

Metview – Introduction



The screenshot displays the Metview software interface. The main window shows a desktop with icons for 't_std_dev.grb', 'Temperature Cross Section', 'Reading Meteogram', 'Folder', 'Mars Retrieval', 'Average Data', 'UK Map View', 'Shaded Coastlines', 'Rain Contouring', 'Notes', and 'Wind Barbs'. A window titled 'statistics' is open, showing a list of data points and a code editor with the following code:

```
# 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
```

The statistics window also shows the output: 'Program finished (OK) : 4.078 s [Finished at 14:05:55] | L 14, C 27'.

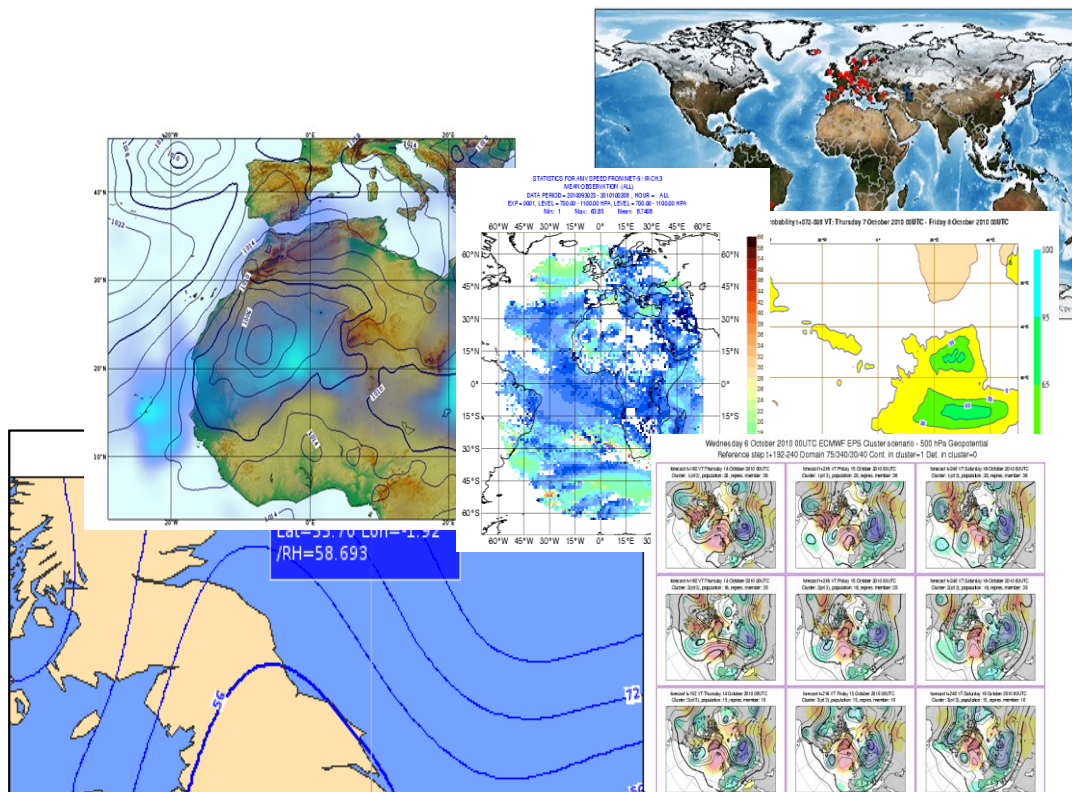
Fernando li

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:

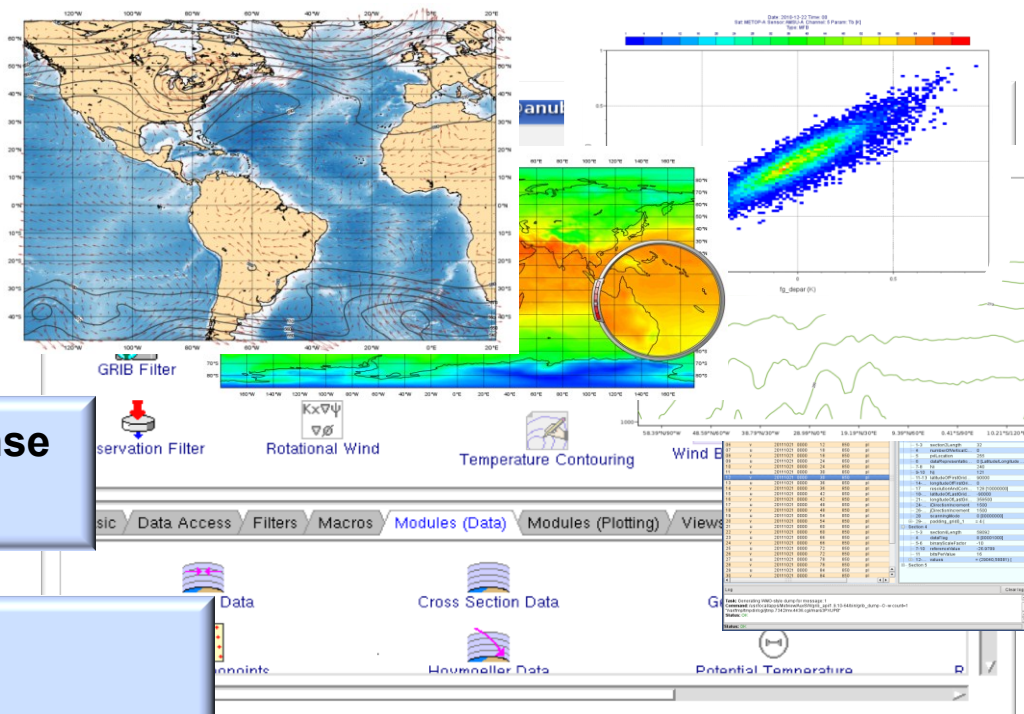


(Brazil)

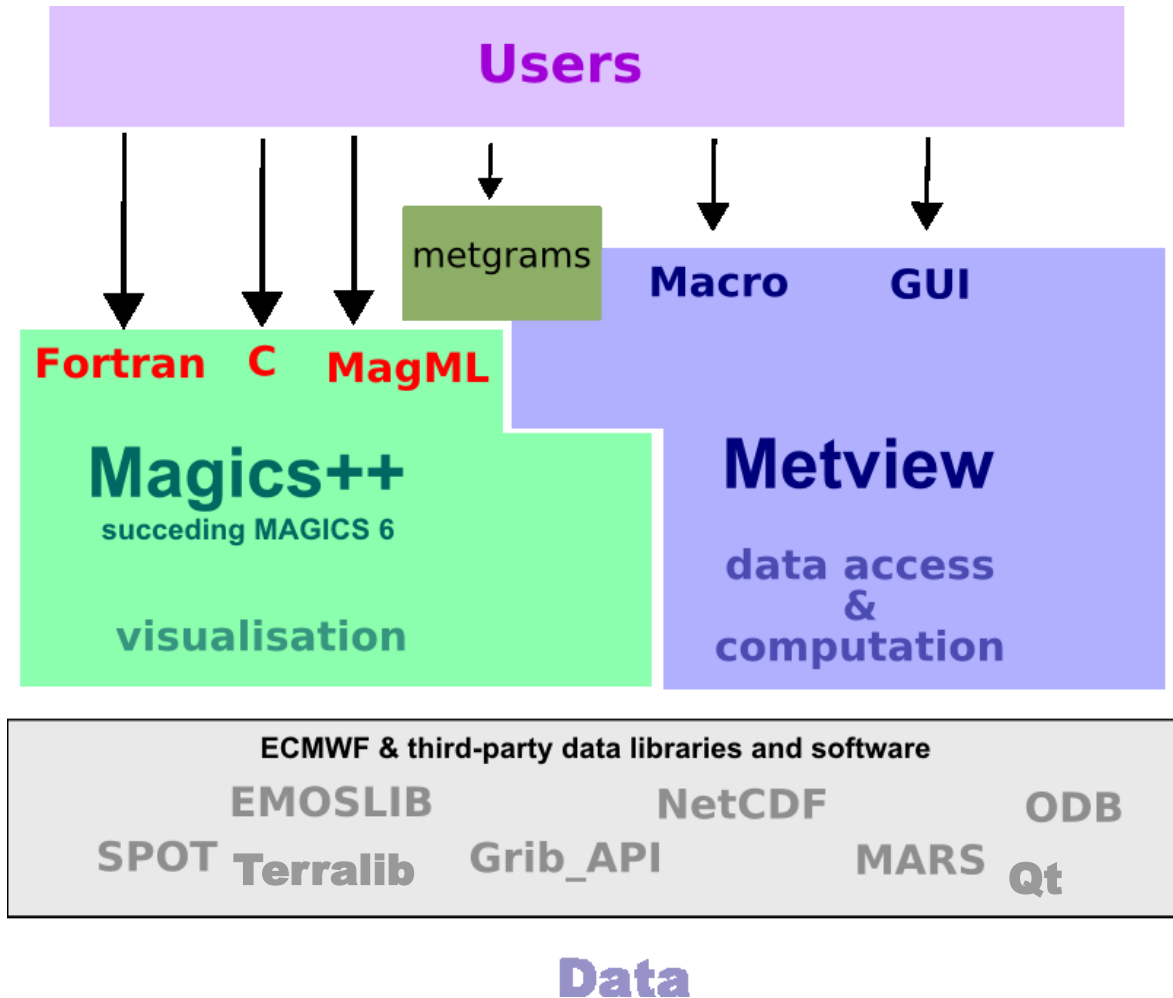
Freely available under Apache license
(since August 2012)

Built on core ECMWF technologies:

MARS, GRIB_API, Magics, ODB, EMOSLIB



Metview: software relationship

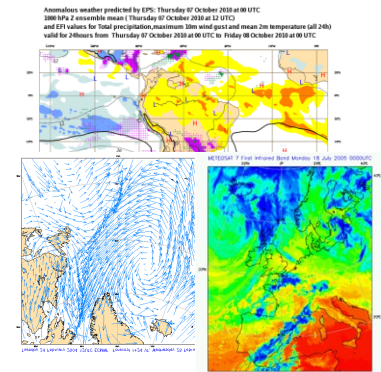


Metview history (summary)

- ▶ 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

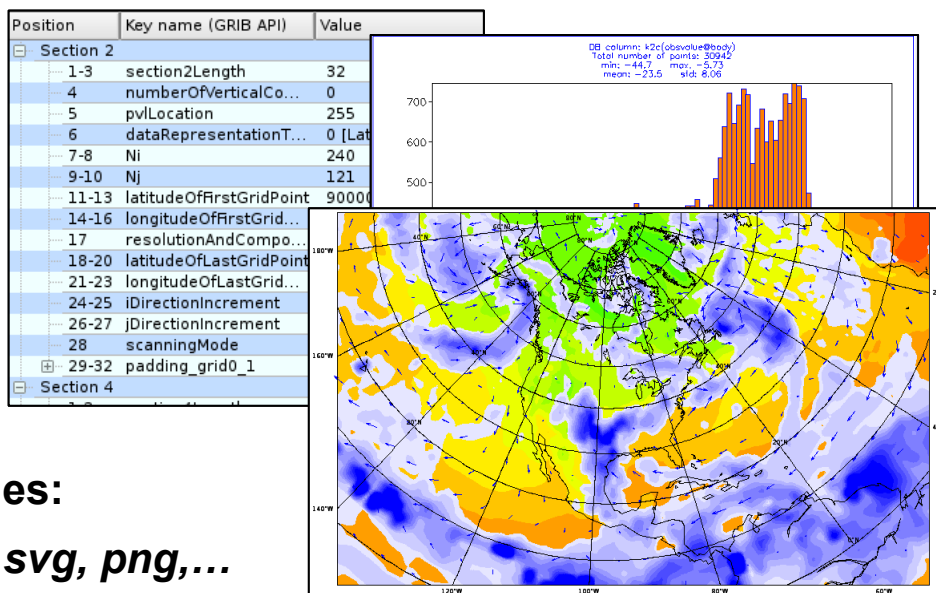
What can Metview do?

► 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

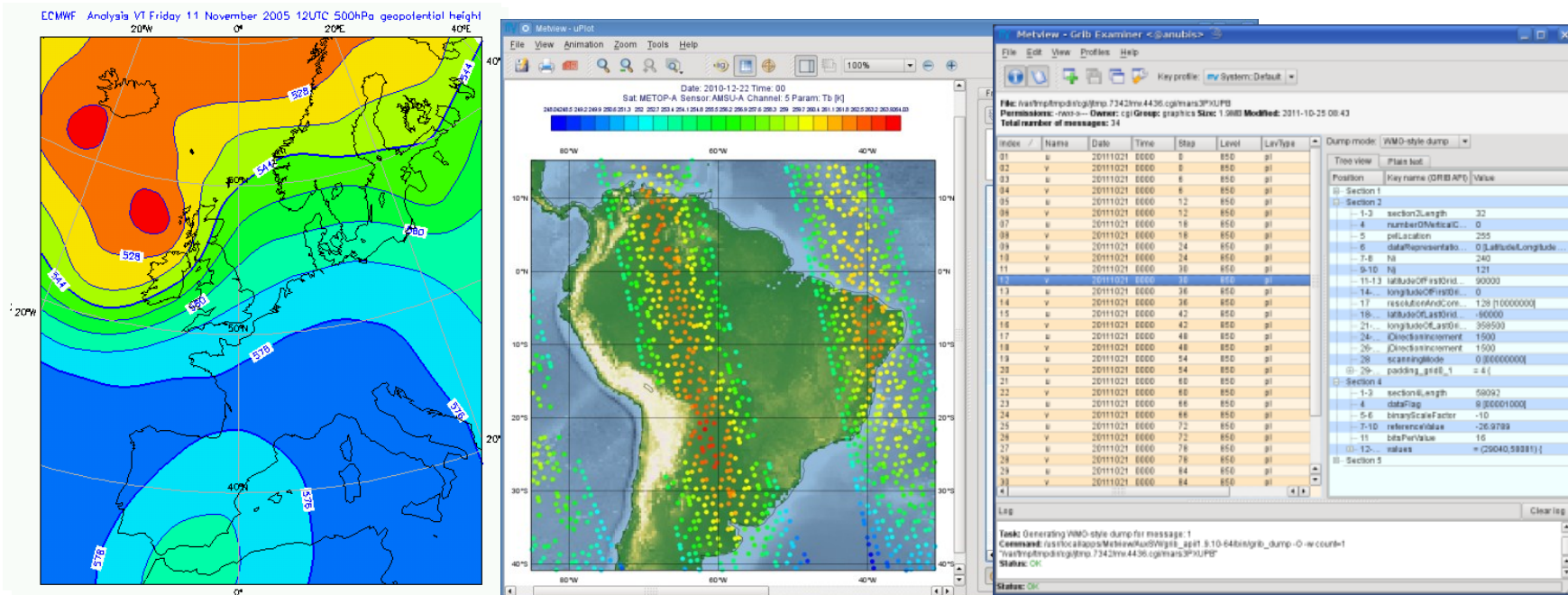
- From laptops to supercomputers

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

Main features

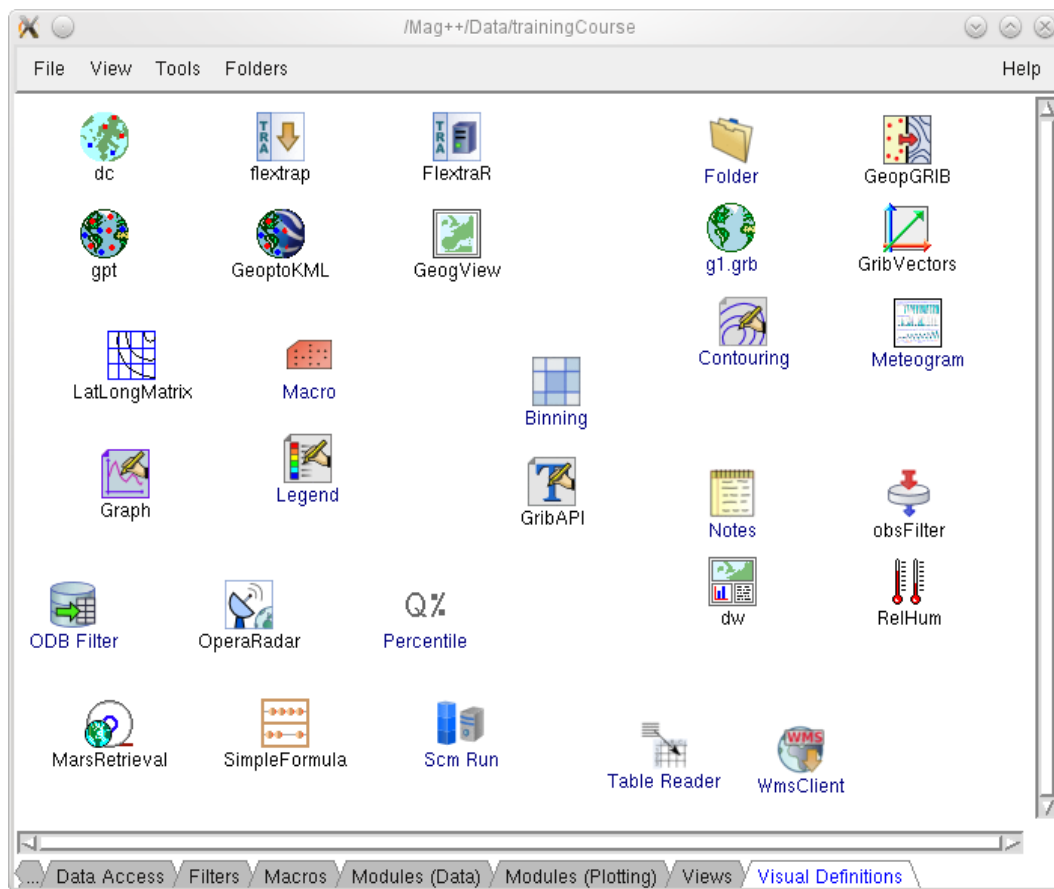
1) Data handling

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



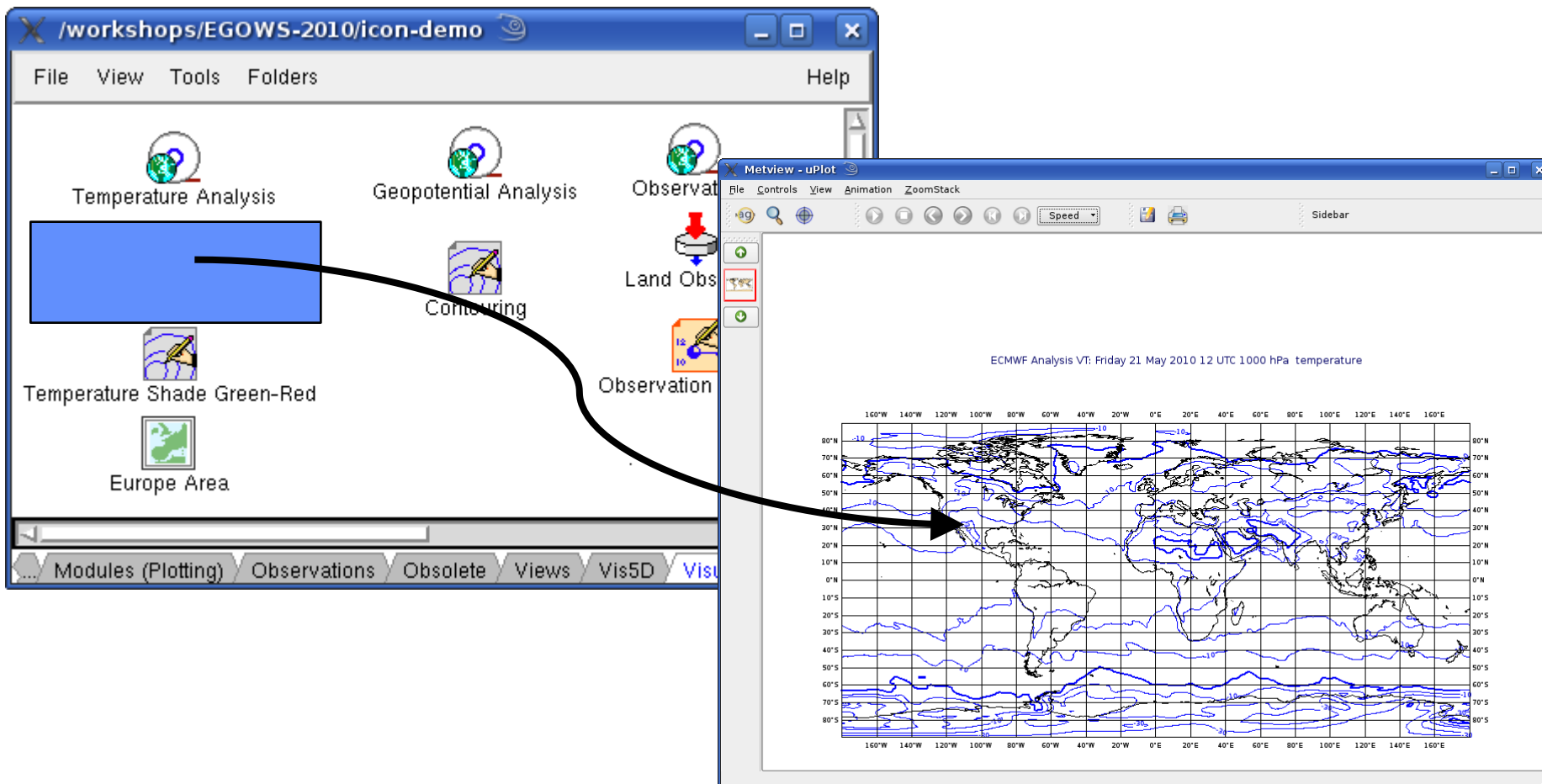
Main features

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 )

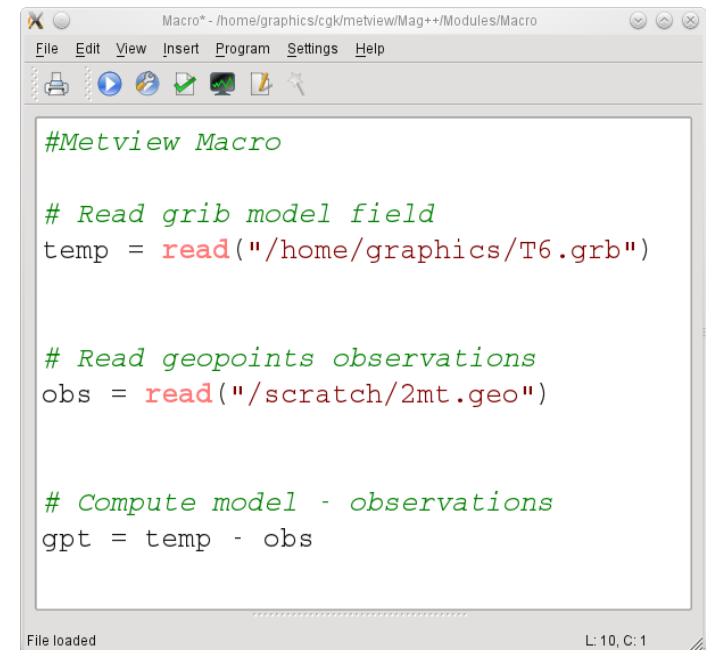
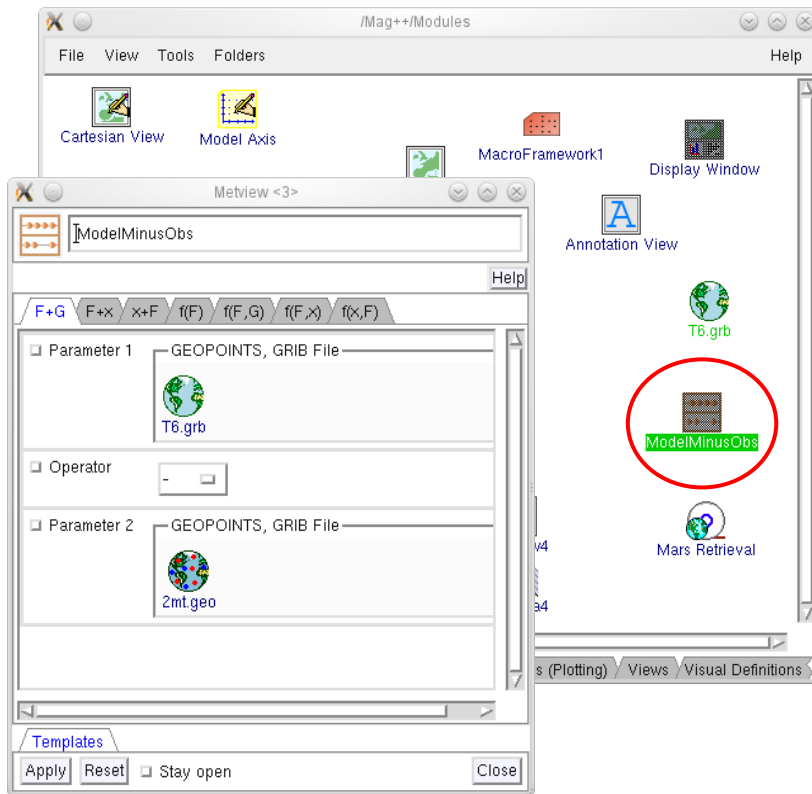
# Save field
write ( "/home/graphics/gradient.grb" , q )

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

Main features

5) Strong synergy between Icons & Macros

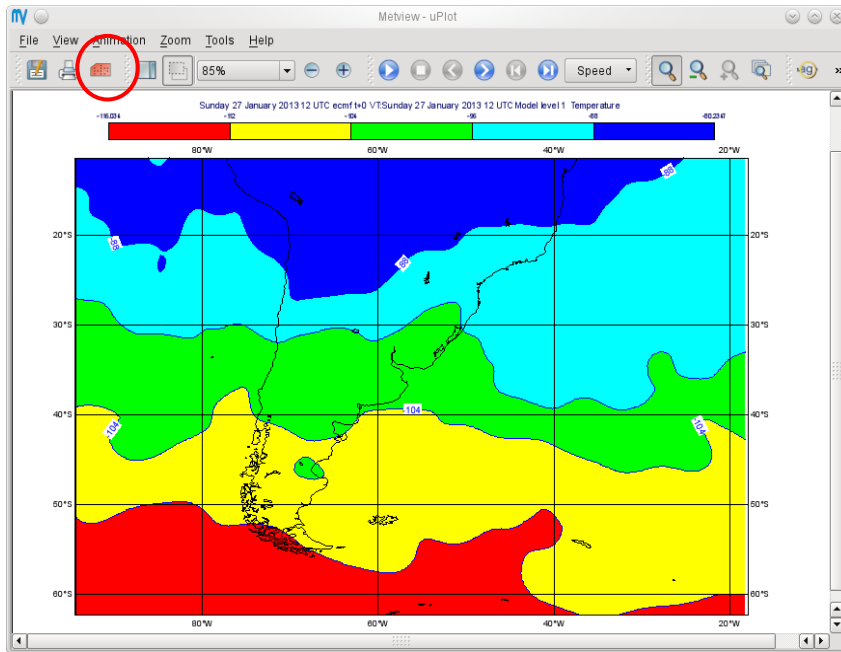
- ▶ Every icon can be translated into a Macro command



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 )

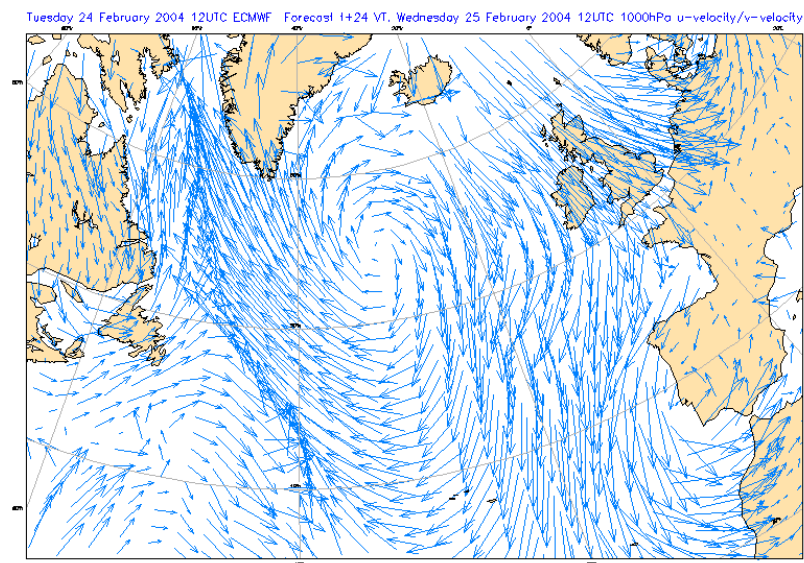
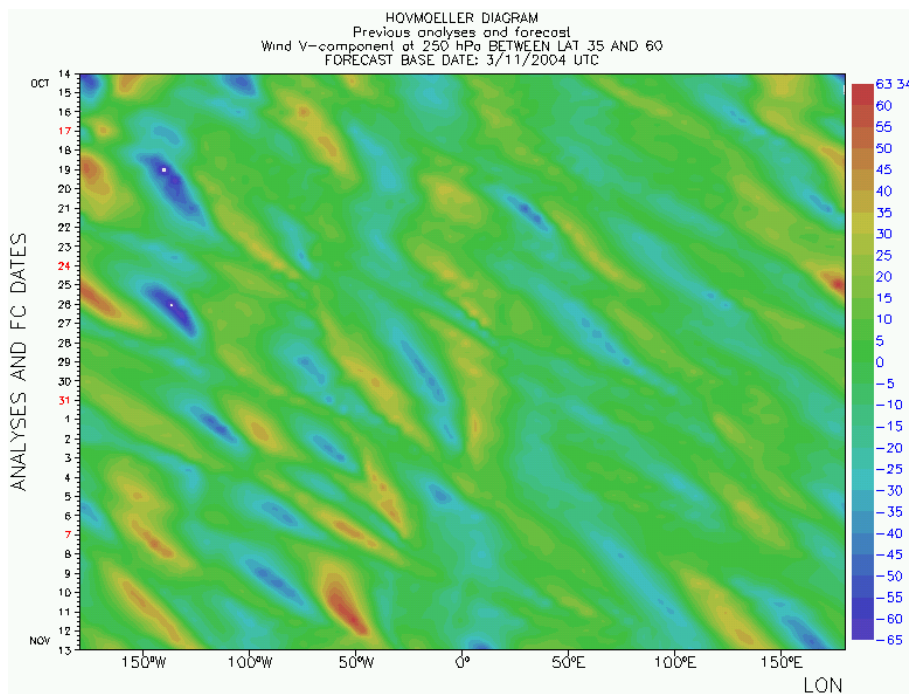
File saved                                     L: 16, C: 1

```

Main features

6) Can produce a variety of meteorological charts

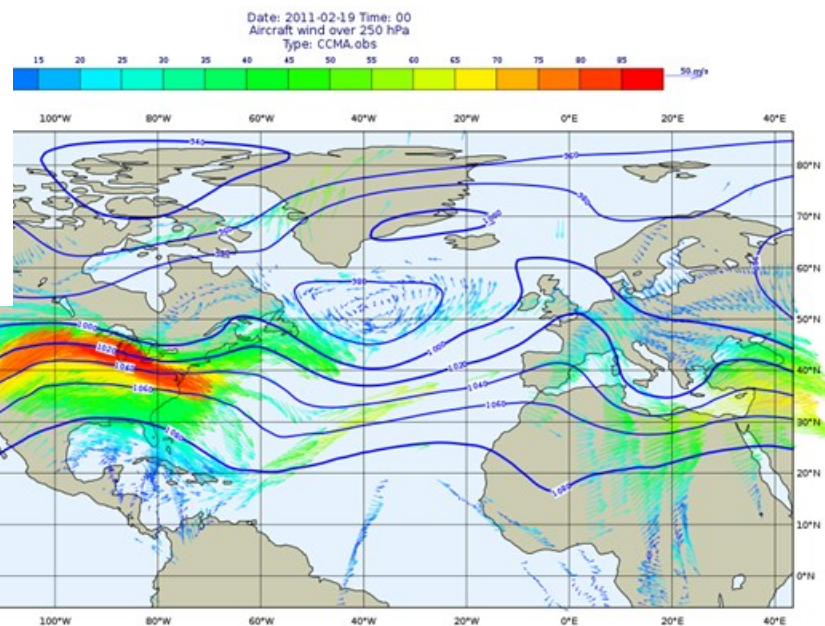
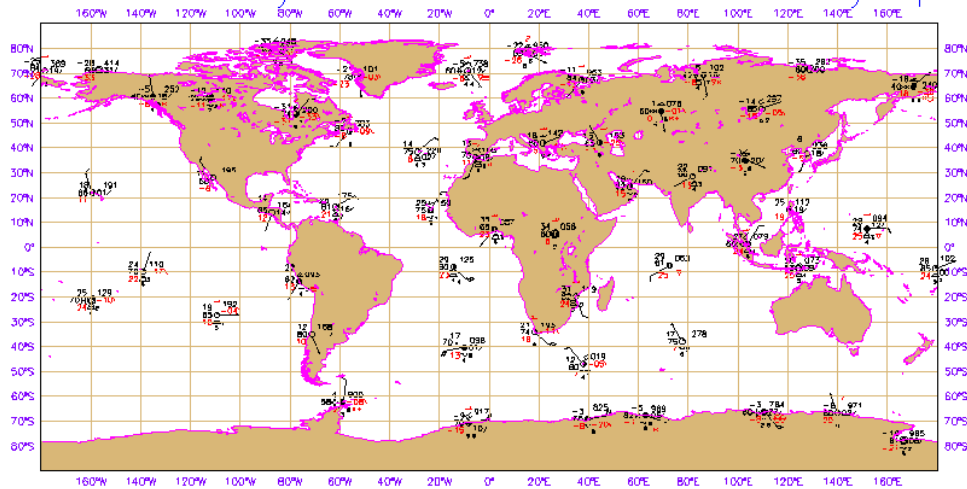
- ▶ Rich set of visualisation attributes



Main features

6) Can produce a variety of meteorological charts

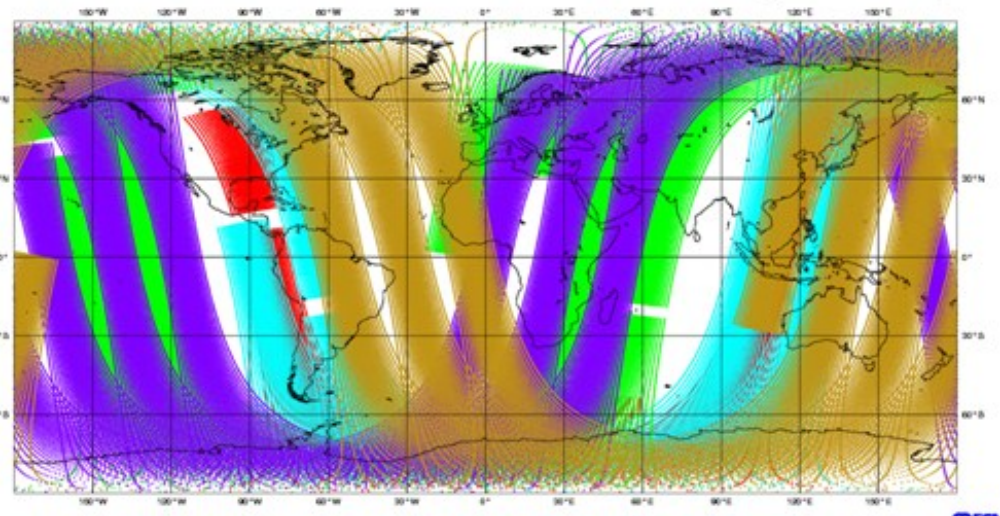
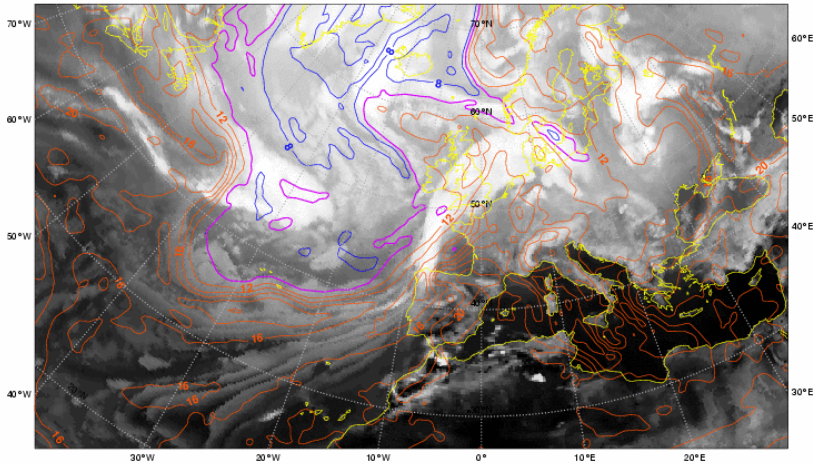
Obs: Sunday 3 March 2002 12UTC Surf:synop



Main features

6) Can produce a variety of meteorological charts

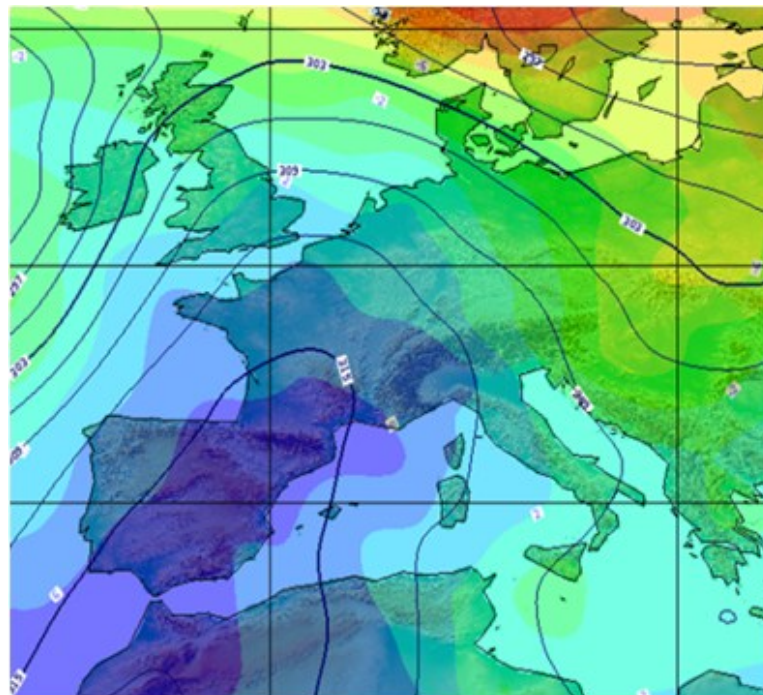
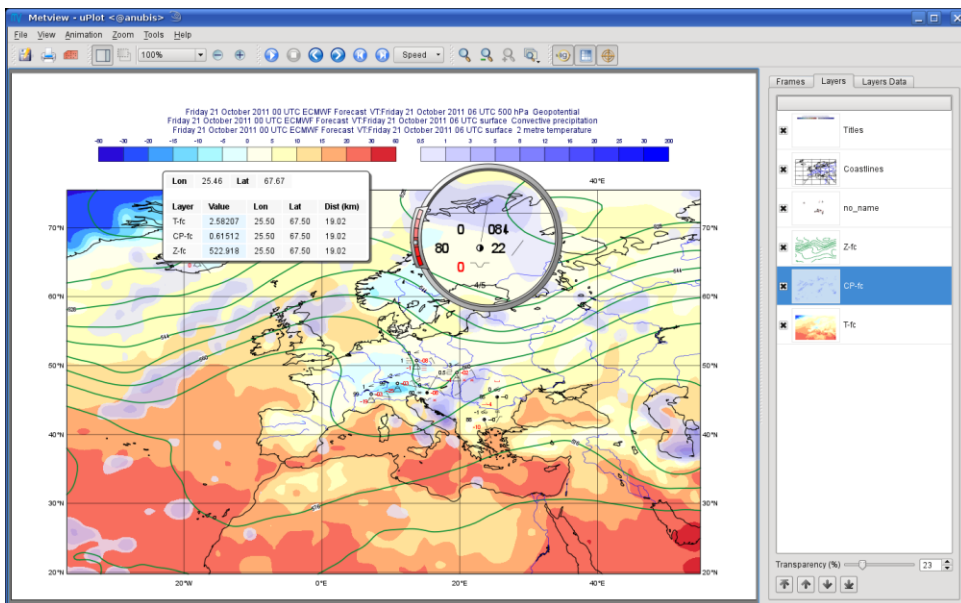
Monday 27 July 2009 00UTC © ECMWF 1+0 VT: Monday 27 July 2009 00 UTC
 Model simulated METEOSAT 9 SEVIRI (Channel 9 IR10.8) Brightness Temperature and 850 hPa wet bulb pot. temp.



Main features

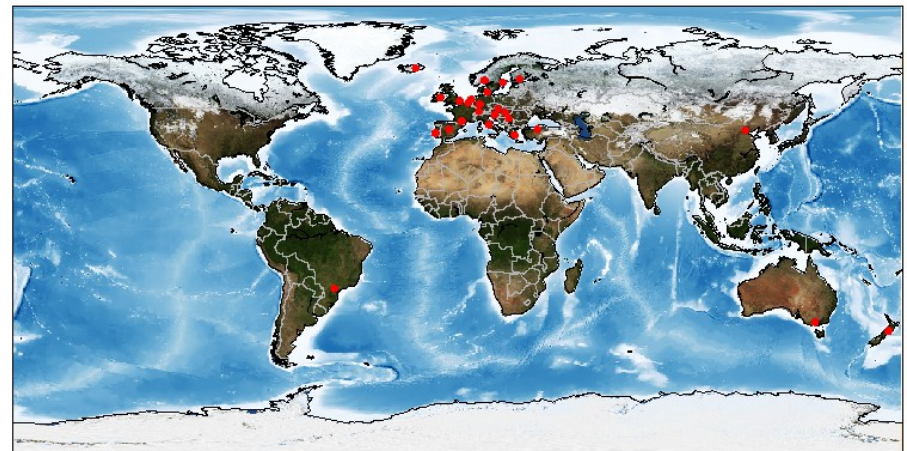
6) Can produce a variety of meteorological charts

- ▶ 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**



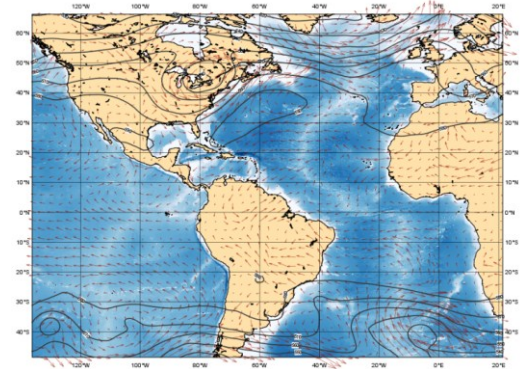
Metview : Interactive Usage Demo



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

visit our web pages:

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

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

Friday, 21st June, 8.30am UTC: Q&A

