

METCAP+ : IMPORTANCE OF ANALYSING OBSERVATIONS, SATELLITE DATA, SAF PRODUCTS, NUMERICAL WEATHER FORECASTS ON THE SAME SCREEN

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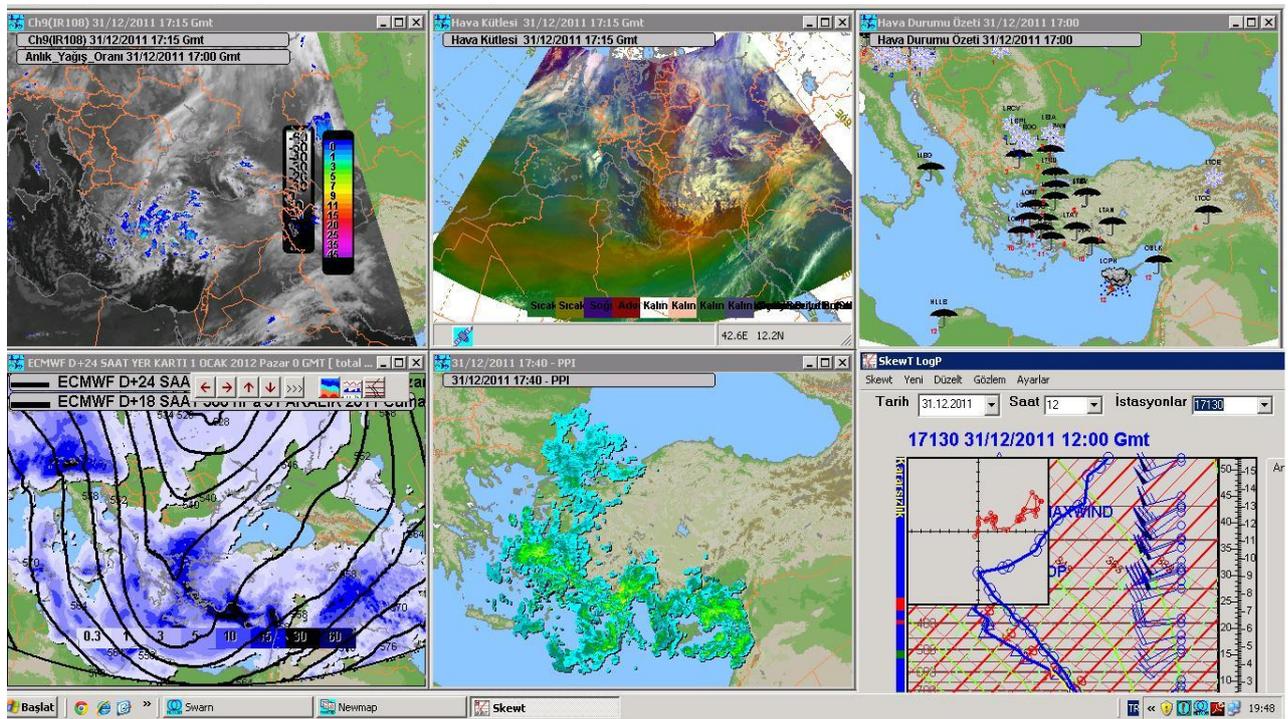
ABSTRACT

In order to observe the weather and predict the possible changes, as much as having different types of meteorological information and numerical weather forecast outputs, It is also important to analyse these huge amount of data at any time as it is desired by the weather forecasters. All meteorological services and institutions use different softwares to analyse different kind of meteorological data. Turkish Meteorological Service has been developing software packages to visualize meteorological data for more than twenty years to fulfill weather forecasters demands. METCAP+, latest version of the visualization package, aims to present all possible meteorological data like meteorological observations (Synoptic, upper air, METAR, ship, airmet etc), remote sensing products (all MSG channels, RGB applications, different SAF products, Radar products , Lightning etc), and Numerical Weather Prediction data from different sources to the users in different map projections. Multi Windows characteristic of the package gives the users power of analysing meteorological data on different screens at the same time. The package may warn the users when any selected data type exceeds or fall below the threshold values. Instead of just showing images for selected parametres, the software enables users to see point values of the all plotted data like IR, VIS, WV, VISHRV channels, calculated RGB, SAF products, Radar , NWP and actual observations where the mouse is on the screen. Interpretions from the users of the latest version show that this software is more powerful and useful than the previous ones.

INTRODUCTION

Variety of data used in weather monitoring and forecasting has been increased rapidly paralel to speedy change in technology. In order to handle these data, many computer programs working on different platforms has been developed by institutions and commercial producters. As Turkish Meteorological Service is considered as an example, It is seen that different meteorological systems have their visualiztion packages on different computers. While MSG systems have their own package, Radar systems run on different workstations and NWP products are presented on the WEB. This complex structure needed to be simplified to give much time to the forecasters for interpreting the weather situations. Turkish Meteorological Service has been developing visualization package to present all possible data and products to the users on the same screen. The Project has been being developed by TSMS programmers and forecasters. Previous version of the package (METCAP 5.2) has been used by all regional forecasting centers and airport forecasting offices. The increase in size and variation of data sent to the end users resulted in some problems to handle all data by the previous version. To fill these gaps METCAP+ has been developed. As it is described in the following paragraphs, the new package is powerful to use the all

meteorological data. While It uses data from GTS, Radar and MSG, SADIS, EUMETCAST and other systems, It is also capable to download different meteorological data from Internet. Appearance of the background map may easily be changed by the users.



Metcap+ Multi Windows Screen

MAIN FEATURES

METCAP+ has been developed in C++ for Windows. Development phase is a continuous process. New modules for different purposes may be added to package.

Background Maps

Area of the interest may be defined by the users. Any part on the earth may be selected. Projection of the map, topography, geographical borders, longitude latitudes lines, colors on the map may be changed. Zoom in/out is possible for the selected region.



Polar Stereographic, Europe, North Africa, Middle East



Mercator, Balkans



Orthographic, North America and Mexican Gulf

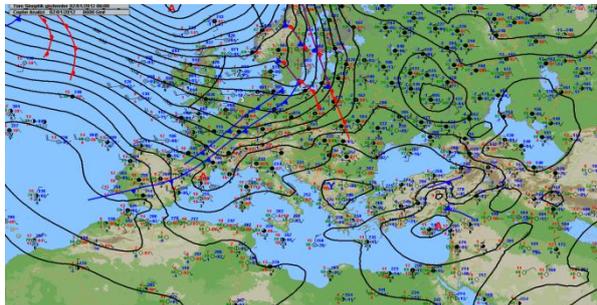


Stereographical, Middle East

Surface Observations

Synoptic Observations from different sources may be plotted on the map. Size, density of the plot can be selected. Contouring for almost all synoptic parameters is possible. More than one parameters may be contoured on the same map. Some restrictions for observation plot may be chosen by the users. I.e only synoptic observations that contain precipitation, fog or thunderstorms may be put on the map. BUFR decoding module for synoptic observations is operational.

METAR observations from the airports may be plotted and weather conditions of the airport may be summarized by colors. While blue indicates good weather, red shows dangerous conditions. It is also possible to show SNOWTAM reports from METAR observations.



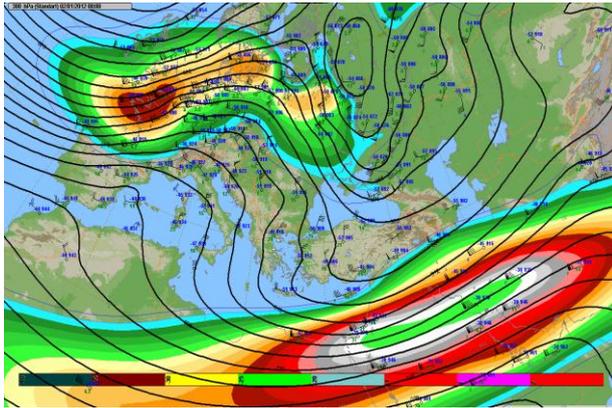
Surface Synoptic Chart 02 Jan 2012 06:00 Utc
(Fronts from EGRR)



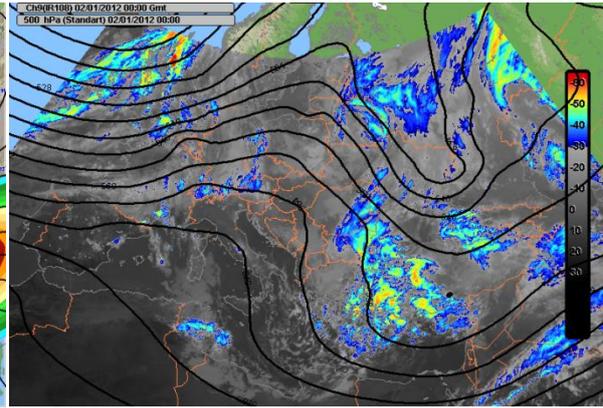
Metar with MSG VisHRV 02 Jan 2012 10:00 Utc
(Lower Limit for VisHRV is 35)

Upper Level Observations

All upper level charts from 1000 hPa to 100 hPa may be created by the software. METCAP+ is capable to decode upper level observations from both text and BUFR formats. In addition to measured parameters (Geopotential Height, Temperature, Dewpoint Depression, Wind Direction and Speed), derived parameters (Humidity, Wet Bulb Temperature, subsidence, thickness for different level, temperature change between two layers) may also be plotted and contoured. Different instability indices are calculated and charts are prepared. Some of these indices are Vertical Total, Cross Total, Total total, K Index, Sweat, Lifted, Precipitable Water, Thomson, Boyden, KO, Miller, S Index.



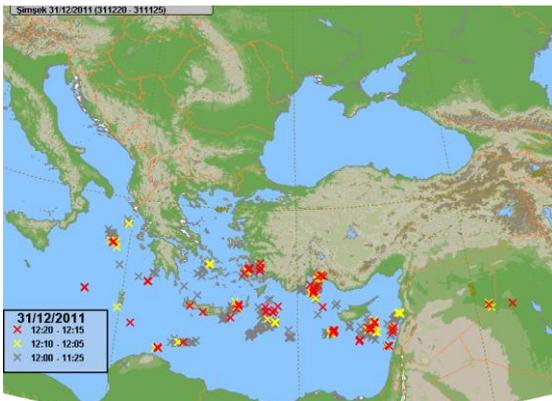
02 Jan 2012 00:00 Utc 300 hPa Geopotential Height
Wind Speed > 50 Knot



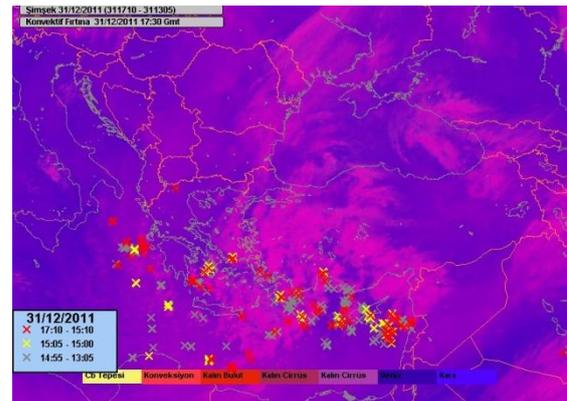
02 Jan 2012 00:00 Utc 500hPa Geopotential Height
MSG Channel IR10.8

Lightning Data

Lightning data is very useful to track significant weather events like thunderstorms and storms caused by CB clouds. METCAP+ plots lightning data for different time periods. When this data is used with MSG and Radar data, the users have a very powerful and valuable product.



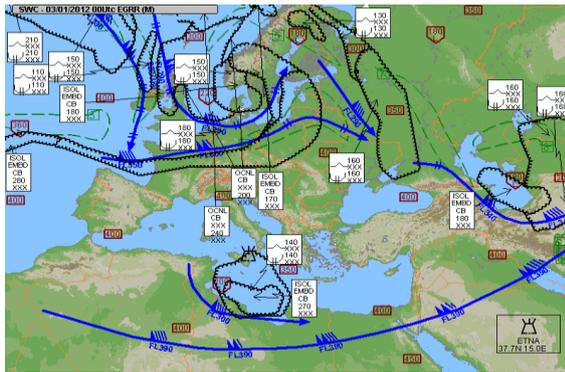
Lightning Observation 31 Dec 2011
between 11:25 and 12:20 Utc



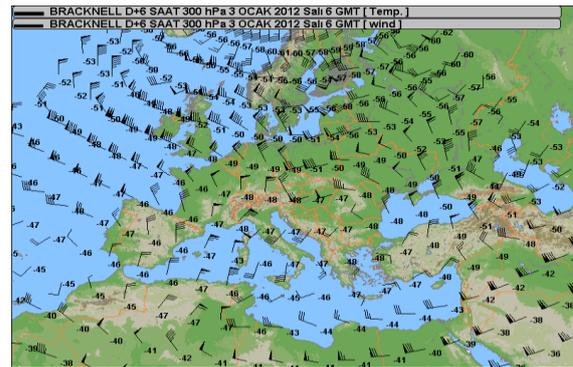
Lightning Obs. 31 Dec 2011 with Convective RGB

Aviational Data

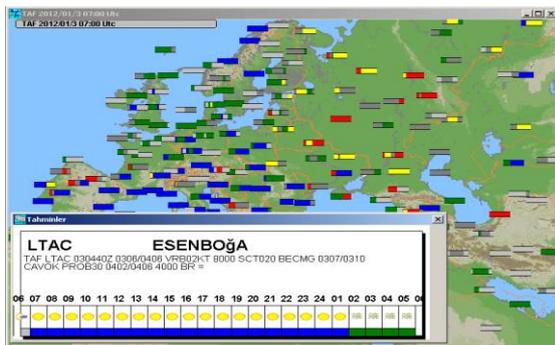
Thousands of bulletins are created every day for aviational purposes. Significant Weather Charts in BUFR format, Temperature and Wind charts for different levels and areas in GRIB format, Sigmet Reports, Volcanic ash reports, Tropical cyclone and hurricane reports, Aircraft reports, SnowTAM reports and Terminal Aerodrome Forecast reports are some of them. It is important to have these reports and warn the related persons and organisations on time. METCAP+ has both warning and displaying modules for aviational bulletins.



Mid Level SWC Chart 03 Jan 2012 00 Utc



Temperature and Wind chart for FL300 03 Jan 2012 00Utc



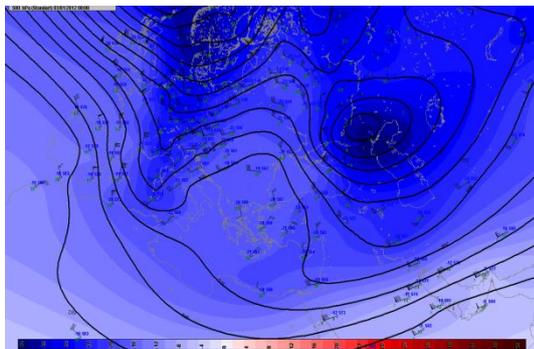
TAF reports for 03 Jan 2012 07 Utc



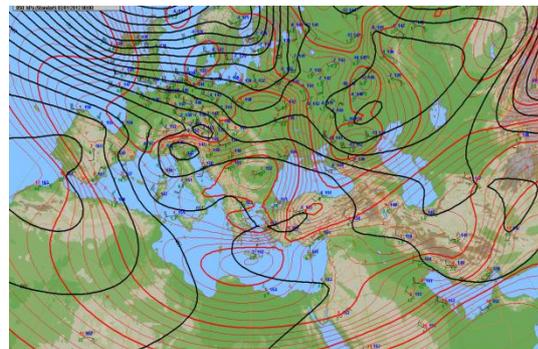
Ash report for Europe 21 Mar 2010 00 Utc

Contouring

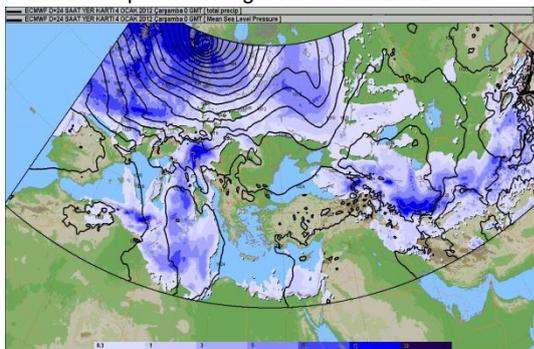
Contouring for different parameters of the observations and Numerical Weather Products is enriched in the latest version.



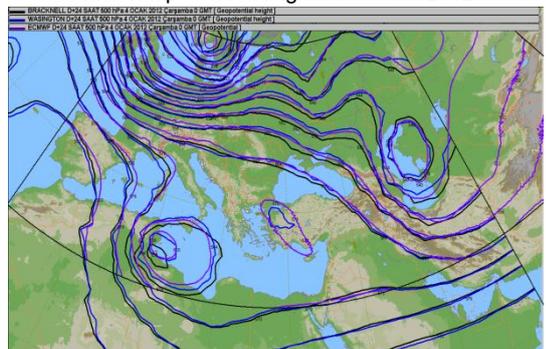
500 hPa Temp + Geo. Height for 03 Jan 2012 00Utc



850 hPa Temp + Geo. Height for 03 Jan 2012 00Utc



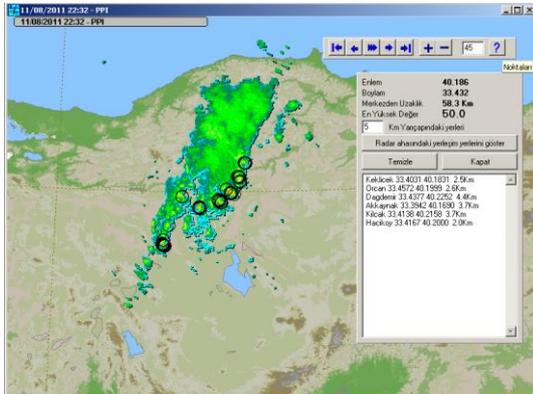
ECMWF MSL Pressure 24hr Accumulated Precipitation for 04 Jan 2012



500 hPa Geo. Height from 3 centers for 04 Jan 2012 00Utc

Radar Products

Data from different radar locations may be displayed in different color scales. Radar data under Mouse point is displayed. Animation for a selected interval in different speed is enabled. Many observations like synop, METAR, lightning may be put on radar image. Areas for selected radar values may be marked.



Ankara Radar PPI for 11 Aug 2011 22:32 Utc
(Radar values more than 45 is marked)



Ankara Radar MAX for 11 Aug 2011 22:33 Utc
(Radar values more than 50 are marked)



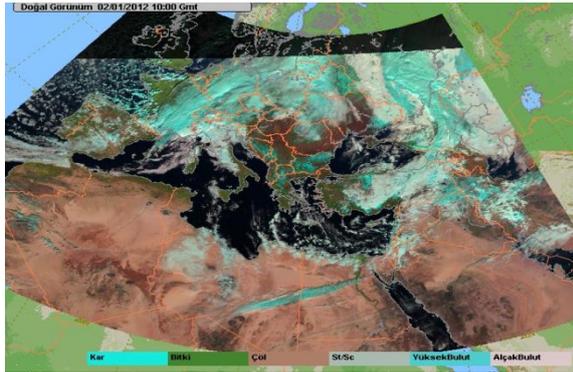
Turkey Composite Radar PPI for 10 Oct 2011 15:46 Utc



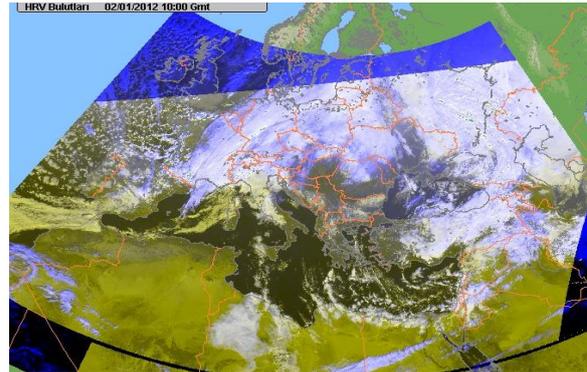
Turkey Composite Radar CAPE for 10 Oct 2011 15:46 Utc

MSG Products

Satellite Data from all MSG channels, RGB application, channel differences, MPEF and Nowcasting SAF products are displayed on different color scales. It is possible to arrange displayed data like not plotting the points that is higher or lower than selected values. Animation for a selected time interval is also possible. Speed of animation may be adjusted. METCAP+ enables users to set their own RGB products and create images for different channel differences. Color scale of the products may be selected and new color scales may be created.



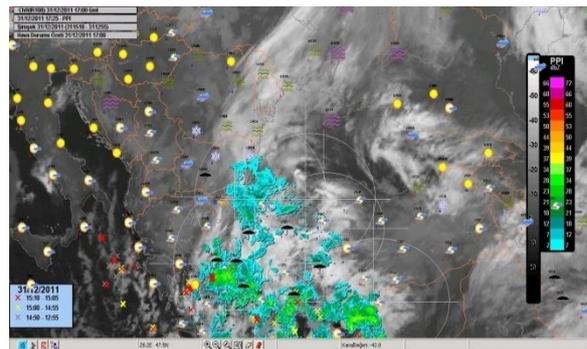
Natural Colors for 02 Jan 2012 10Utc



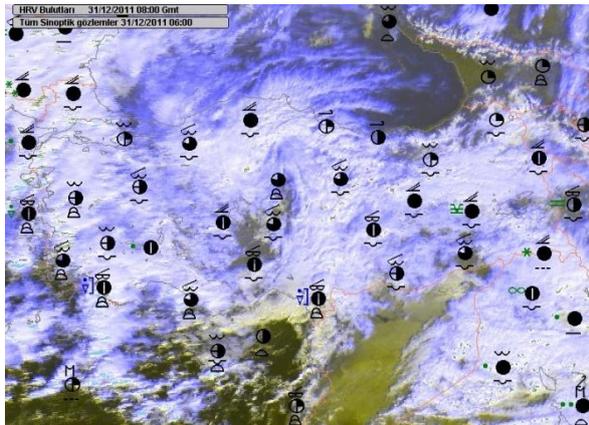
HRV Image for 02 Jan 2012 10Utc



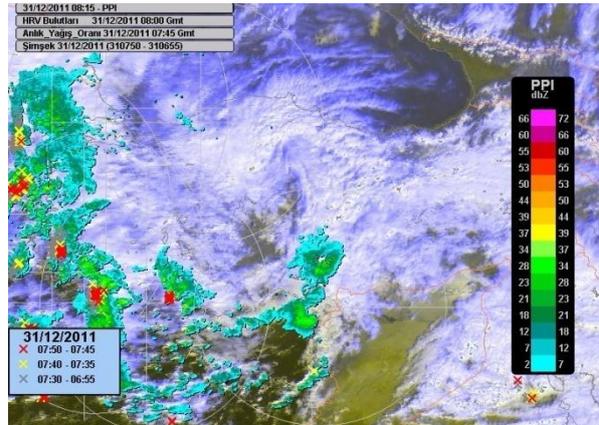
Channel IR10.8 for 01 Jan 2012 08:45 Utc
(Temperature values below -30 C was colored)



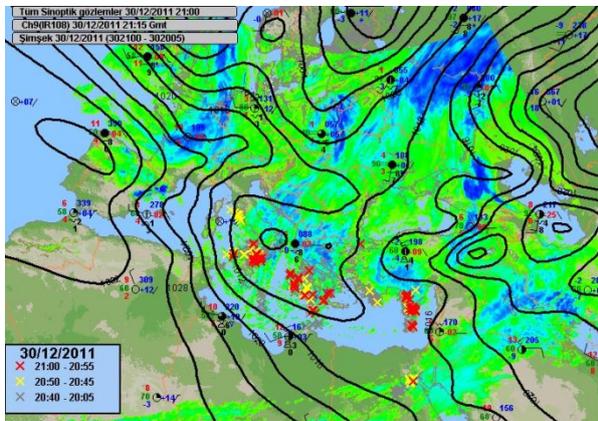
Channel IR10.8 + Composite Radar PPI + Lightning Data +
Weather Icons for 31 Dec 2011 17 Utc



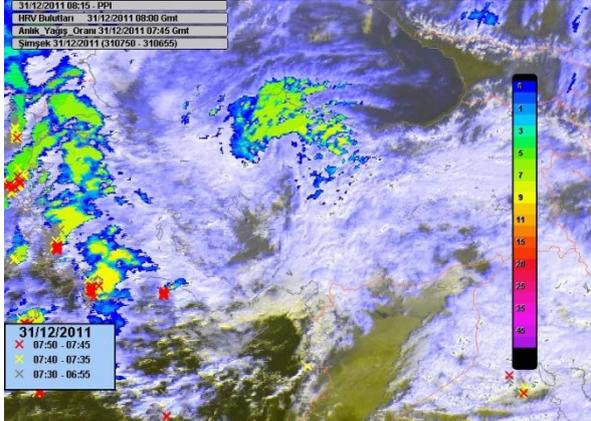
HRV Image+Cloud Amount and types for 31 Dec 2011 08 Utc



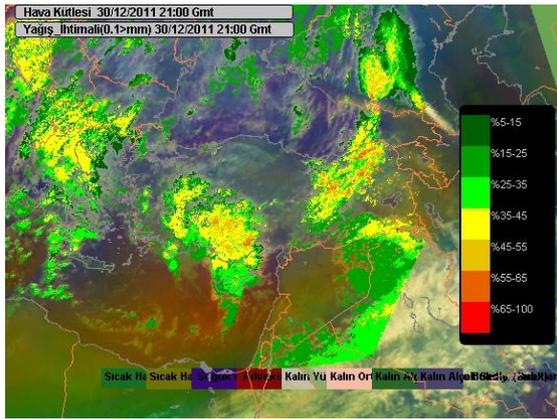
HRV+Radar Composite PPI+ Lightning for 31 Dec 2011 08 Utc



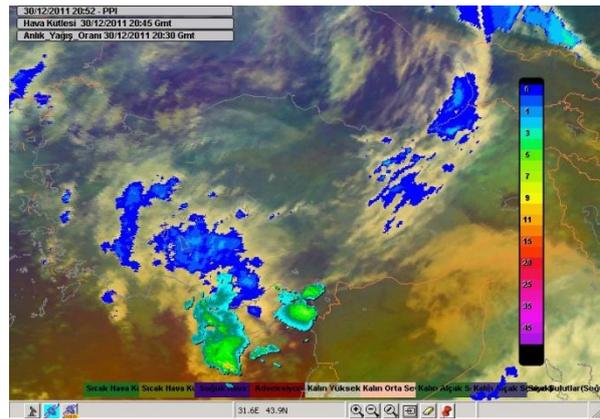
Synoptic Obs + MSL contours +Lightning + IR10.8 for
30 Dec 2012 21 Utc



HRV + Instant Precipitation rate + Lightning
31 Dec 2012 08 Utc



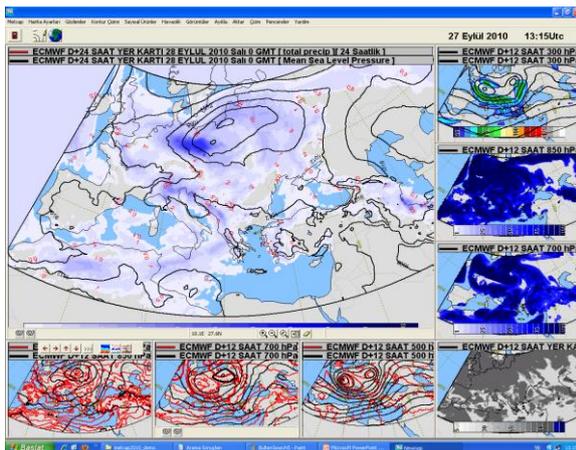
Air Mass + possibilities of precipitation more than 20 Dec 2011 21 Utc



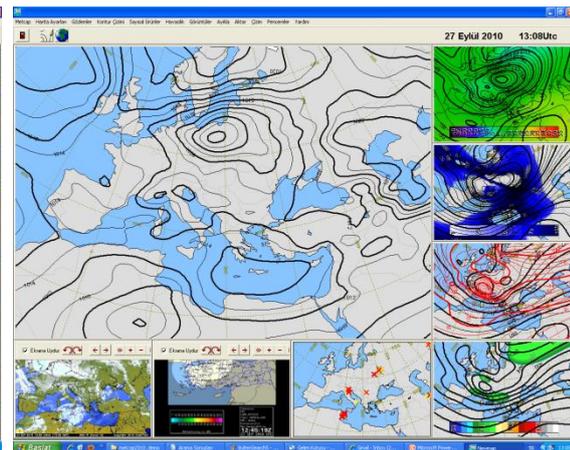
A Mass + Precipitation Rate + Antalya and Hatay 01.mm for Radarfo 30 Dec 2012 20:30 Utc

Multi Window and Auto Creating

Many Windows may be opened depending on the users choice. Each window may be used to see one or more meteorological products. Each user may design his/her screen. Selected products may be created at specified times automatically. Products may be sent to email or ftp addresses.



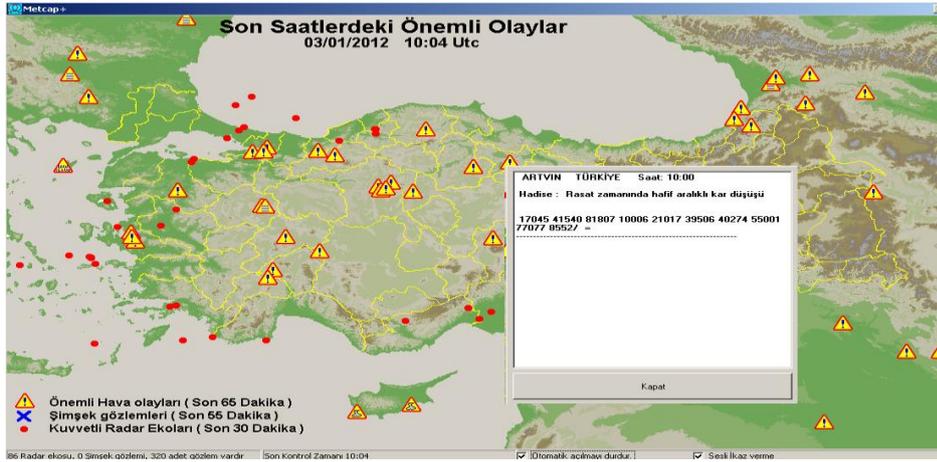
NWP Products



Actual charts

Warnings

It is important to know significant weather events for both aviatational and weather forecasting purposes. METCAP+ checks all received observations, radar echos, lightning data to warn the users for the values are lower or higher than the threshold values. Threshold values may be set separately for each parameter of the observations, radar echo etc. Boundries of the interested area may also be specified. When any significant event reported a popup Windows with icons is opened.



Warning Screen for 03 Jan 2012 10:04 Utc

Icons : Significant events, Blue multiplication sign : Liging, Red Dot : High Radar Echo

CONCLUSION

METCAP+ is very useful to analyse actual and forecast meteorological data. It is the latest version of the visualization package that has been being used by Turkish weather forecasters for twenty years. It filled many gaps to handle bulky meteorological data. One of the advantages of the package is being suitable for future developments. Any new demand may be easily provided in a short time. Development of the package will continue as long as the users need new products.

REFERENCES

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