

# Metview – Introduction



The screenshot shows the Metview software interface. The desktop environment includes icons for 't\_std\_dev.grb', 'Temperature Cross Section', 'Reading Meteogram', 'Folder', 'Mars Retrieval', 'Average Data', 'UK Map View', 'Shaded Coastlines', 'Geopoints', 'Rain Contouring', 'Notes', 'Temperature Contouring', and 'Wind Barbs'. A window titled 'statistics' is open, displaying the following code and output:

```
File Edit View Insert Program Settings
# retrieve some data
f1 = retrieve (date : -1, levels : 1000, grid : [1.5, 1.5])
f2 = retrieve (date : -2, levels : 1000, grid : [1.5, 1.5])

# perform some calculations for comparison
cv_f1f2 = covar_a (f1, f2)
cv_f1f1 = covar_a (f1, f1)
cv_f2f2 = covar_a (f2, f2)
var_f1 = var_a (f1)
var_f2 = var_a (f2)

corr_manual = cv_f1f2 / (sqrt(cv_f1f1) * sqrt(cv_f2f2))
corr_manual2 = cv_f1f2 / (sqrt(var_f1) * sqrt(var_f2))
corr_builtin = corr_a (f1, f2)

Choosing RETRIEVE (MARS)
covar of f1 and f2 = 707195.562425
corr_manual = 0.876684930973
corr_manual2 = 0.876684930973
corr_builtin = 0.876684930973

Program finished (OK) : 4.078 s [Finished at 14:05:55] | L 14, C 27
```

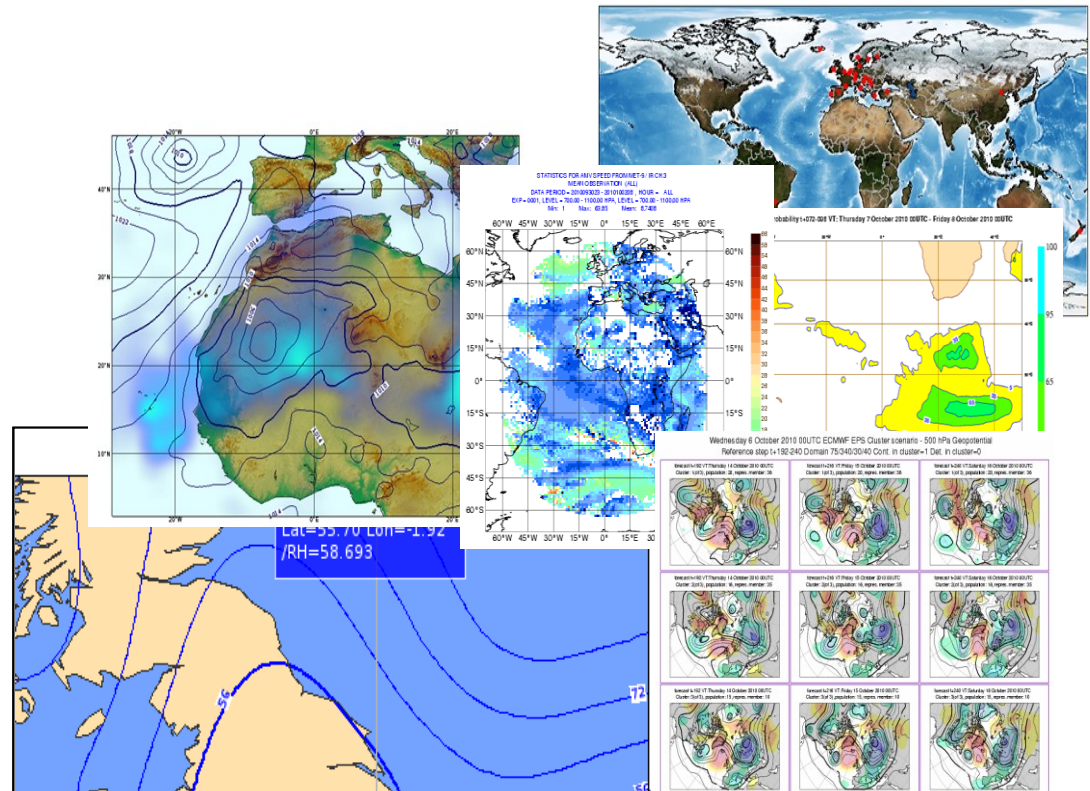
Fernando li

Meteorological Visualisation Section  
ECMWF



# Outline

- ▶ Introduction
- ▶ Interactive usage demo



# Metview: meteorological workstation

- ▶ Working environment for Operational and Research Meteorologists
- ▶ Desktop plotting + data processing software

Co-operative project:

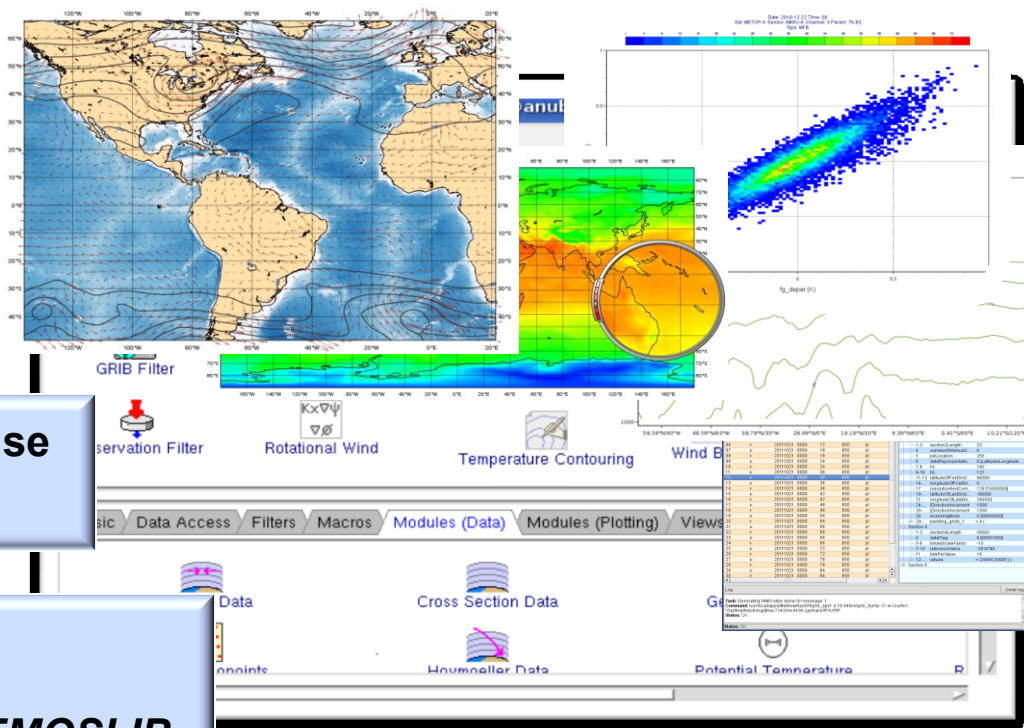


(Brazil)

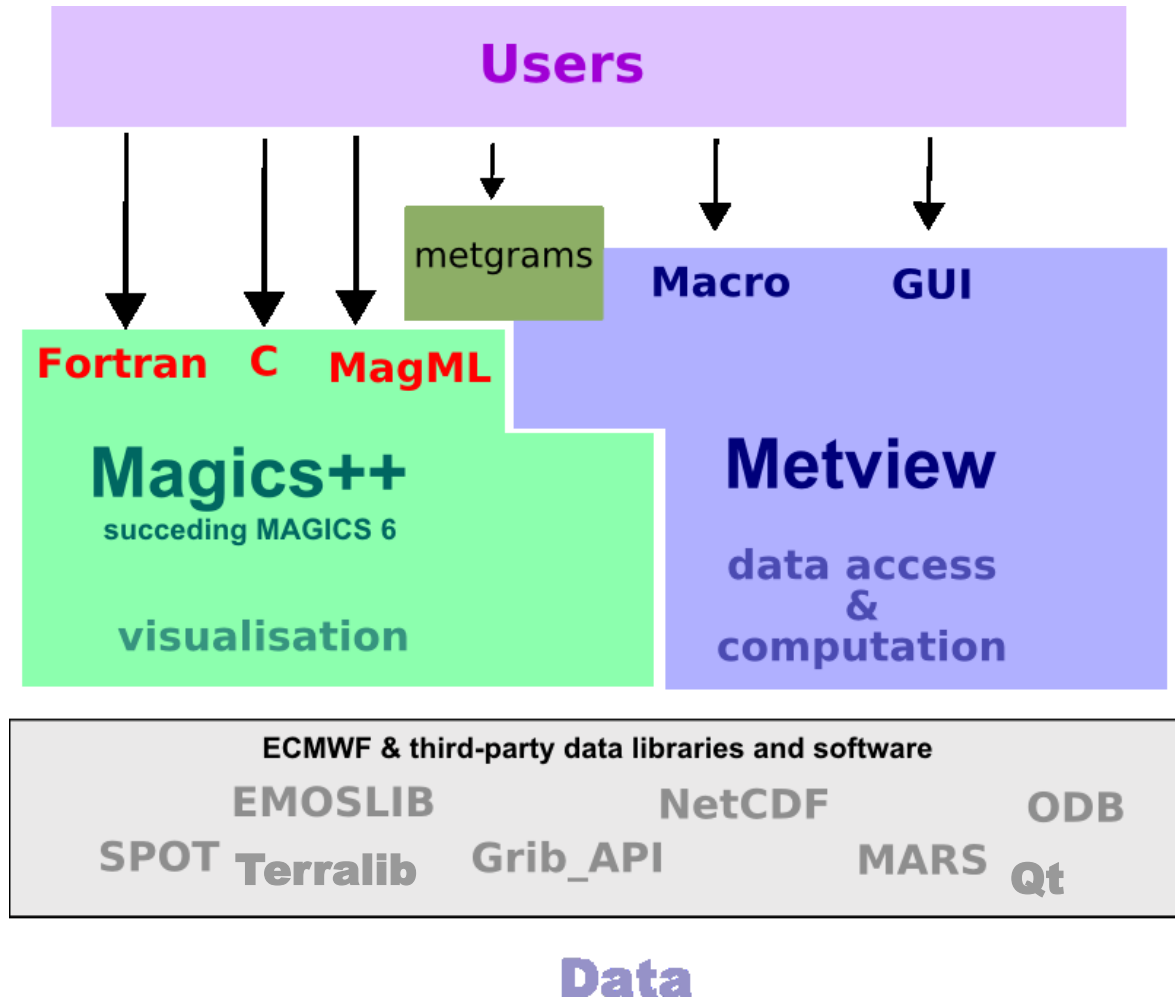
Freely available under Apache license  
(since August 2012)

Built on core ECMWF technologies:

*MARS, GRIB\_API, Magics, ODB, EMOSLIB*



# Metview: software relationship

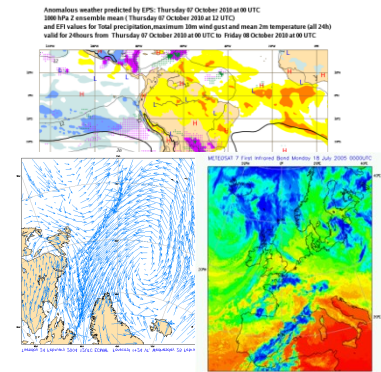


# Metview history (summary)

- ▶ Announced at first EGOWS in June 1990 (Oslo)

## Metview

*There are plans to develop a general and unique system for the visualization of meteorological data at ECMWF which should serve the scientist and the operational analyst alike. The Metview concept will provide a standard framework within which applications relating to the retrieval, processing and visualization of meteorological data can be implemented, and will enable both Operations and research*



- ▶ First prototype in 1991
- ▶ First operational version in 1993
- ▶ OpenGL graphics introduced in 1998
- ▶ New user interface in 2000
- ▶ Magics++ and Qt introduced in 2010

**INPE**

**Metview 1.0**

**Metview 2.0**

**Metview 3.0**

**Metview 4.0**

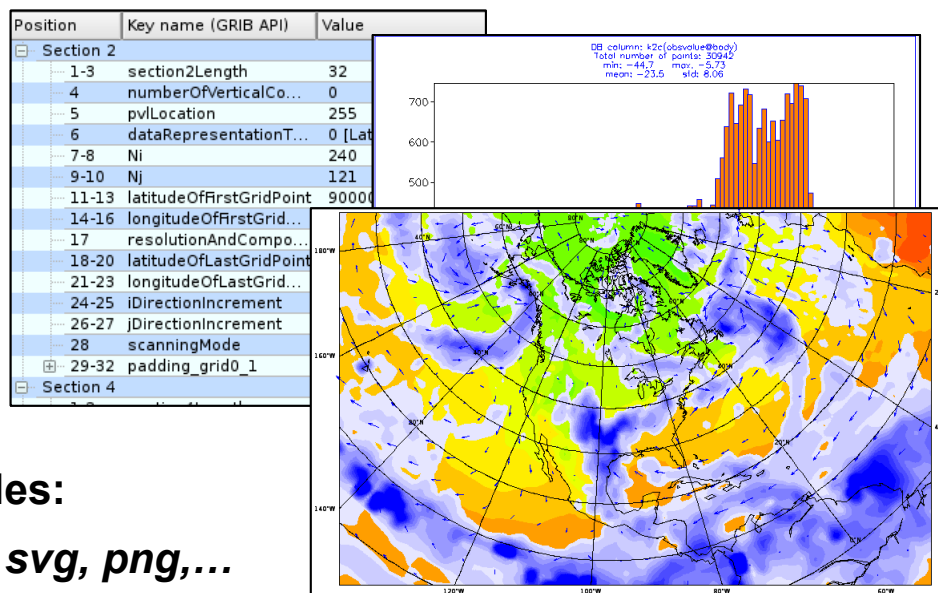
# What can Metview do?

## ► Data:

- Access
- Examine
- Manipulate
- Plot / Overlay

- Generate graphics files:

*ps, eps, kml, svg, png,...*



- Can be run interactively or in batch

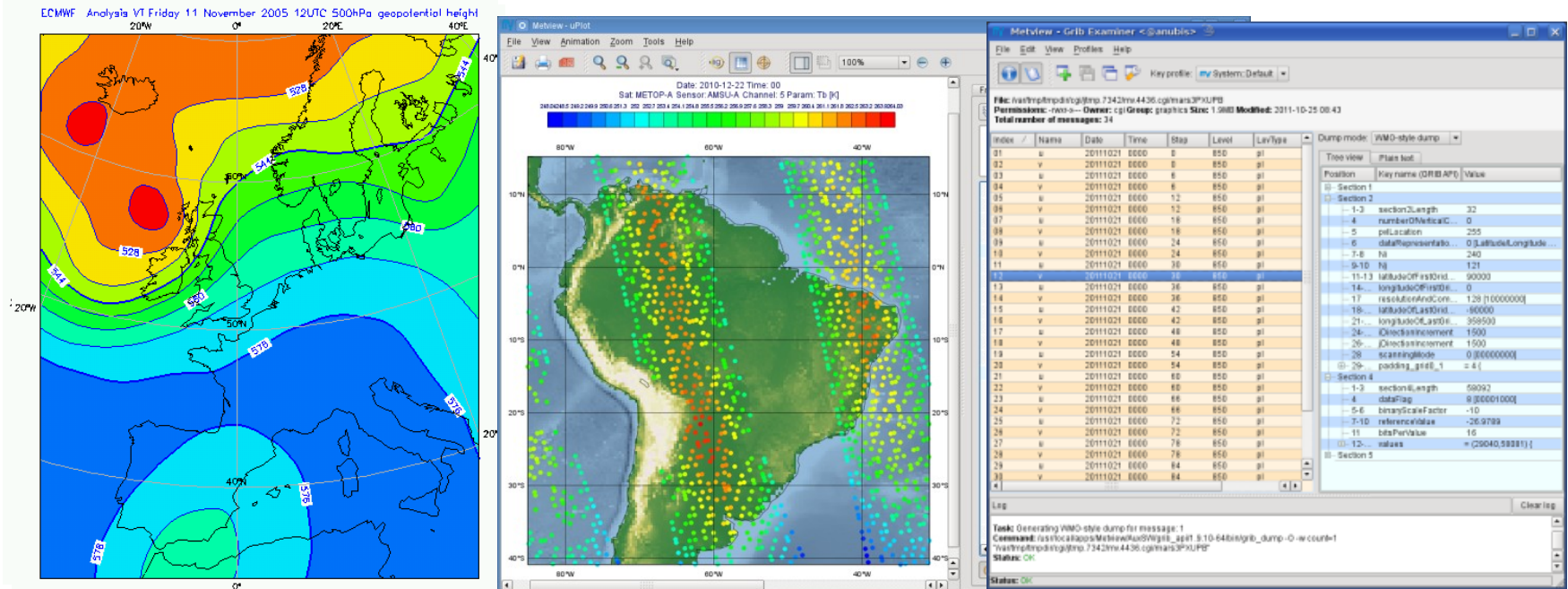
- Runs self-contained standalone

- From laptops to supercomputers
- No special data servers required (but easily connected to MARS or local databases)

# Main features

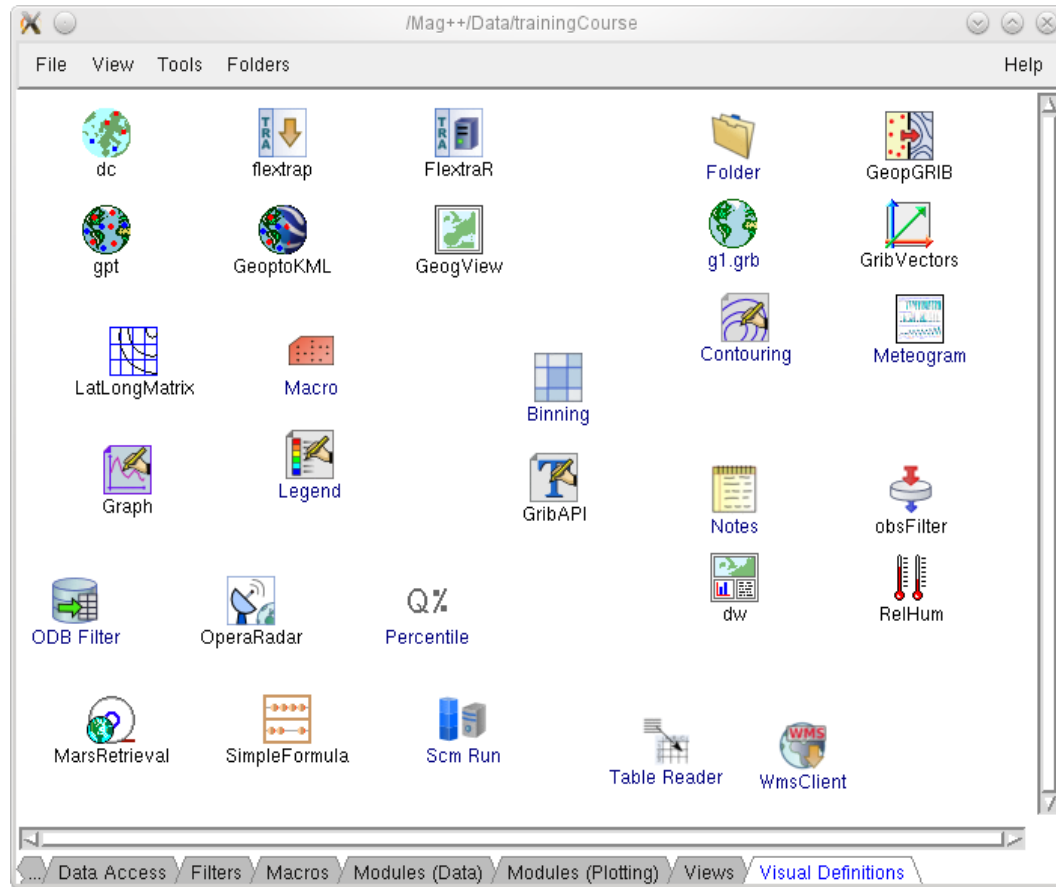
## 1) Data handling

- ▶ Supports a variety of data types (meteorological and non-meteorological)
- ▶ Rich set of modules and functions for data manipulation



# Main features

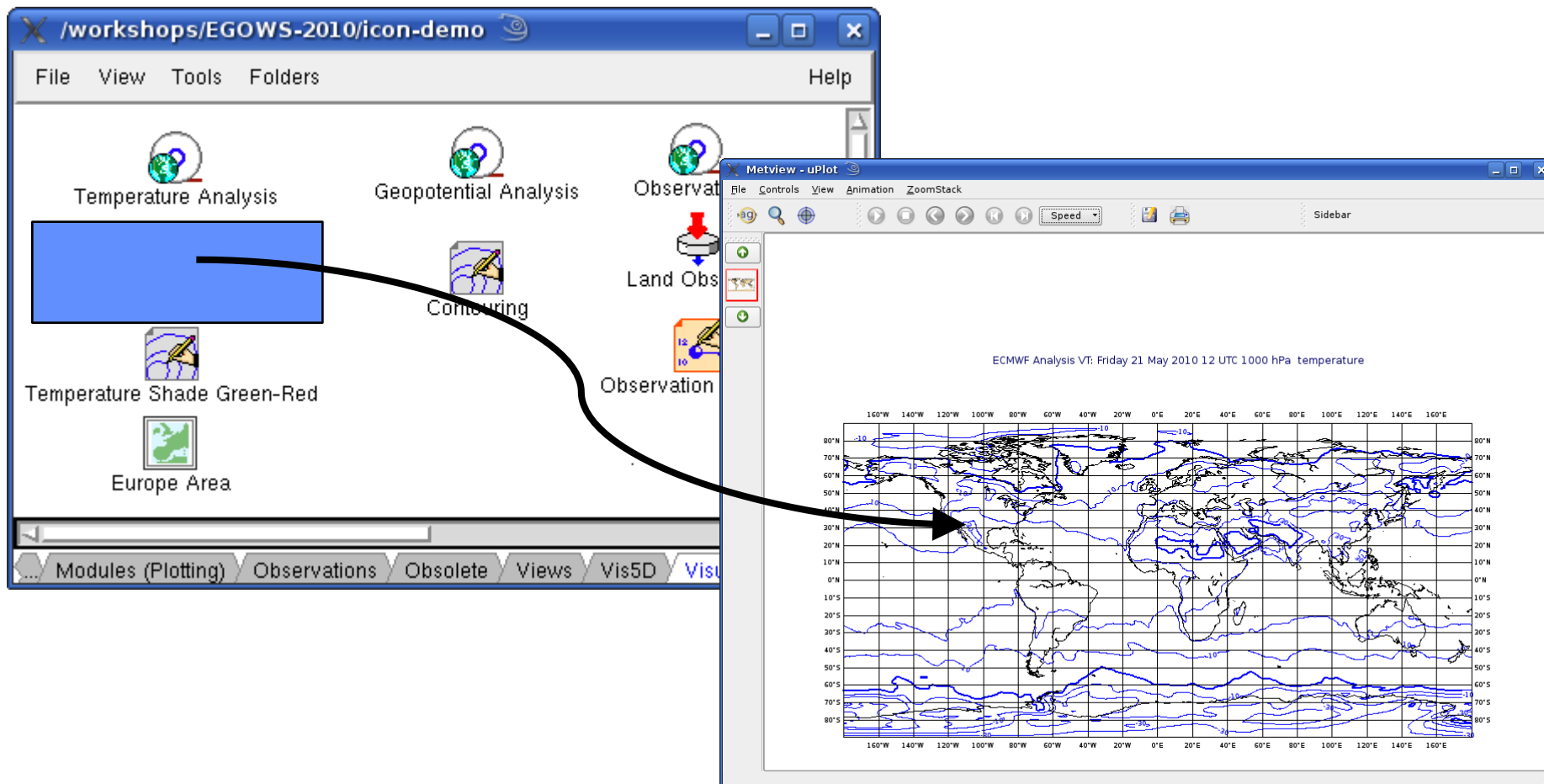
## 2) Icon-based interface





# Main features

## 3) Drag and Drop support



# Main features

## 4) Macro language

- ▶ Powerful meteorologically oriented language
- ▶ Simple script language + modern computer language
- ▶ Extensive list of functions
- ▶ Interfaces with Fortran/C/C++ code
- ▶ Outputs:
  - ▶ Derived data
  - ▶ Multiple plots
- ▶ Customised editor
- ▶ Run in batch or interactive modes

```
# Read a grib file
temp = read ( "/home/graphics/temp.grb" )

# Re-scaling field
if threshold > 0 then
    temp = temp - 273.5
    a = integrate ( temp )
end if

# Compute the gradient
q = gradientb ( temp )

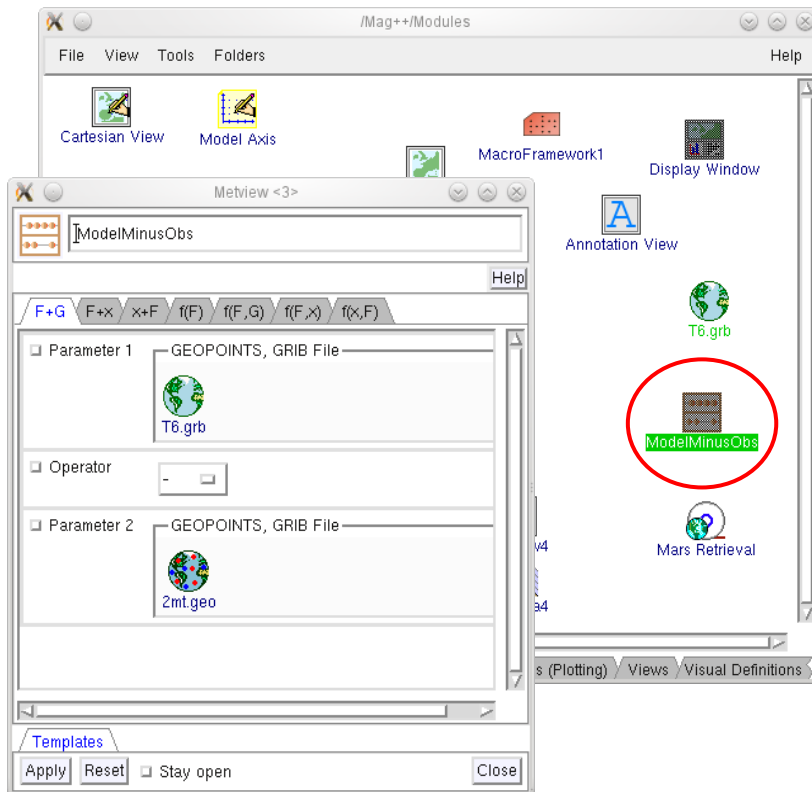
# Save field
write ( "/home/graphics/gradient.grb" , q )

# Plot field
plot ( [ps,svg], q )
```

# Main features

## 5) Strong synergy between Icons & Macros

- ▶ Every icon can be translated into a Macro command

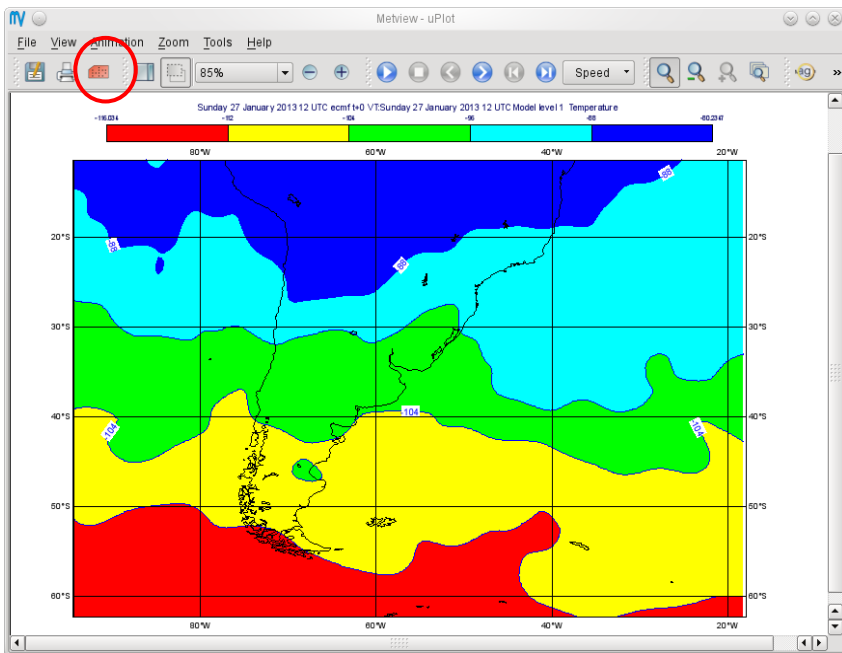


```
Macro* - /home/graphics/cgk/metview/Mag++/Modules/Macro
File Edit View Insert Program Settings Help
#Metview Macro
# Read grib model field
temp = read("/home/graphics/T6.grb")
# Read geopoints observations
obs = read("/scratch/2mt.geo")
# Compute model - observations
gpt = temp - obs
File loaded L: 10, C: 1
```

# Main features

## 5) Strong synergy between Icons & Macros

- ▶ Plots can be translated into a Macro program

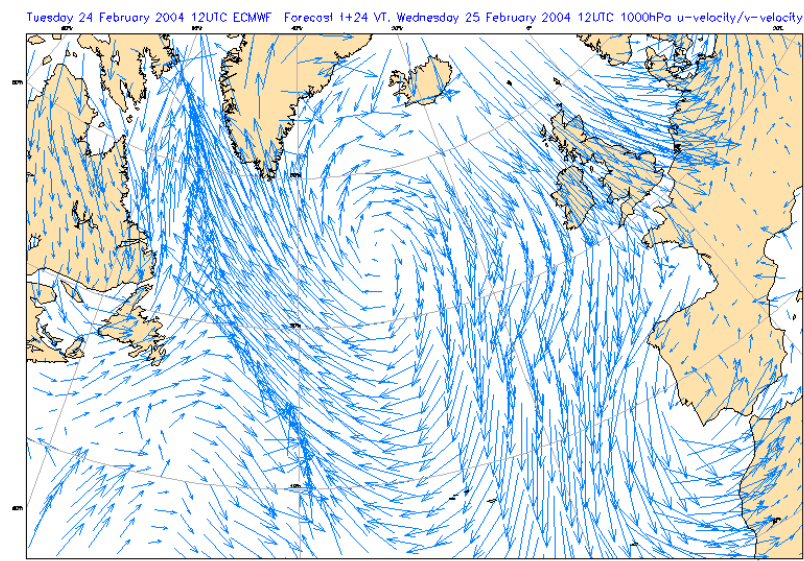
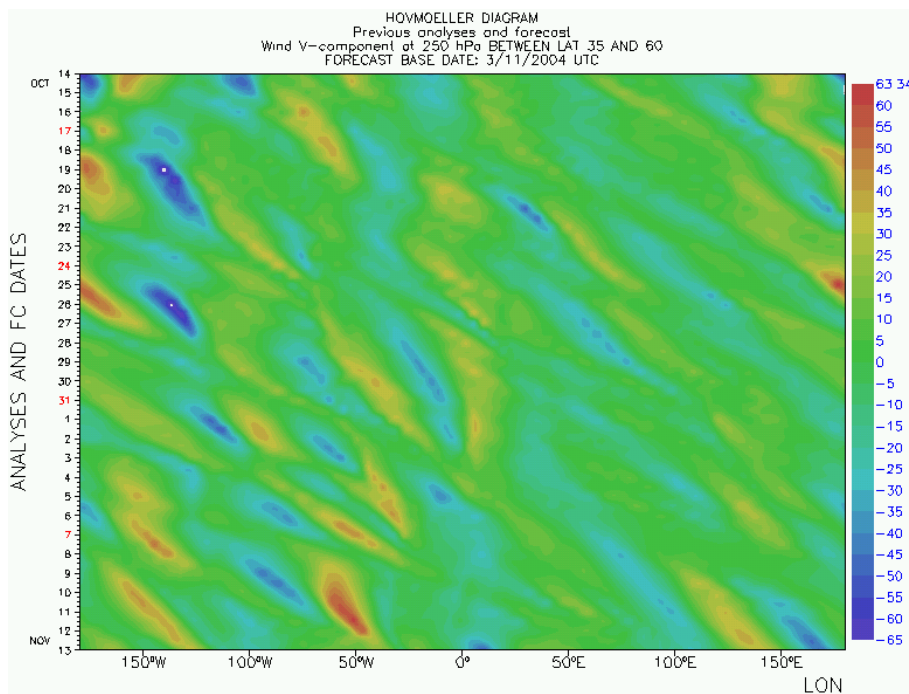


```
File Edit View Insert Program Settings Help
# Metview Macro
# Importing T91_grb
temp = read ( "/home/graphics/cgk/T91.grb" )
cont4 = mcont(
    LEGEND : "ON",
    CONTOUR_LEVEL_SELECTION_TYPE : "INTERVAL",
    CONTOUR_LABEL_TEXT : "",
    CONTOUR_SHADE : "ON",
    CONTOUR_SHADE_METHOD : "AREA_FILL"
)
# Plot command
plot ( temp, cont4 )
File saved L: 16, C: 1
```

# Main features

## 6) Can produce a variety of meteorological charts

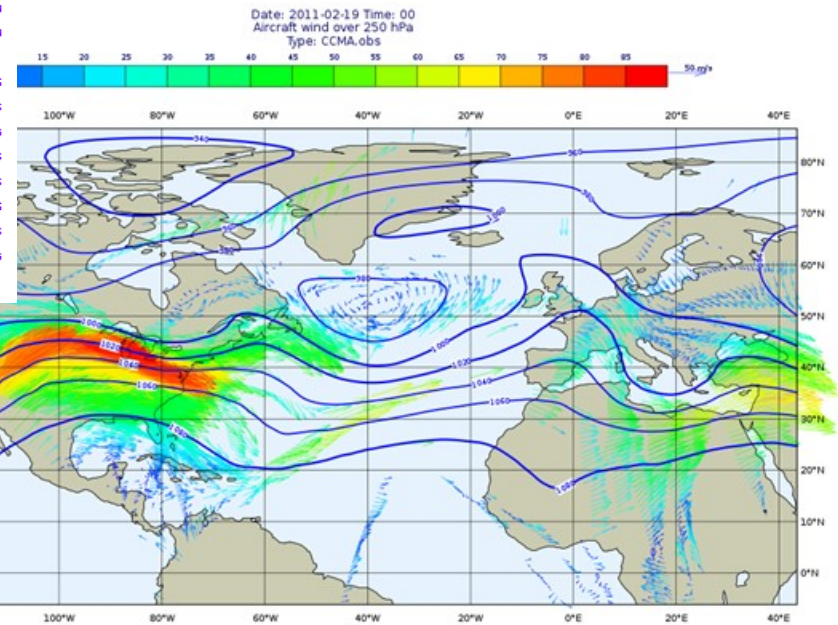
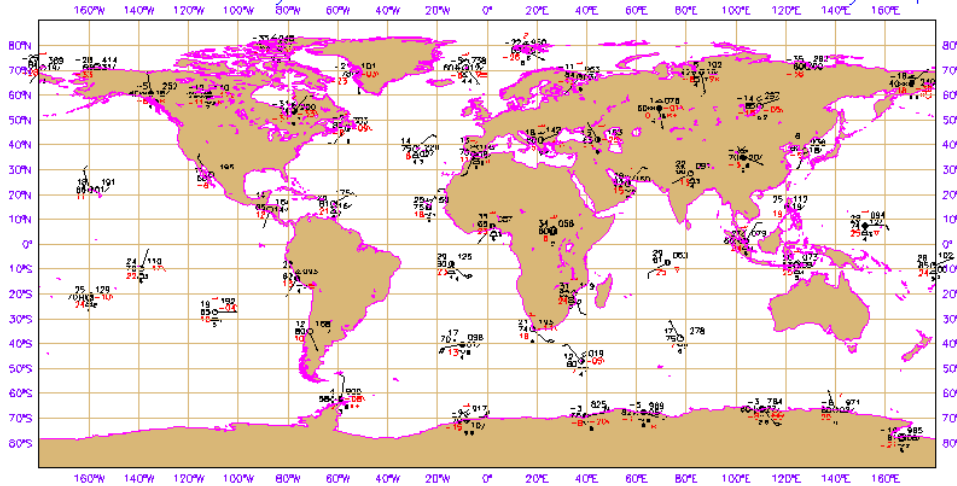
- ▶ Rich set of visualisation attributes



# Main features

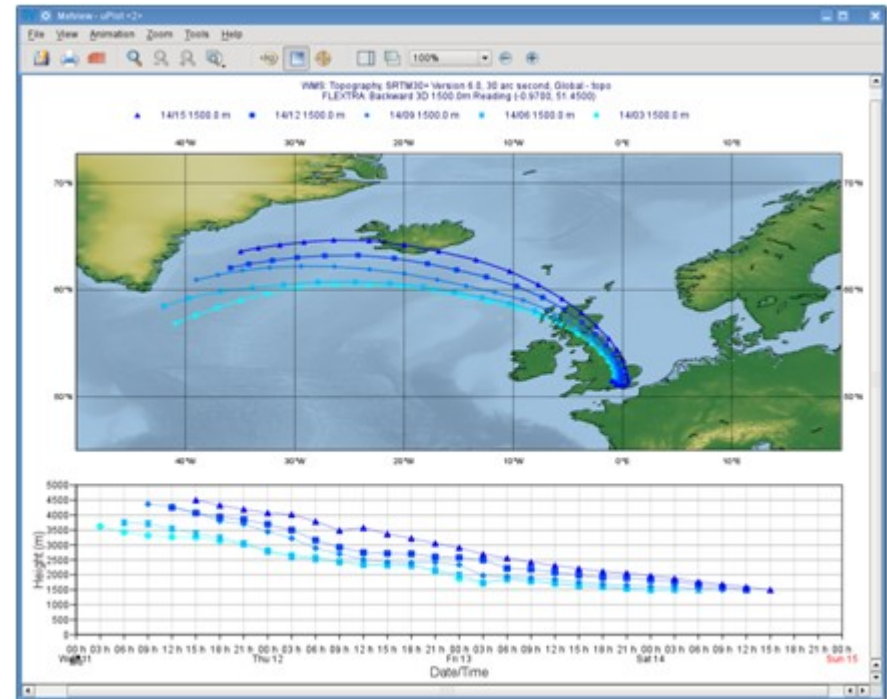
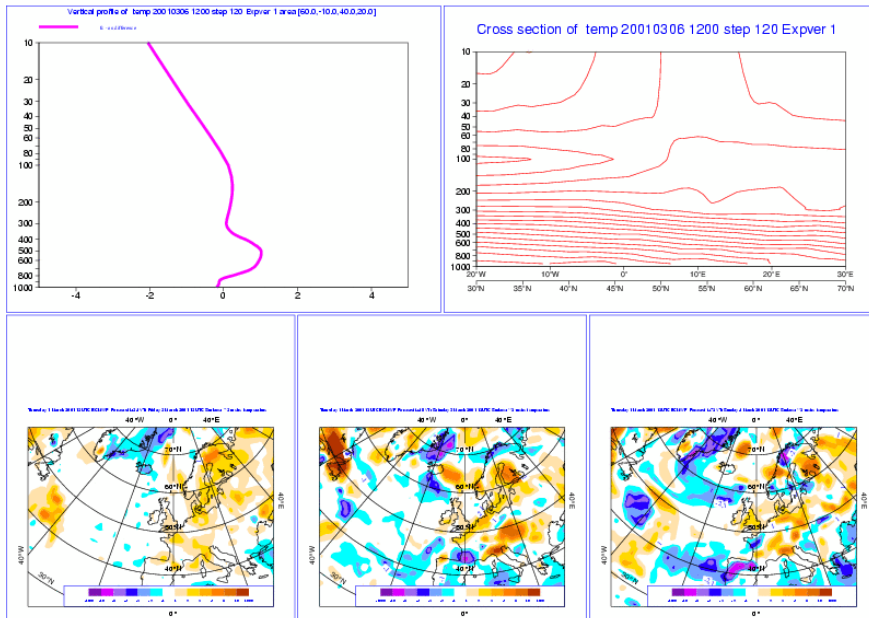
## 6) Can produce a variety of meteorological charts

Obs: Sunday 3 March 2002 12UTC Surf:synop



# Main features

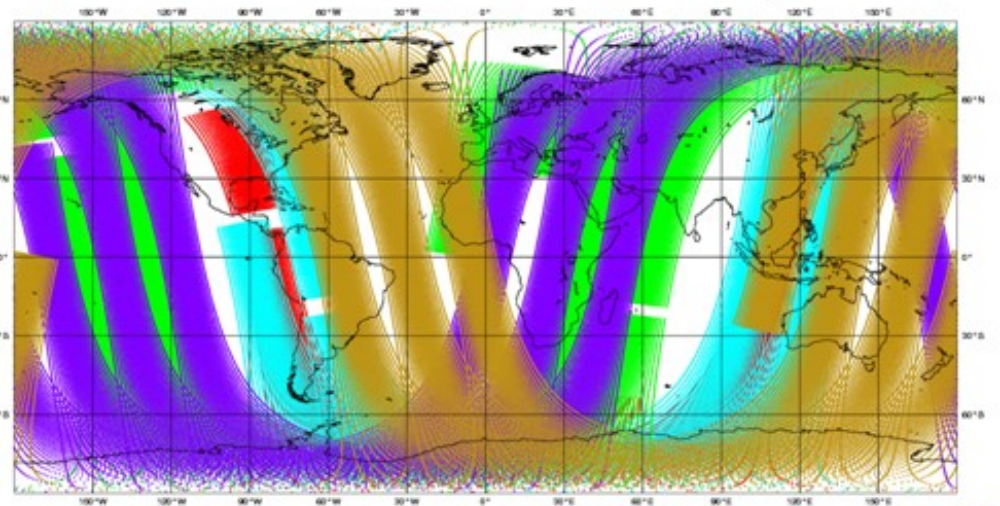
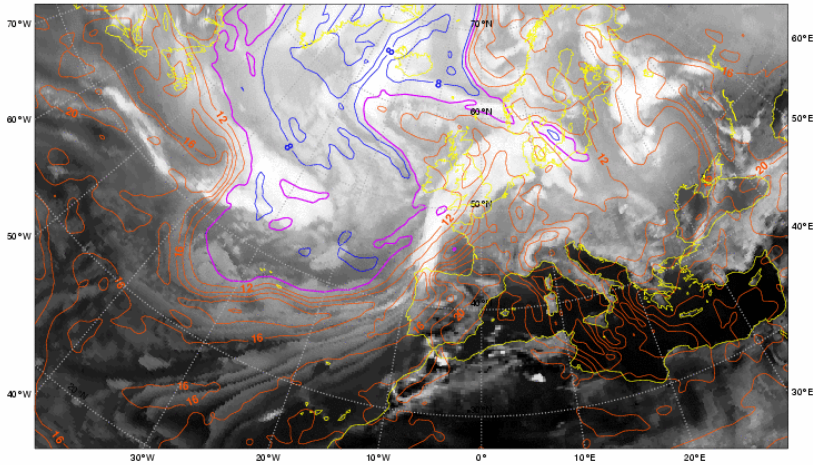
## 6) Can produce a variety of meteorological charts



# Main features

## 6) Can produce a variety of meteorological charts

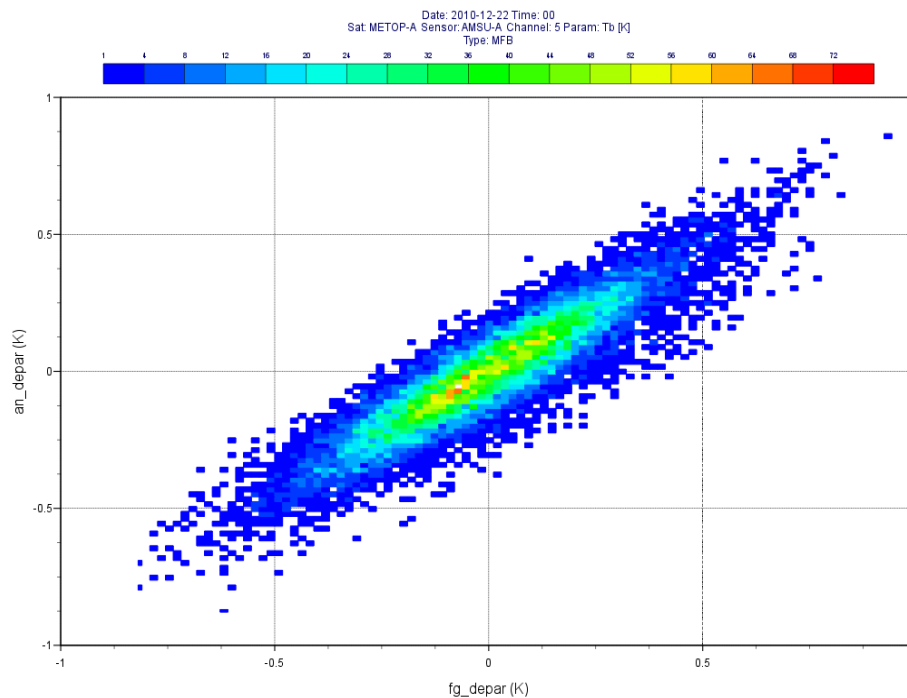
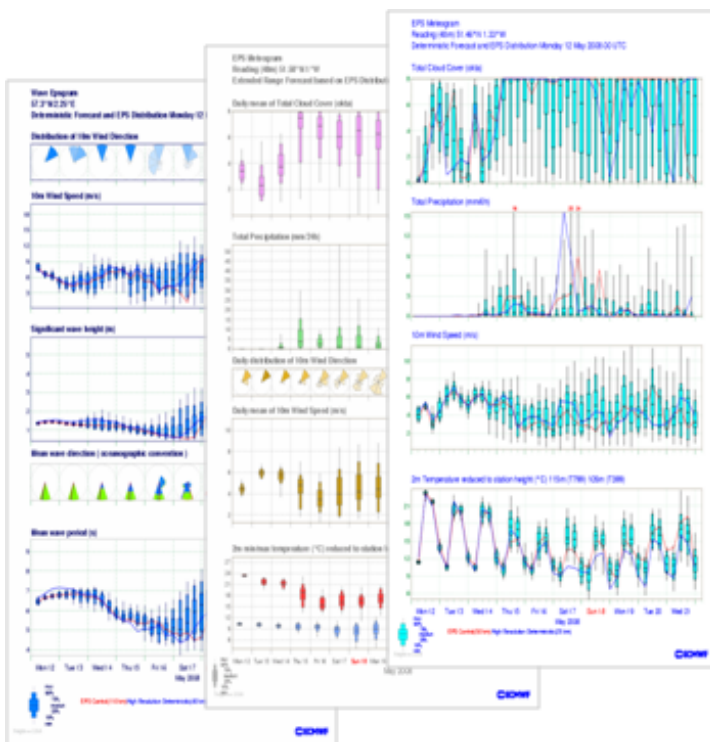
Monday 27 July 2009 00UTC © ECMWF 1+0 VT:Monday 27 July 2009 00 UTC  
 Model simulated METEOSAT 9 SEVIRI (Channel 9 IR10.8) Brightness Temperature and 850 hPa wet bulb pot. temp.





# Main features

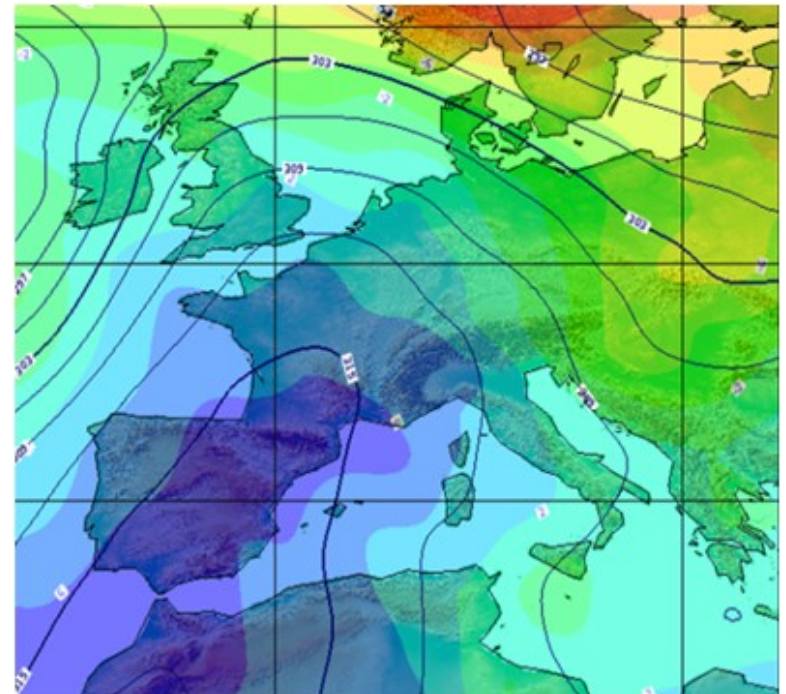
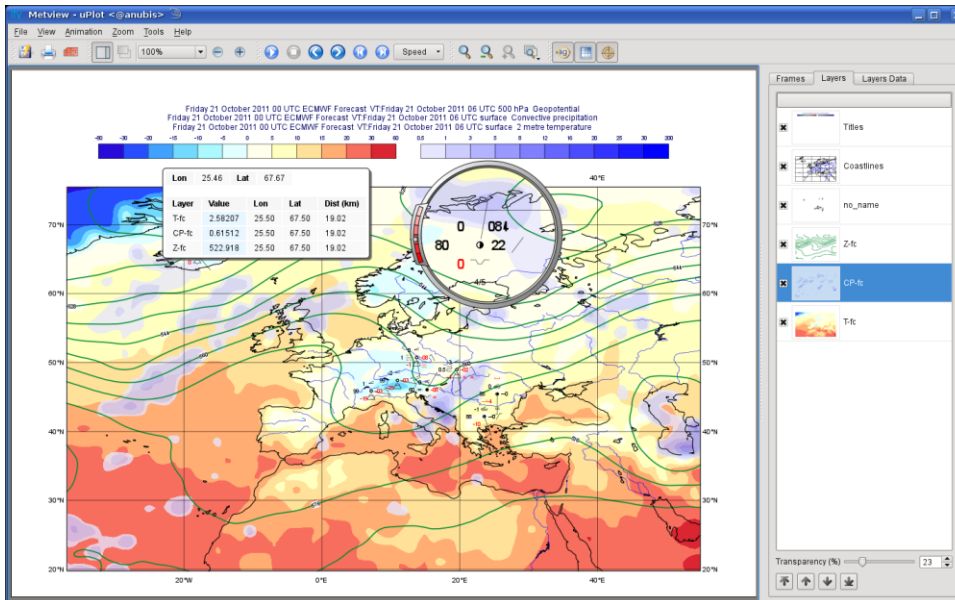
## 6) Can produce a variety of meteorological charts



# Main features

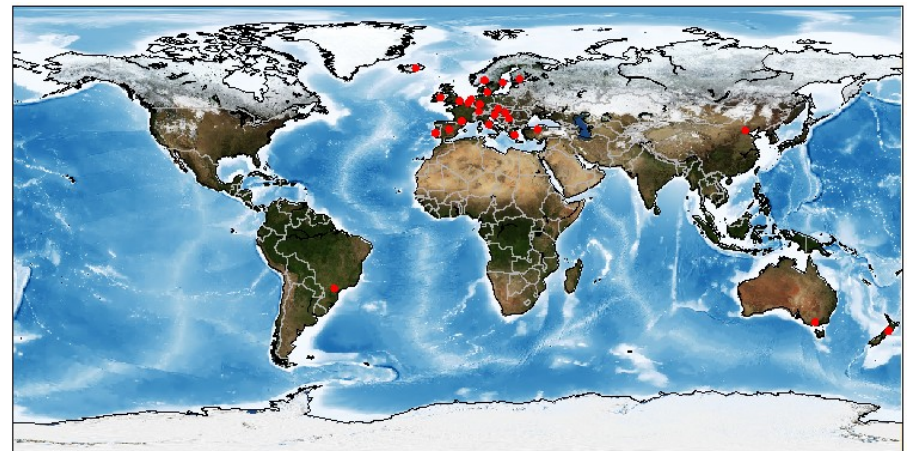
## 6) Can produce a variety of meteorological charts

- ▶ Easy to overlay different data sets



# Who uses Metview?

- ▶ **Used internally at ECMWF by researchers and operational analysts**
  - ▶ To assess the quality of Observations/Forecast
  - ▶ To develop new (graphical) products
  - ▶ For general research activities
- ▶ **Member States (local installations and remotely on our *ecgate* server)**
- ▶ **Other national weather services and Universities**
- ▶ **Commercial customers of ECMWF products**



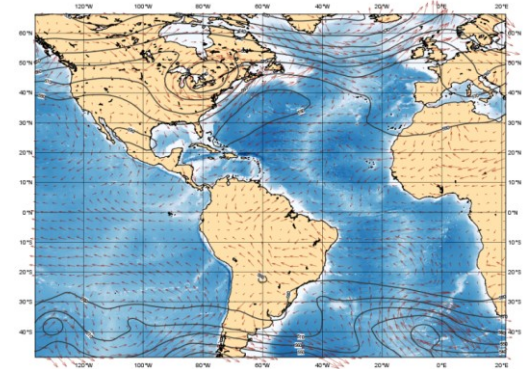
# Metview : Interactive Usage Demo



# Metview releases

## ▶ Metview at ECMWF

- ▶ `metview4` : stable user version
- ▶ `metview4_new` : test version
- ▶ available on ecgate



## ▶ Metview outside ECMWF

- ▶ export version: 4.3.10, released 2013-05-28
- ▶ available for download
  - ▶ as a source tarball
  - ▶ as a virtual machine from the [Webinars](#) webpage

# For more information ...

email us:

🖱️ **Metview:** [metview@ecmwf.int](mailto:metview@ecmwf.int)

visit our web pages:

🖱️ <https://software.ecmwf.int/metview>

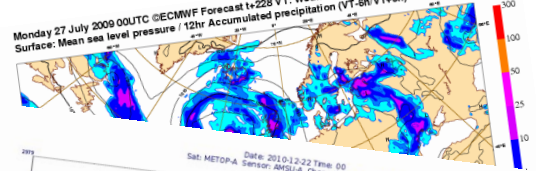
- *Training / Webinars*
- **Links to optional tutorial material**
- **Download the virtual machine**

Friday, 21<sup>st</sup> June, 8.30-10.30am UTC: Q&A

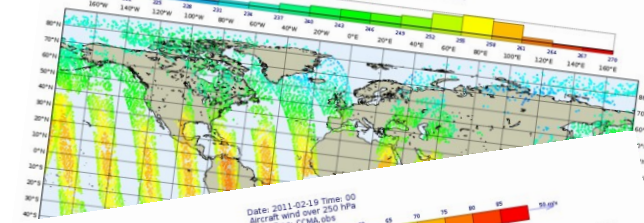
Via discussion room: [www.hipchat.com/gRuxxenIY](http://www.hipchat.com/gRuxxenIY)

In case of problems, please email us.

Monday 27 July 2009 00UTC ©ECMWF Forecast t+228 VT, Wednesday 5 August 2009 12UTC  
Surface: Mean sea level pressure / 12hr Accumulated precipitation (VT-6h/VT+6h)



Sat. METOP-A Date: 2011-02-22 Time: 00  
Sensor: AMSU-A Channel: 5 Param: Tb [K]  
Type: MFB



Date: 2011-02-19 Time: 00  
Aircraft wind over 200 hPa  
Type: CMAObs

