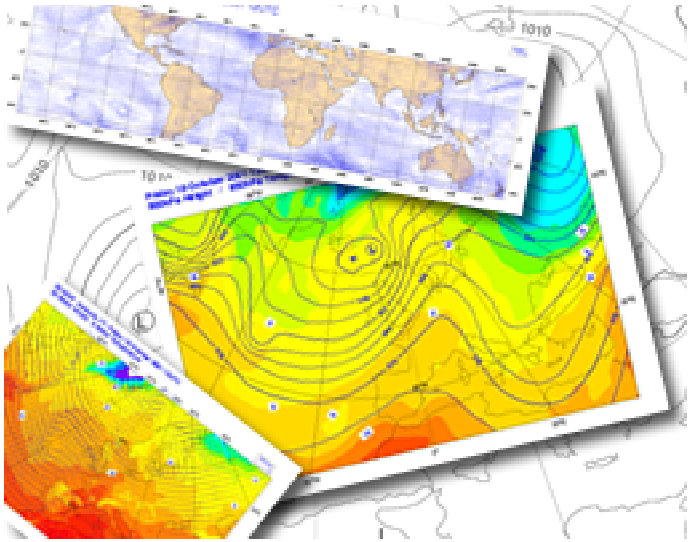
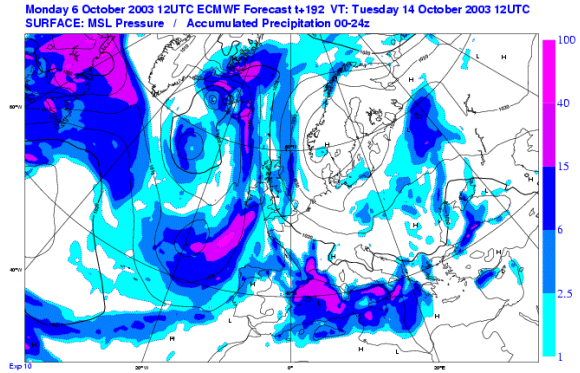
Magics Next Generation

An Object-Oriented Architecture With a New Contouring Package



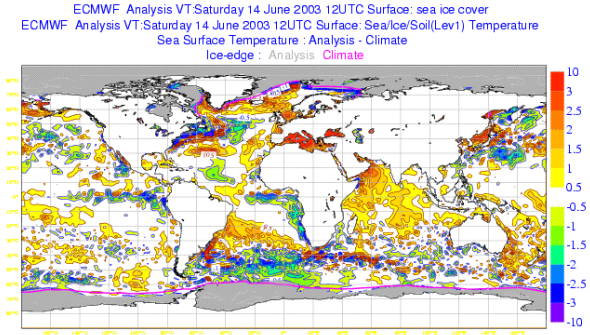
Sylvie Lamy-Thépaut

Magics Next Generation



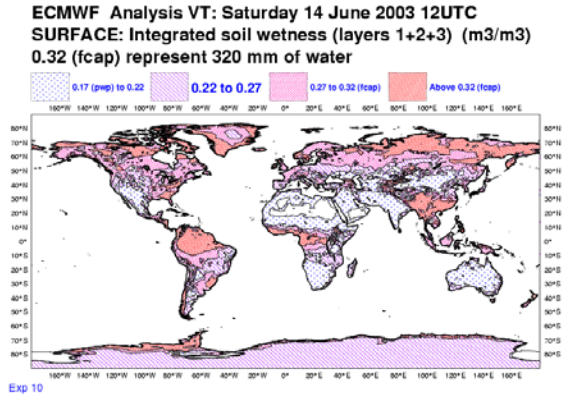
- The present
- Our challenge : to be better
  - ➔ Review the old requirements
  - ➔ Consider the new ones
- The keys for a bright future
  - ➔ A solid object-oriented architecture
  - ➔ A new flexible contouring package
  - ➔ A smooth migration

Magics : The Present

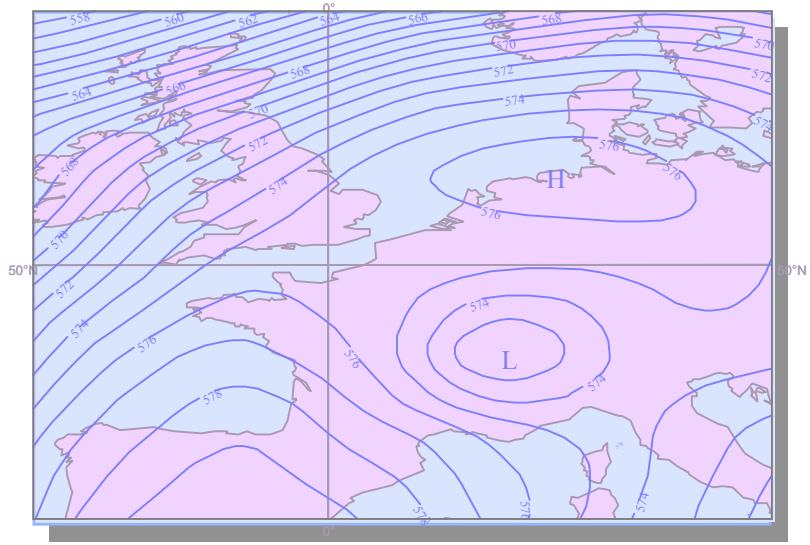


- Magics is producing 500 maps every day for Metops
- Magics is producing more than 5000 maps for the Web, and the demand is increasing
- Magics is installed in … member states
- Magics is used by Synergie (Météo-France)
- Magics is the graphical kernel of Metview

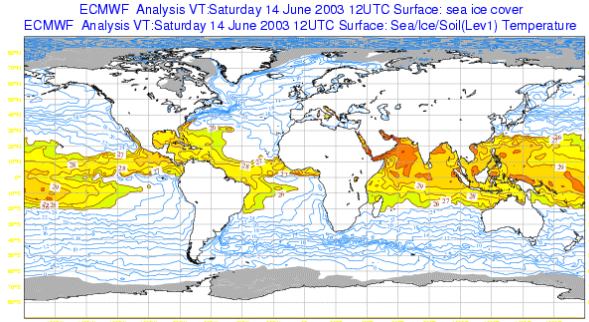
Magics : The good points



- **Magics is meteorologically-oriented**
  - ➔ GRIB
  - ➔ BUFR
  - ➔ Specific Visualisation
- **Magics provides a simple API**
  - ➔ Large set of Parameters
  - ➔ Small number of FORTRAN callable subroutines



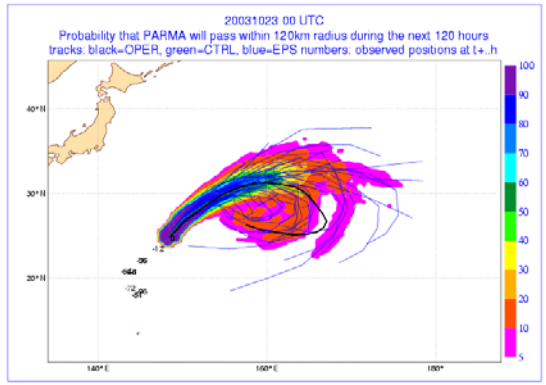
The Challenge



Keep the strong points, improve the weak!

- **Keep the "parameters" concept but refresh the names and defaults**
- **Keep and improve the meteorological aspects**
  - New meteorological data must plotted straightaway with a meaningful title and nice default plotting parameters.
  - Global ECMWF Database.
    - ➔ Parameters long name, short name, units
    - ➔ Specific visualisation

Work on the identified weaknesses

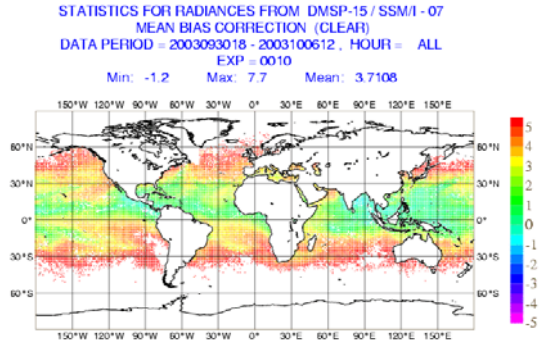


- **Work on the identified weaknesses**
  - Faster integration of new data format
    - → Netcdf
    - → Grib Edition 2
    - → ODB
- **Better legend and text handling**
  - More User Control

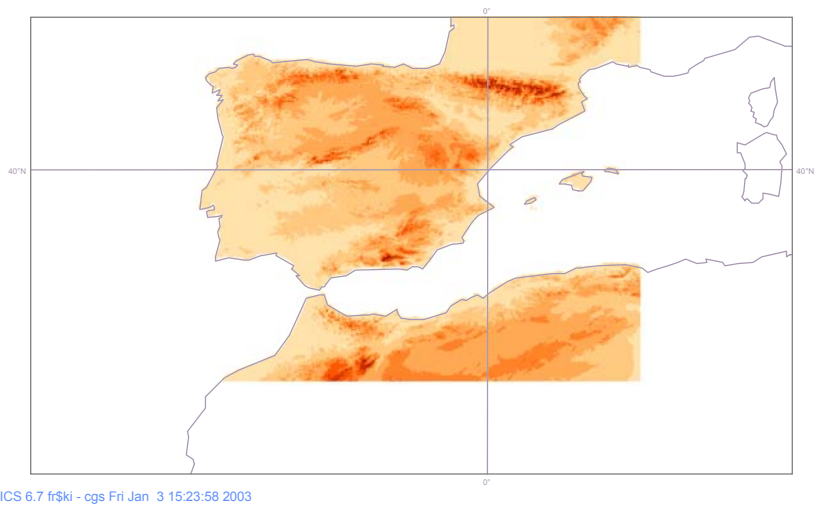
The Challenge

- **Increase the communication with Metview**
  - **Improve the legend mechanism**
  - **Add new possibilities of interaction**
    - ➔ Hierarchical layer visibility
    - ➔ Query the properties of an isoline or an observation
      - Meteorological
      - Graphical
    - ➔ Easier layout
      - More WYSIWYG tools

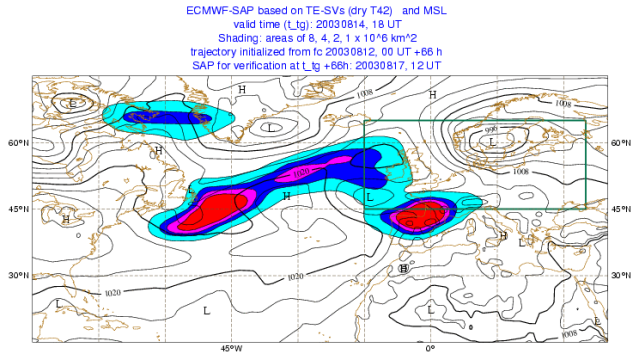
Review the old requirements



- New ideas for Coastlines
  - Adapt the resolution of coastlines according to the plotted area
  - Add rivers, towns, orography and implement a system of layers

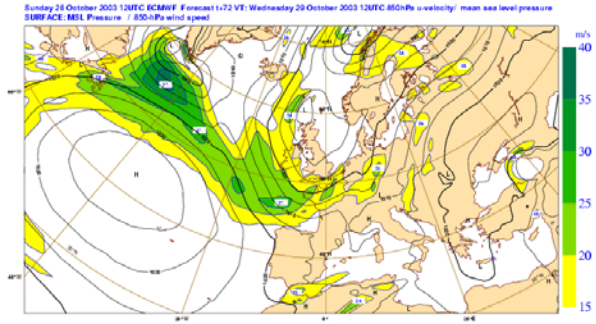


Review the old requirements



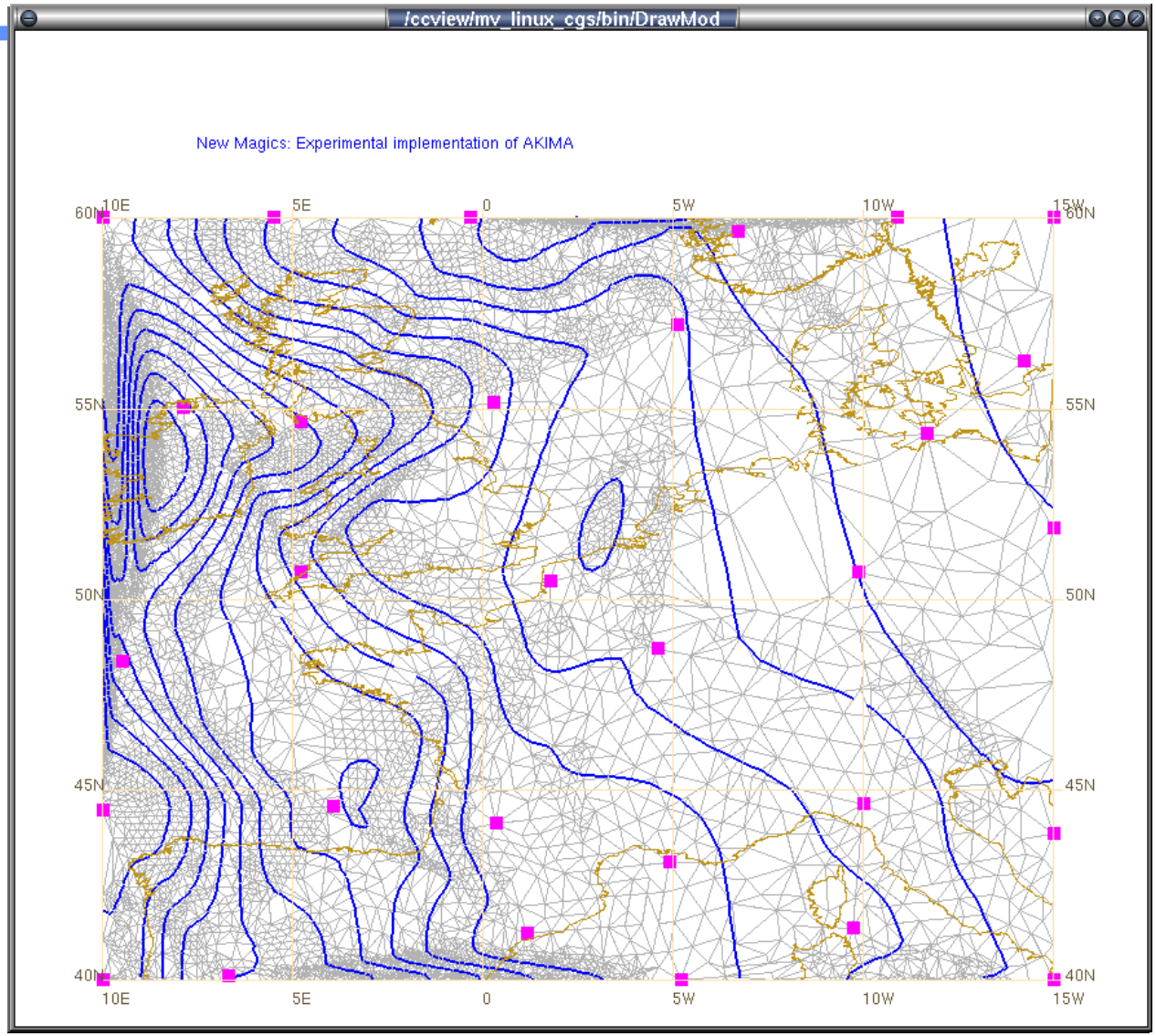
- **Review the requirements for a new contouring package**
  - ➔ User-defined interpolation level should determine the smoothness of the isolines
    - Can be automatically adapted according to the selected geographical area
    - Gives a tool to enable close inspection of the data
  - ➔ The new package should enable new input data representations
    - Scattered data
    - irregular grids

Akima

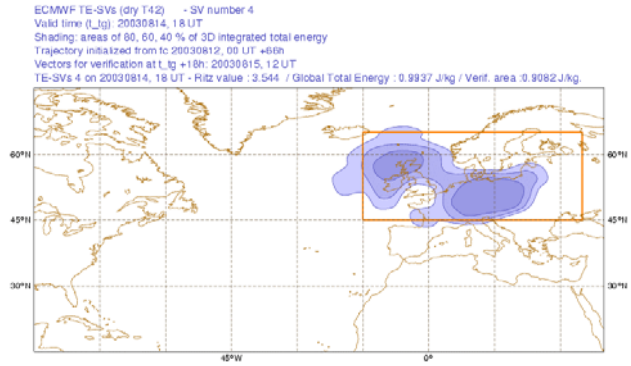


- **The Akima Method satisfies these requirements**
- **The principle of the Akima Method**
  - Create triangles and apply a simple linear contouring
  - Greater interpolation level results in more triangles
  - The more triangles you create, the smoother the isoline you get
  - INPE/CPTEC, Brazil is making a C++ implementation

Akima in action...



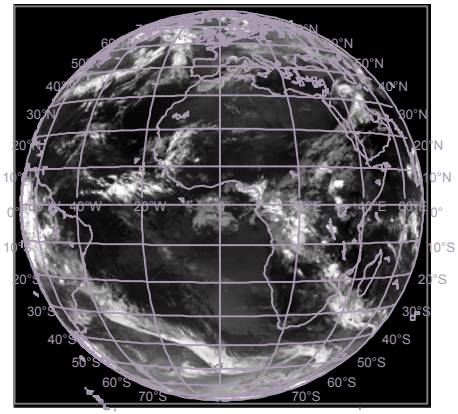
Consider the new requirements



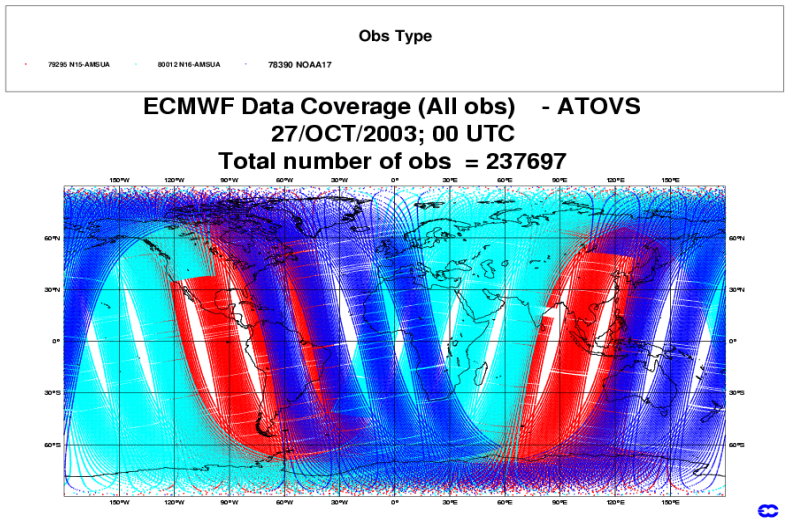
- **The web is an issue**
  - **Keep an eye on the possible new formats**
  - **Allow text definition in HTML**
  - **Enable navigation on produced maps**
    - ➔ Is XML/SGV a solution?
    - ➔ Magics plug-in for web browsers?
- **Graphical annotations**
  - **Drawing of graphical objects**
  - **Drawing of meteorological objects**

Consider the new requirement

Satellite image 31 October 2002

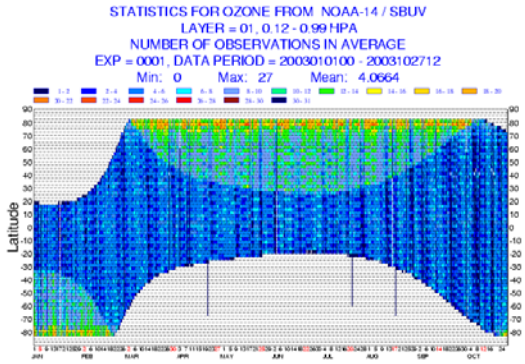


- **High volume satellite radiances**
  - Time consuming to access the data
  - Time consuming to plot the data
    - ➔ Need some filtering tools



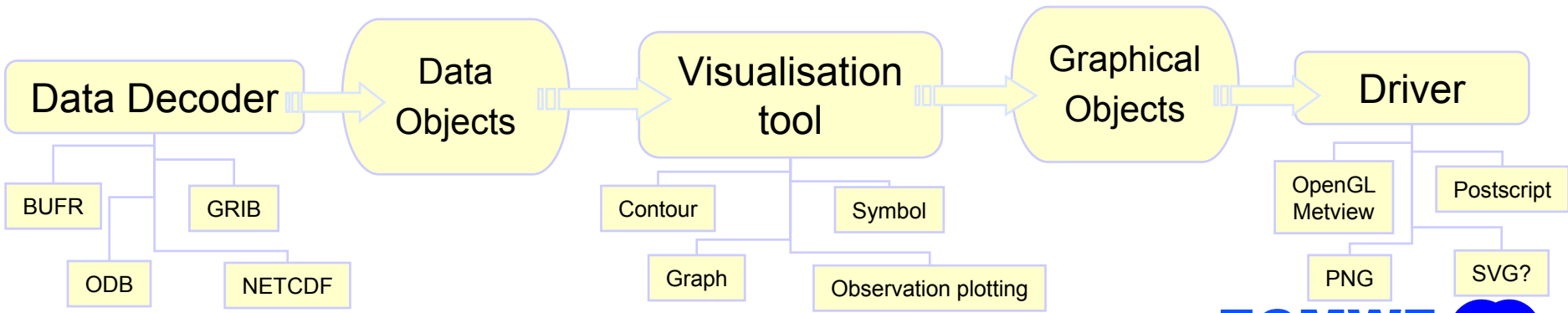
ECMWF

A Solid architecture

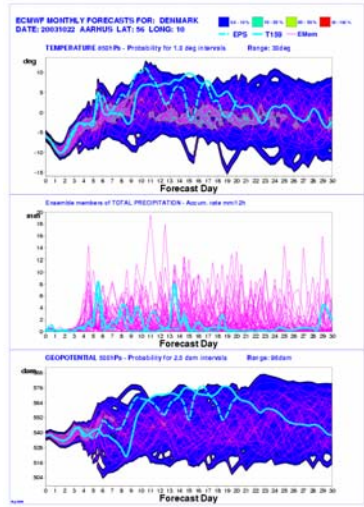


How an object-oriented architecture can help?

- **Magics is already object-oriented**
  - ♦ Thanks to Paddy O'Sullivan and Arne Jørgensen
    - ➔ Action = Object
    - ➔ Parameters = Attributes of the action Object
- **An Object-oriented architecture will always ease the extendibility of a piece of software**



A solid architecture



- **The use of well-known design patterns**

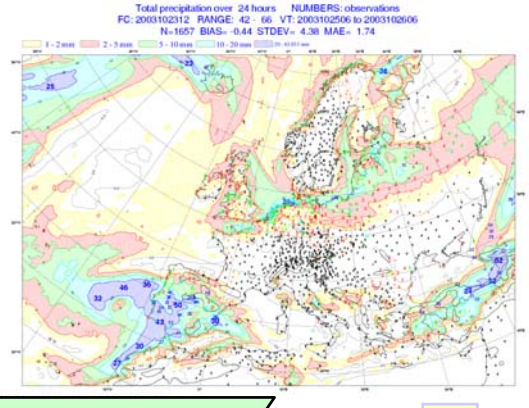
  helps in the design of difficult notions

  ➔ Factory for extendibility (new data types, new projections, new methods of contouring)

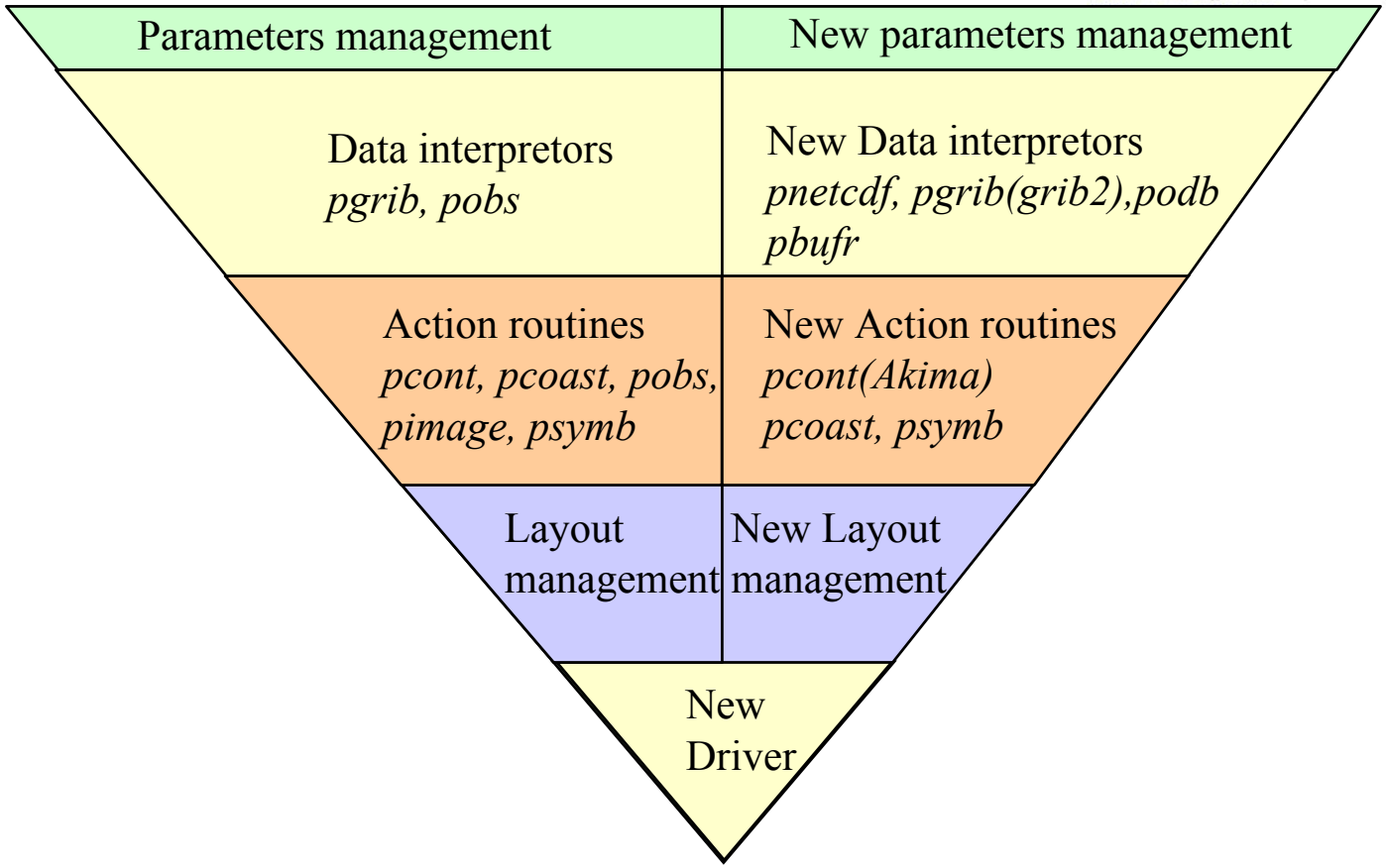
  ➔ Visitor for legend and title

- **The use of the STL (Standard Template Library) eases the handling of large collections of objects.**

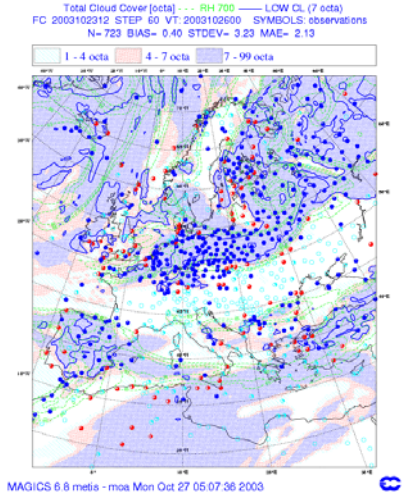
A Smooth migration



- Our plans

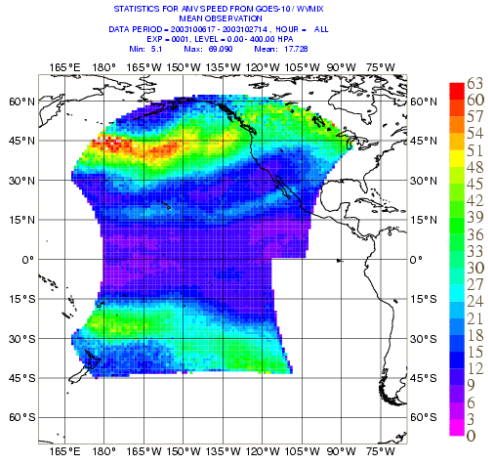


A Smooth Migration



- **Backward compatibility as far as possible**
- **Set of migration parameters**
  - ➔ Enable/disable new action routines
  - ➔ Enable/disable migration messages
- **Lots of migration messages**
  - ➔ Use of new functionalities
  - ➔ Deprecated parameters
  - ➔ Change in defaults
- **Migration tool**
  - ➔ Linked with your code
  - ➔ Analyse the possible side-effects of the migration

The bright future



- **Magics will continue producing attractive Maps**
- **But, will simplify and improve some concepts**
  - ➔ Legend/Title
  - ➔ Addition of new data types
- **Magics will offer new functionalities**
  - ➔ A new contouring package
  - ➔ Methods to visualise high volume data
  - ➔ Graphical annotations