 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









ALARO-1 cy40t1\_bf05 is now operational since June 2016

#### **Interactive Page Study for National Aviation Activities**

According to the need of national aviation, an interactive page study is started to develop. This study will enable pilots to get cross section map between departure and arrival points. On the map, the horizontal axes illustrates flight distance (in km) and the vertical one shows levels from surface to selected level (in km). The outputs generating from the operational AROME model consist of temperature, wind direction and speed, vertical velocity, cloud fraction, QNH, topography. In addition of these parameters, the parameter of ice severity is generated from liquid water content. This user friendly study will give a chance pilots to create their own map with selected parameters. The study is still in the process.





Figure 3: Cruise Planning

Figure 2: 5 Days Forecasts for a point or Marinas

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.

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

**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, mslp, 3 hourly precipitations are re-calculated and represented as graphical and text on the page.

(\*) METU-3 is a wave model which developed by Middle East Technical University under NATO-TU Waves Project in 1995. 10 meter u and v components are using as initial and boundary conditions

#### Interactive SkewT-LogP Diagram Application

Interactive SkewT – LogP Project, which enables the user to plot the Temp diagram of any given point when clicked on google based map. The diagrams are produced based on WRF and ALARO-1 models. In the project, open source codes and softwares were used and code improvements were done by Turkish Aladiners.

User-friendly SkewT diagrams are produced for the given point instead of generating this diagram for every point in the map and user can make alteration on the diagram and layer values. In this context, the computer resources are used more efficiently. Therefore, it was a necessity to switch to interactive applications.



Figure 1: SkewT-LogP Diagram and airport/point selection (<u>http://212.175.180.126/skewt/index.html</u>)

This application generates the following parameters: Temperature, Dew-Point, Velocity, Humidity, CAPE, Contrail, Icing, Vertical Wind, Instability Indices, Thickness. The parameters such as, icing, contrail and vertical wind are calculated to be used for aviation purpose. "Surface CAPE" and "Parcel CAPE" identify the CAPE values calculated by different calculation methods.

For each pressure level, temperature, dew-point temperature, wind speed and direction and the height of the pressure level are shown in a table. The application allows the user to make changes in values and atmospheric profile. After the modifications, all instability indices are recalculated.

In addition, the application has hodograph feature. Wind shear is plotted in 0-1, 0-3, 0-6, 0-16 km height ranges on the hodograph.

