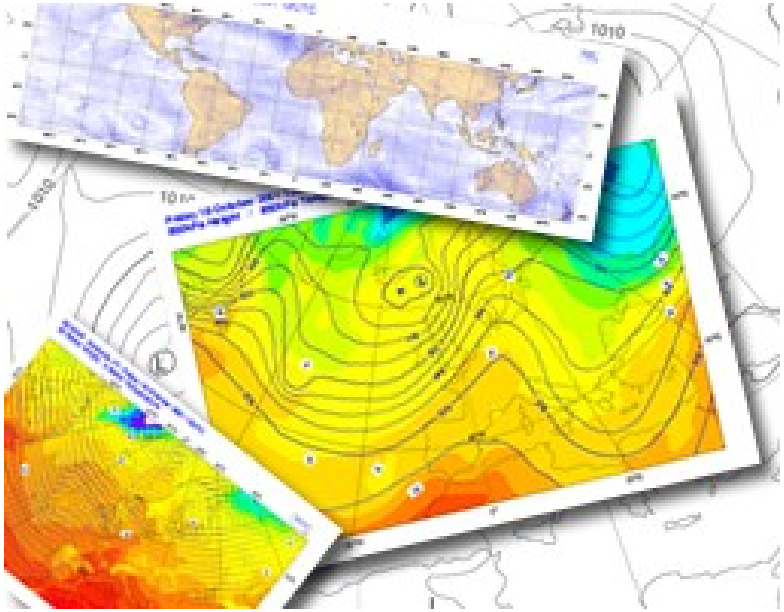
Metview 4: Enhanced functionalities for observation monitoring



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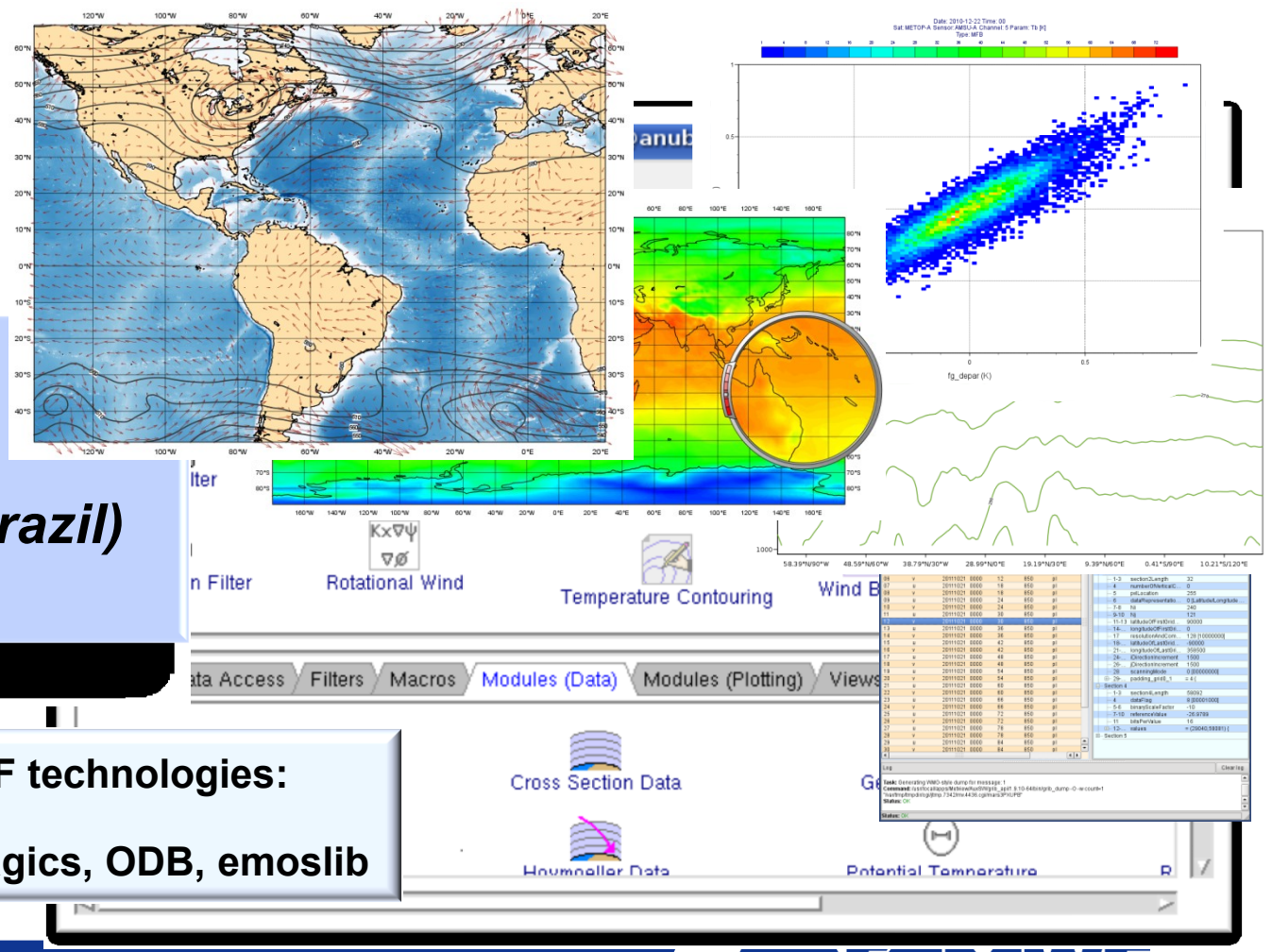
Meteorological Visualisation Section

ECMWF

What is Metview?

- Working environment for Operational and Research Meteorologists
- Runs on UNIX



Co-operative project:

ECMWF

INPE/CPTEC (Brazil)

Météo-France

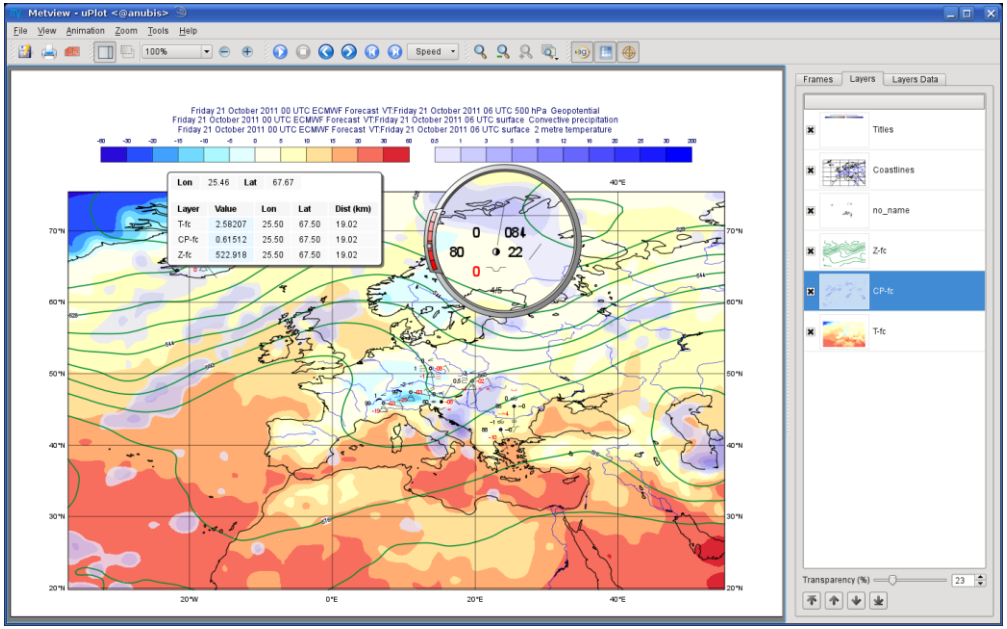
Built on core ECMWF technologies:

Mars, GRIB_API, Magics, ODB, emoslib

What is Metview?

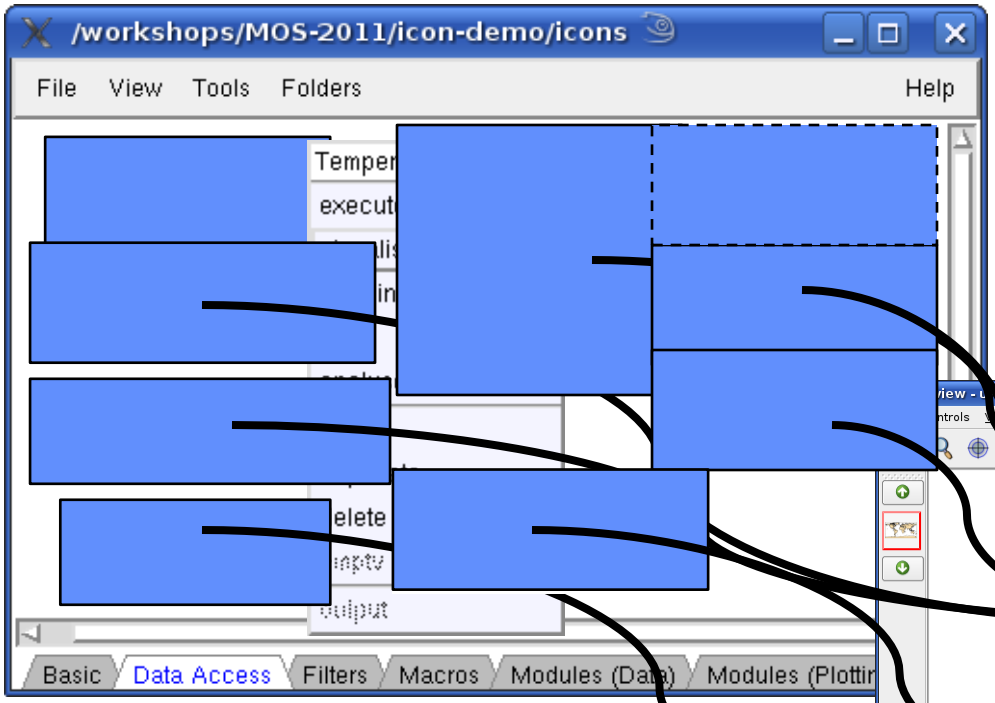
- Data:
  - Access
  - Examine
  - Manipulate
  - Plot
  - Overlay

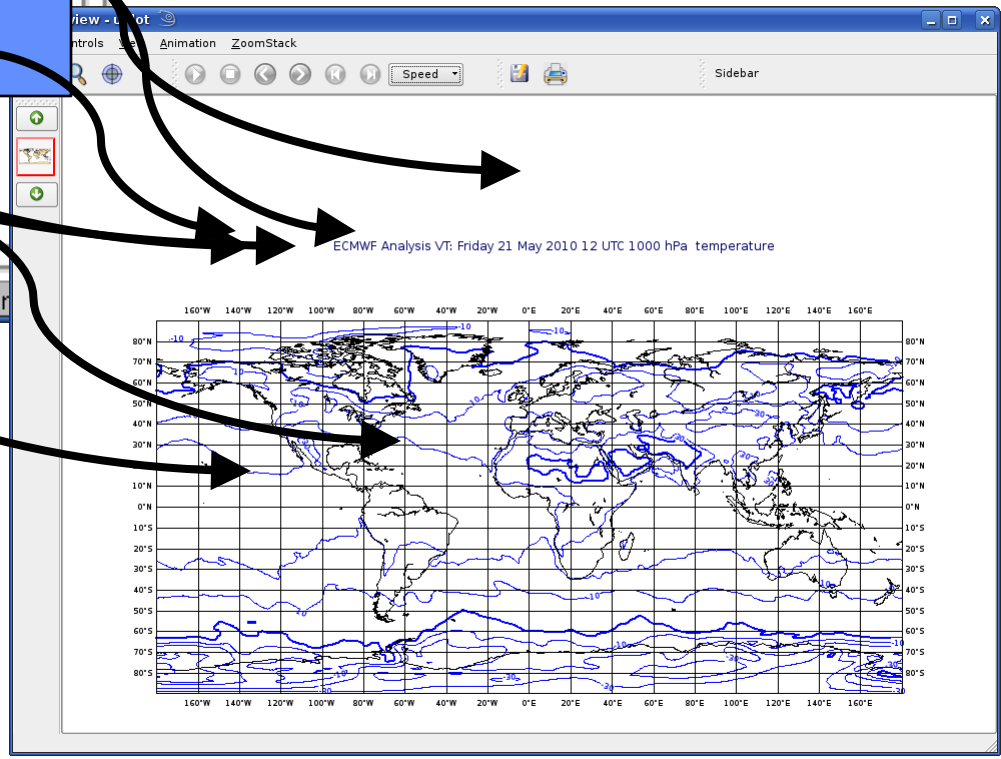
GRIB
BUFR
NetCDF
ODB
Geopoints
ASCII



- Can be run interactively or in batch
- Can be easily installed and runs self-contained standalone
  - From laptops to supercomputers
  - No special data servers required

Interactive Interface





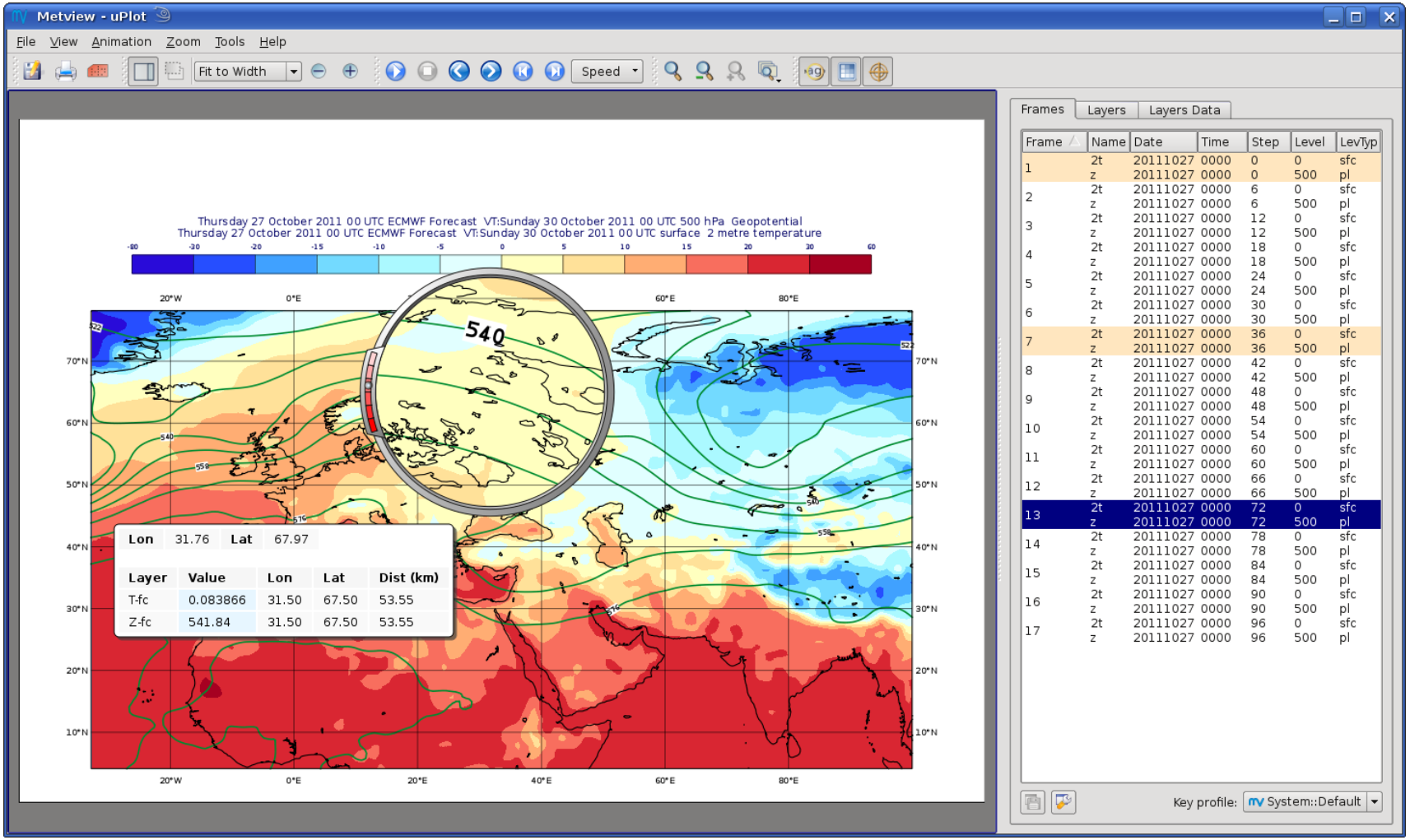
- Icon-based interface
- Everything is represented by an icon (data, actions, visualisation attributes)

Display Window (1)

- Built with Qt, uses Magics for plotting (Qt does the rendering)

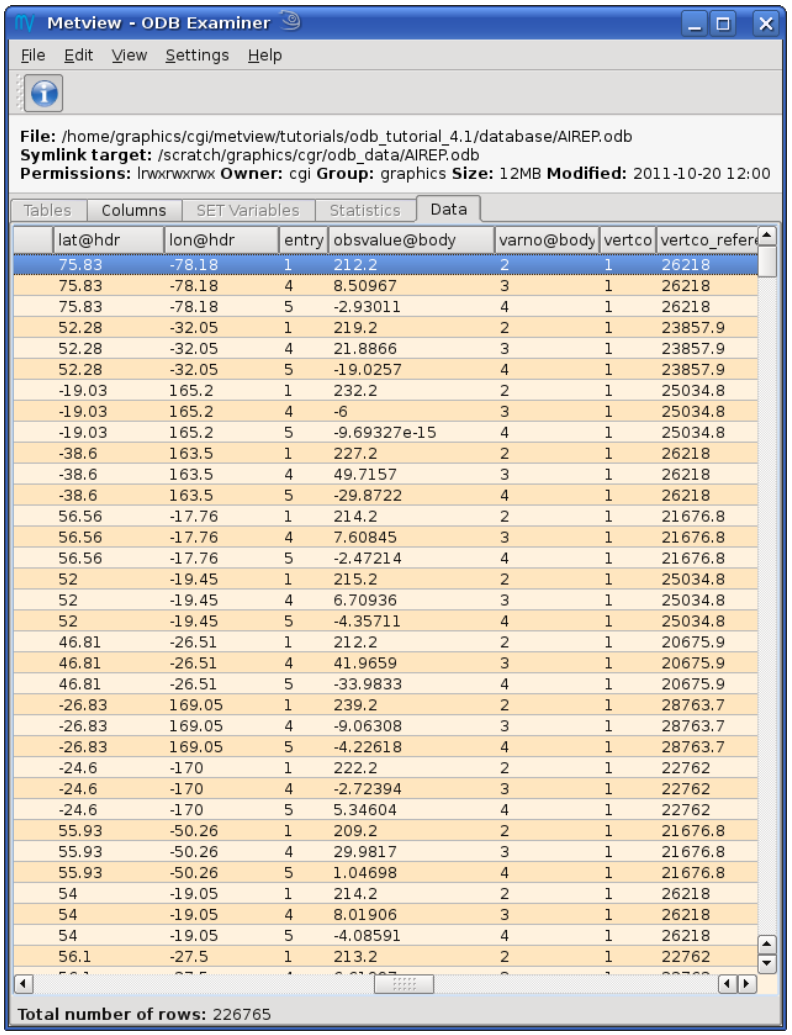
- In addition to plotting, the Display Window can help investigation of data, e.g.
  - Magnifying glass
  - Cursor data display
  - Configurable frame list

Display Window (2)



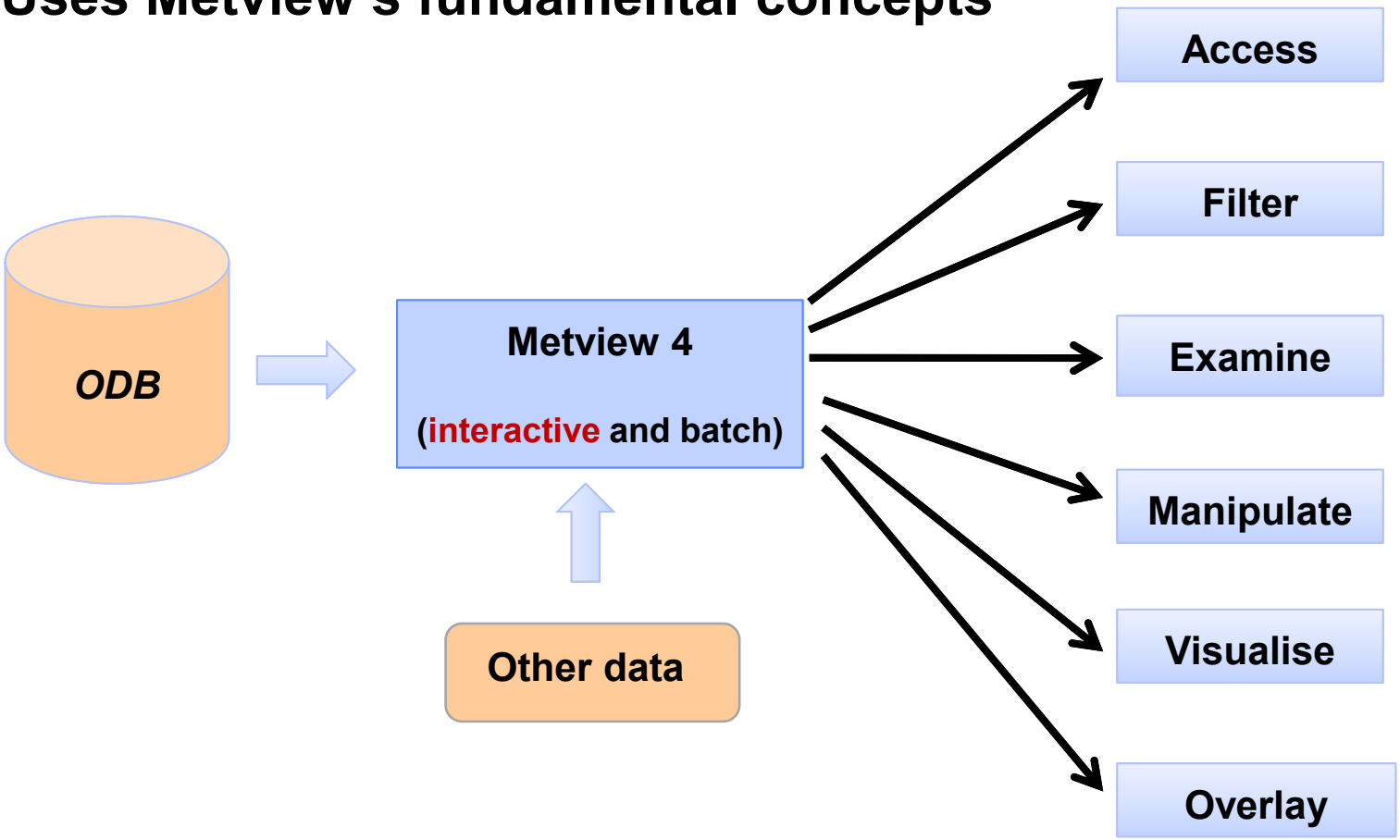
What is ODB?

- ODB: Observational DataBase
- Database software developed at ECMWF for the storage and retrieval of high-volume observational data
- Viewed as data columns
- Can use ODB/SQL to query data
- Will replace BUFR observation feedback in MARS* from 15th November 2011
  - * MARS is ECMWF's meteorological data archive



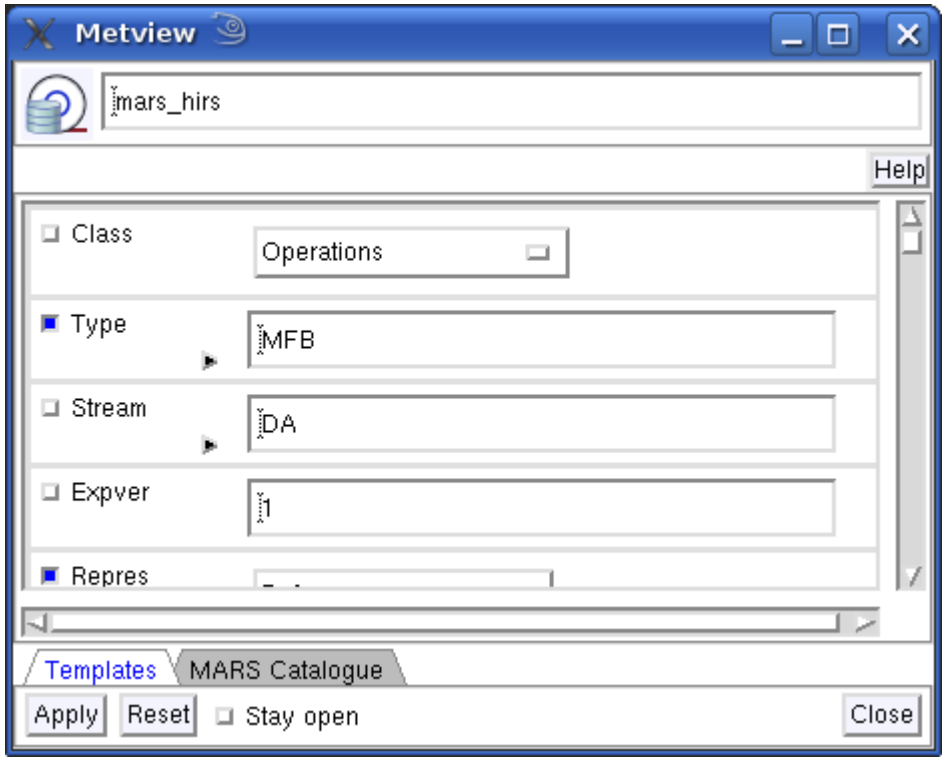
Observation Monitoring in Metview

- Uses Metview's fundamental concepts



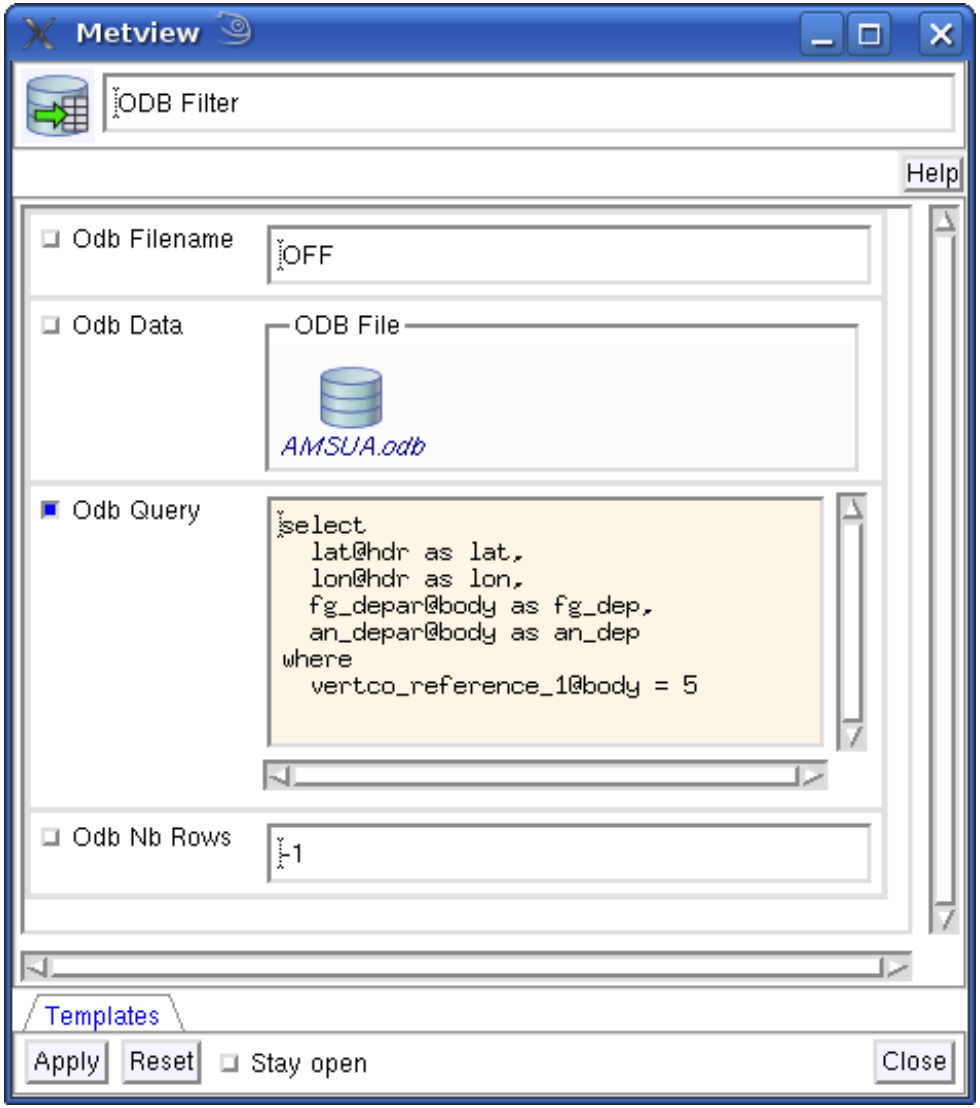
ODB Access

- Metview can access ODB data through:
  - the file system
  - or through MARS
    - can use GUI to construct retrieval query



ODB Filter

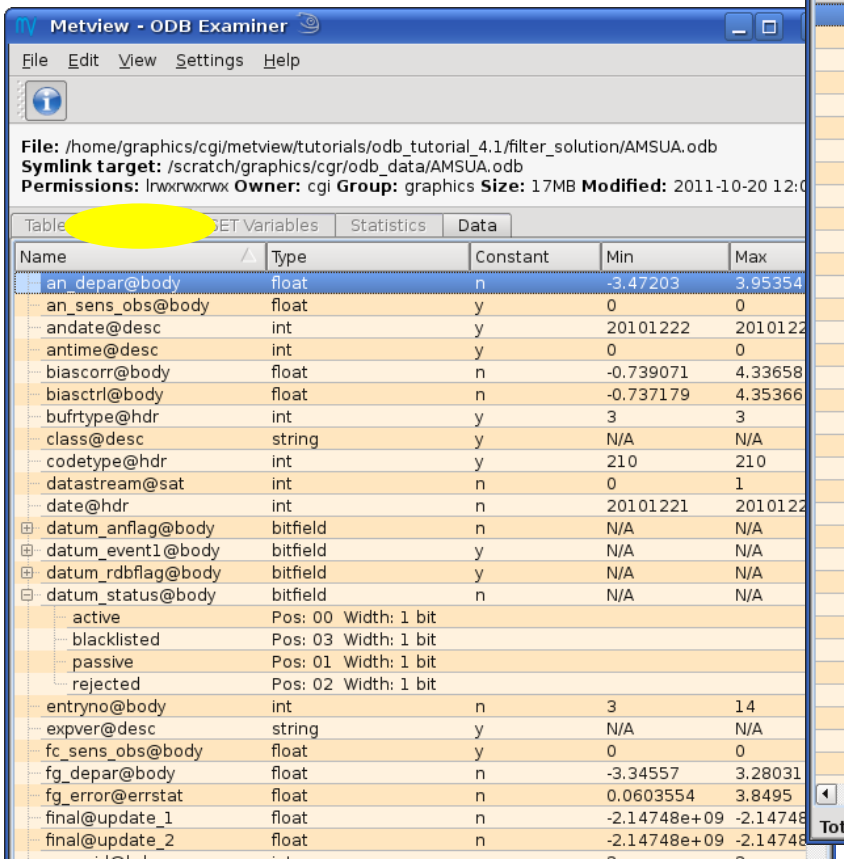
- Can use ODB / SQL query to select and manipulate data



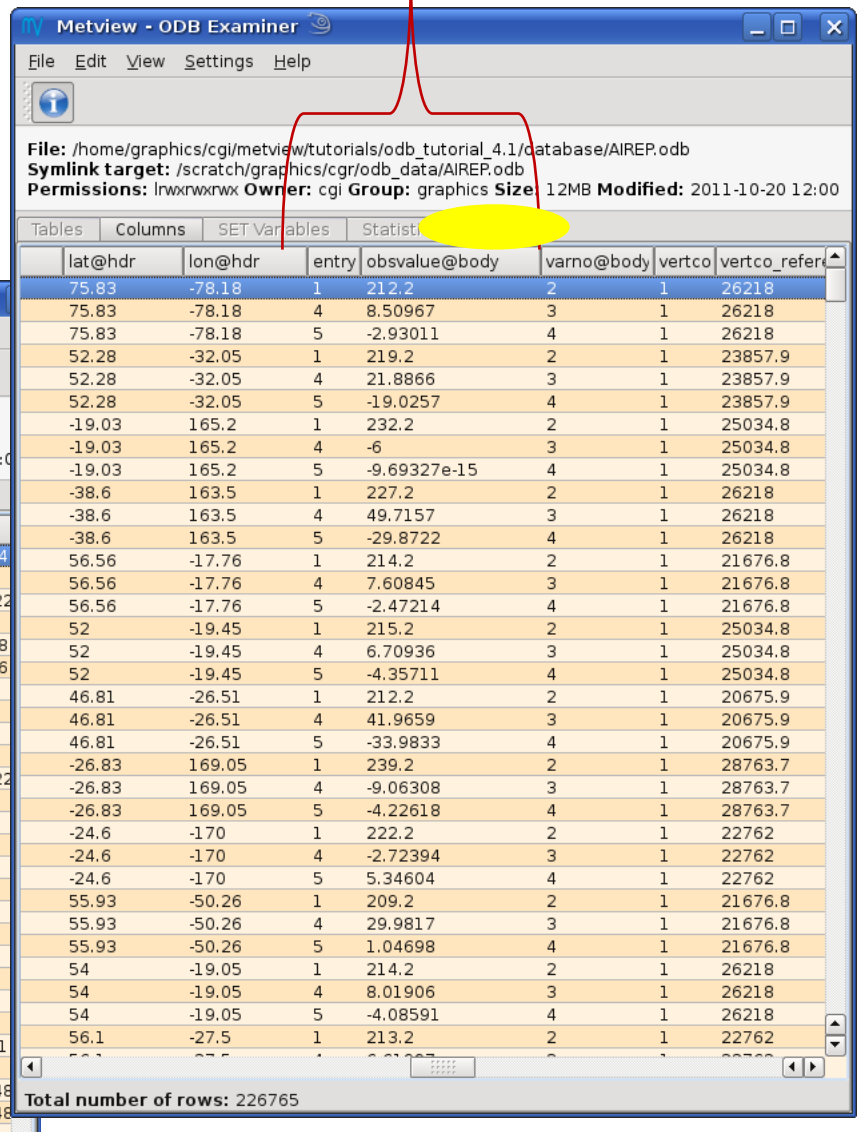
ODB Examiner

-  or  or 
- **Right-click | Examine**

Columns



Columns



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ODB Data Manipulation (1)

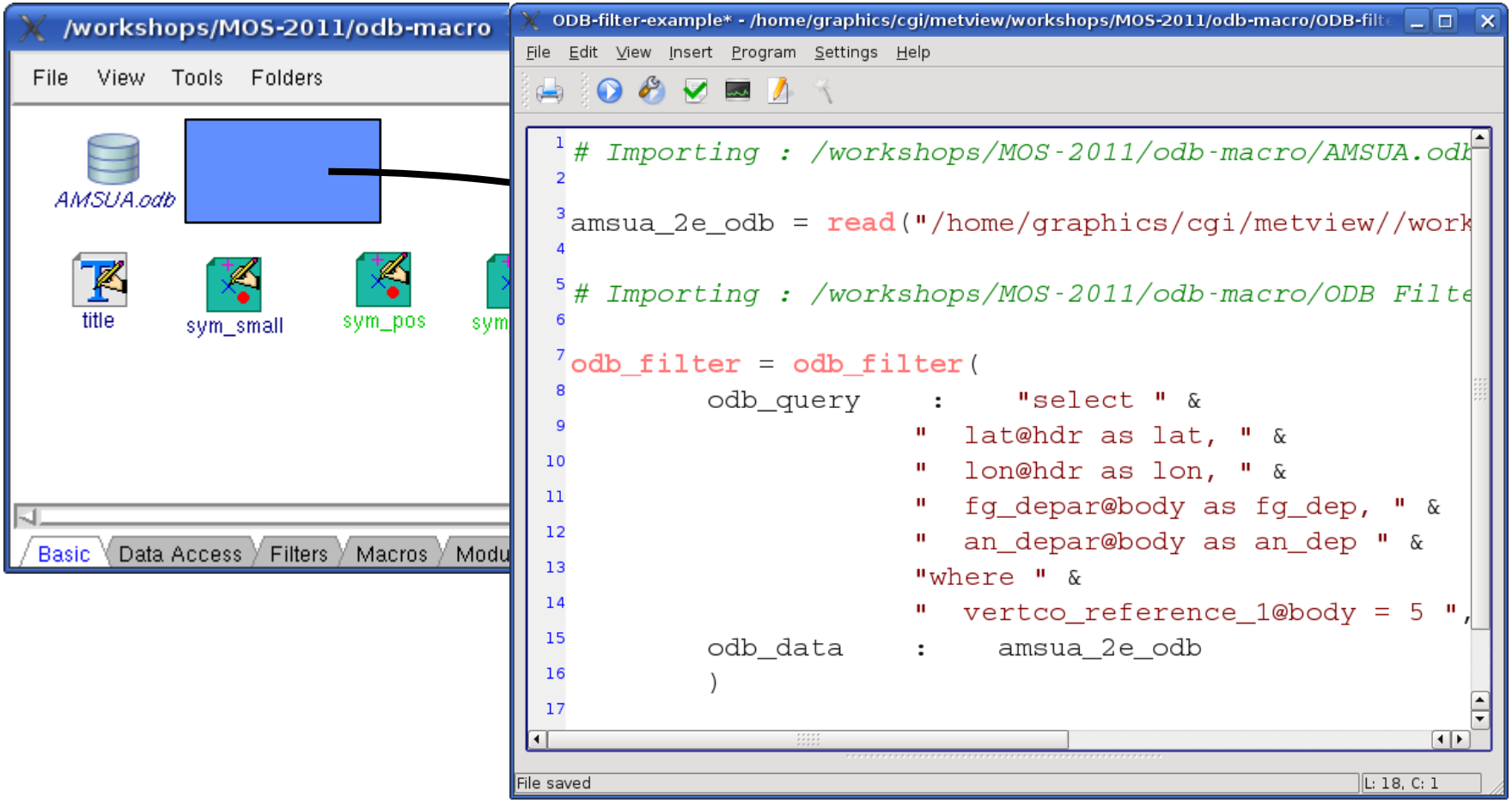
- ODB Filter (through ODB / SQL) provides some opportunity for manipulation (e.g. simple mathematical operators)

- For more advanced manipulation or combination with other data sources use Metview's Macro language

  - a powerful high-level meteorologically oriented script language (extendable with user C++/Fortran code)
  - all Metview tasks can be written or saved as macros, and run in batch or interactively
  - can produce derived data and/or plots

ODB Data Manipulation (2)

- Convert icons into Macro code – drag & drop



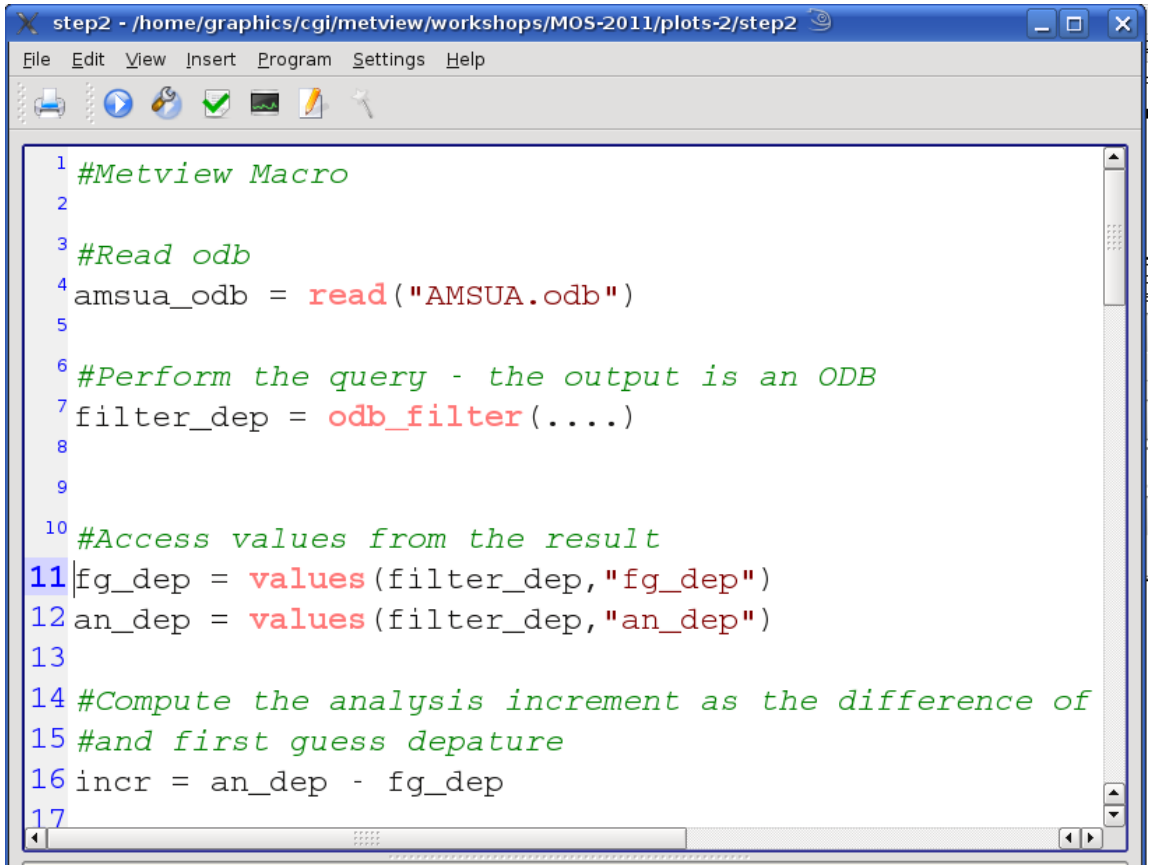
ODB Data Manipulation (3)

- ODB columns can be read into *vector* variables in Macro

```
v1 = values(odb,
     'fg_dep')
```

- Can then perform manipulations on these vectors, e.g.

```
v3 = v1 + v2
mx = maxvalue(v)
```

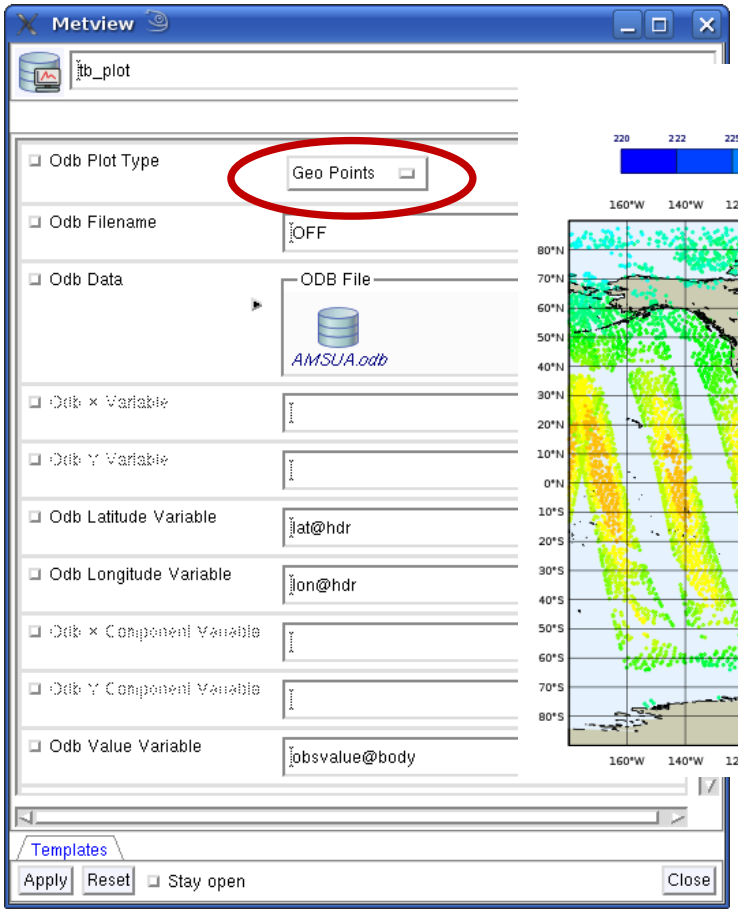


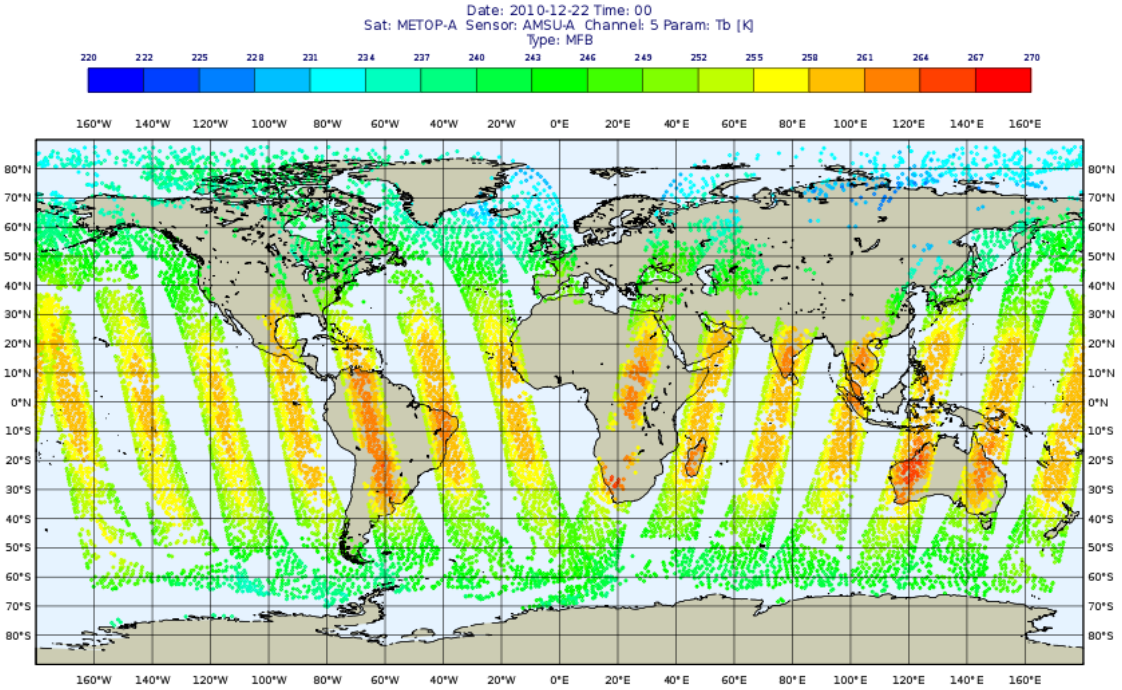
ODB Visualisation

- Some formats, such as GRIB, are easy to visualise in Metview: just right-click | Visualise
- That's because they are quite specific and have enough standardised meta-data for a program to understand how they should be plotted
- ODBs can contain large numbers of columns
  - Which ones do we want to plot?
  - How do we want to plot them – on a map, as a scatter plot, as a matrix?
- Use the ODB Visualiser icon 
- Offers various ways to interpret and visualise the data
  - Metview also offers Visualiser icons for NetCDF, ASCII tables and user-input lists of data; this is a new concept in Metview 4

ODB Visualisation example (1)

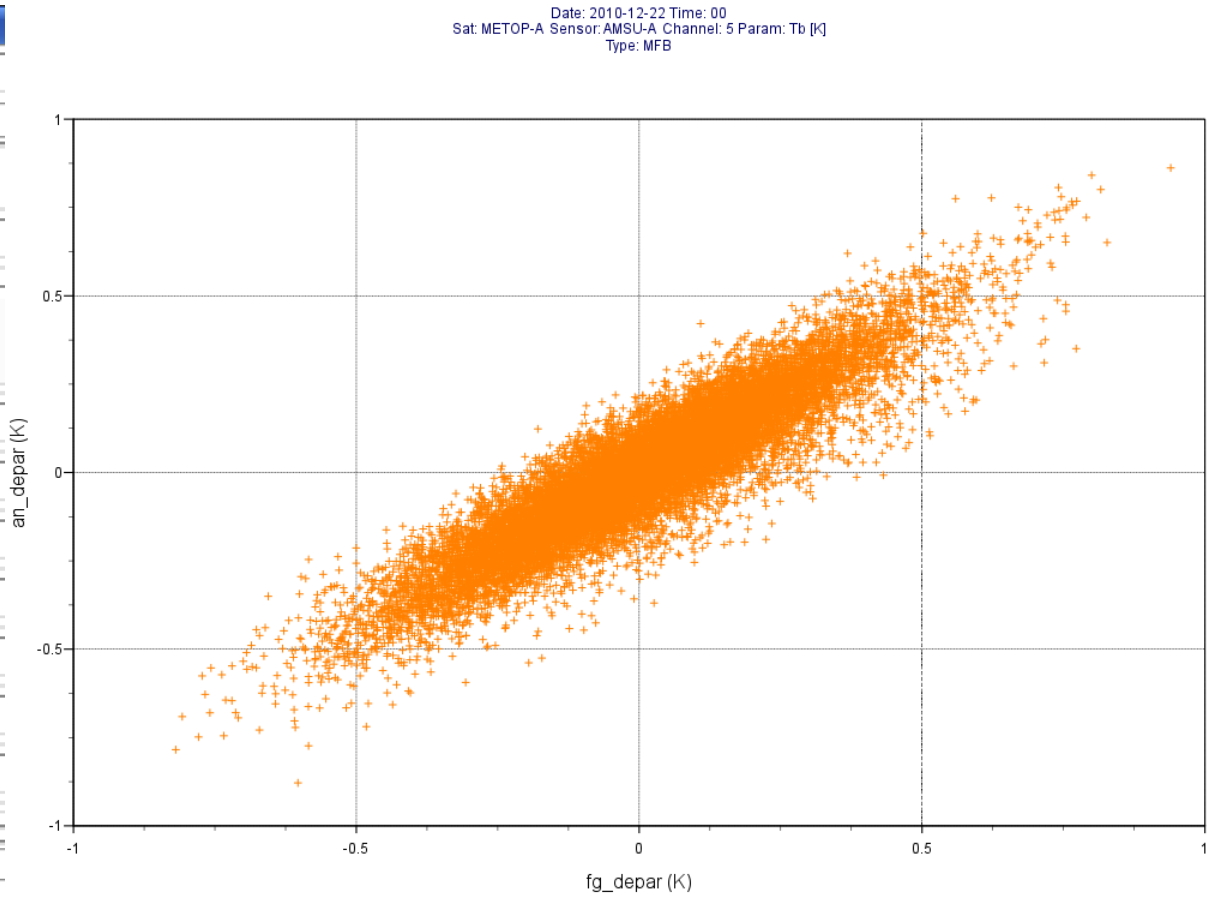
- Example: brightness temperature as scattered geographical plot (colours & styling added separately)





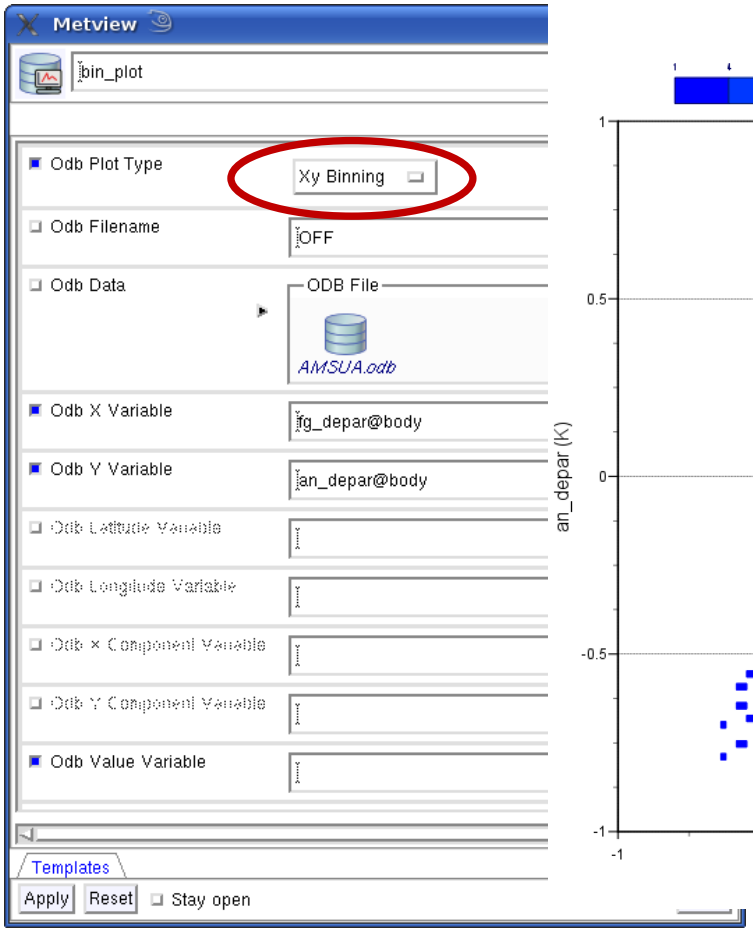
ODB Visualisation example (2)

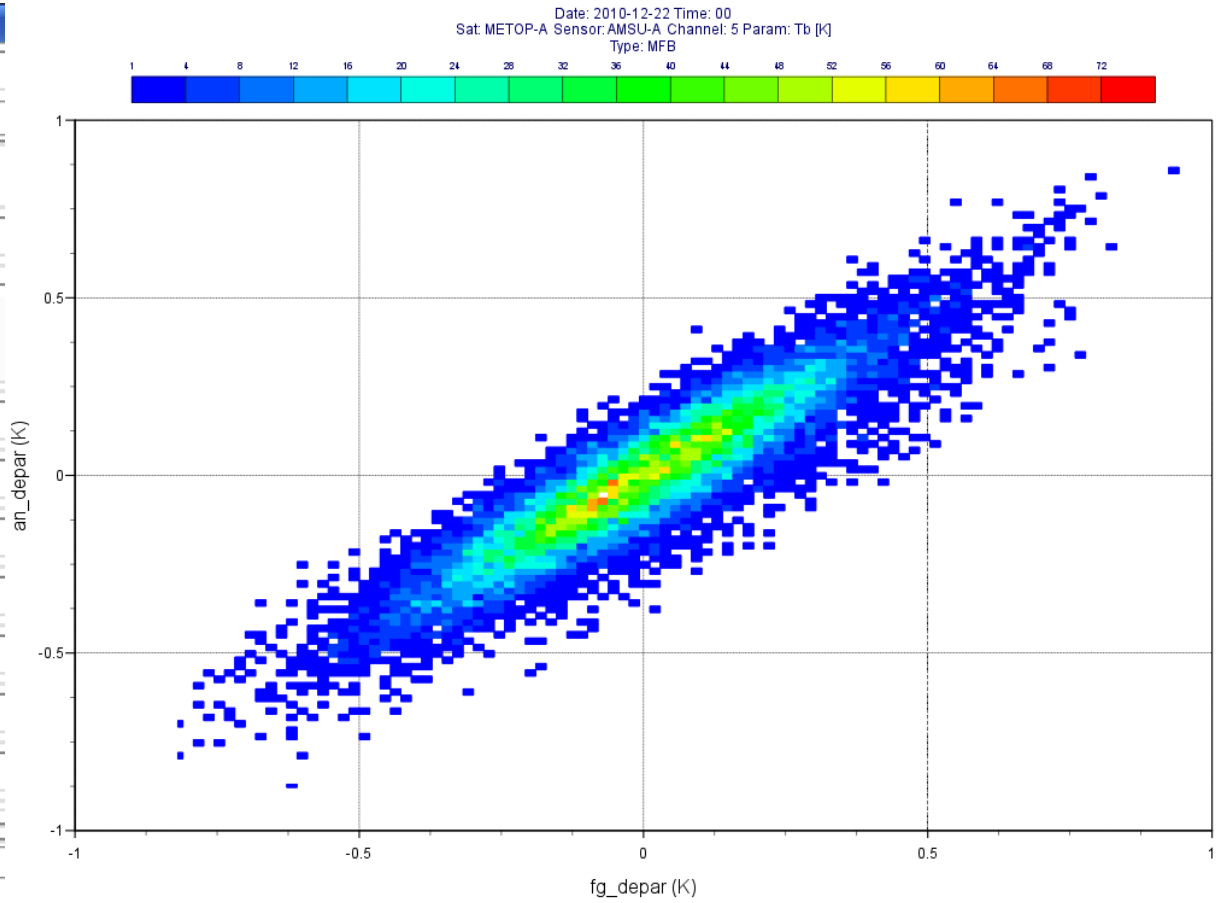
- **Example: scatterplot of first guess departure against analysis departure**



ODB Visualisation example (3)

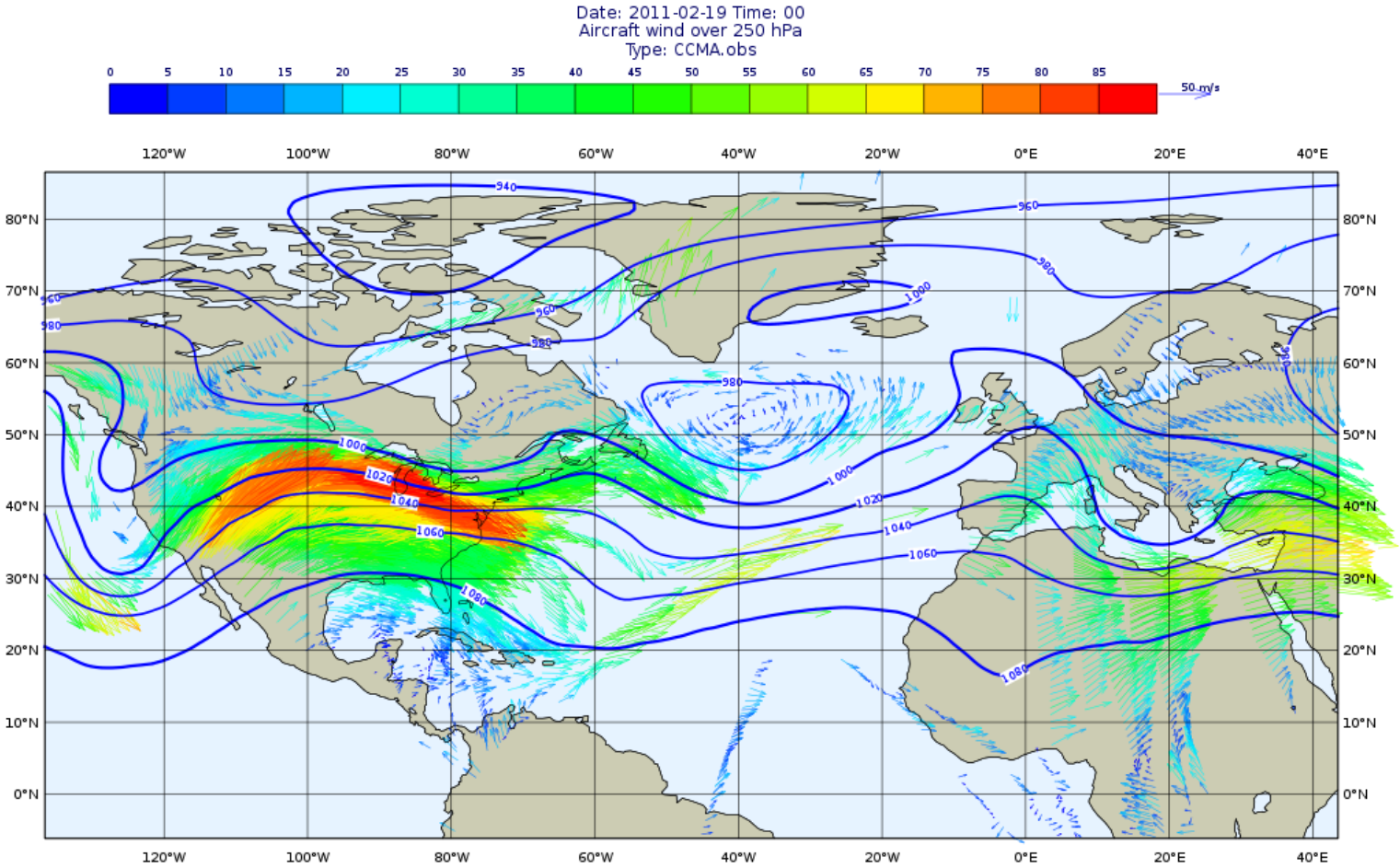
- Example: binned plot of first guess departure against analysis departure





ODB Visualisation example (4)

- ODB wind data with geopotential field from MARS



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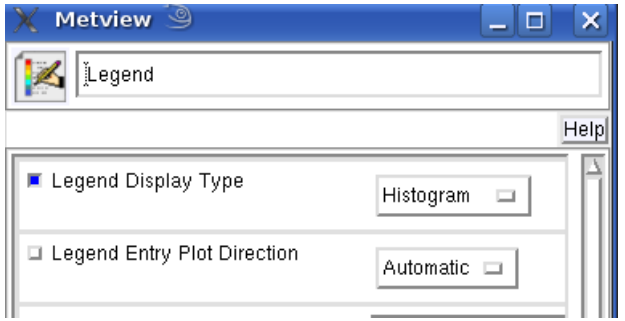
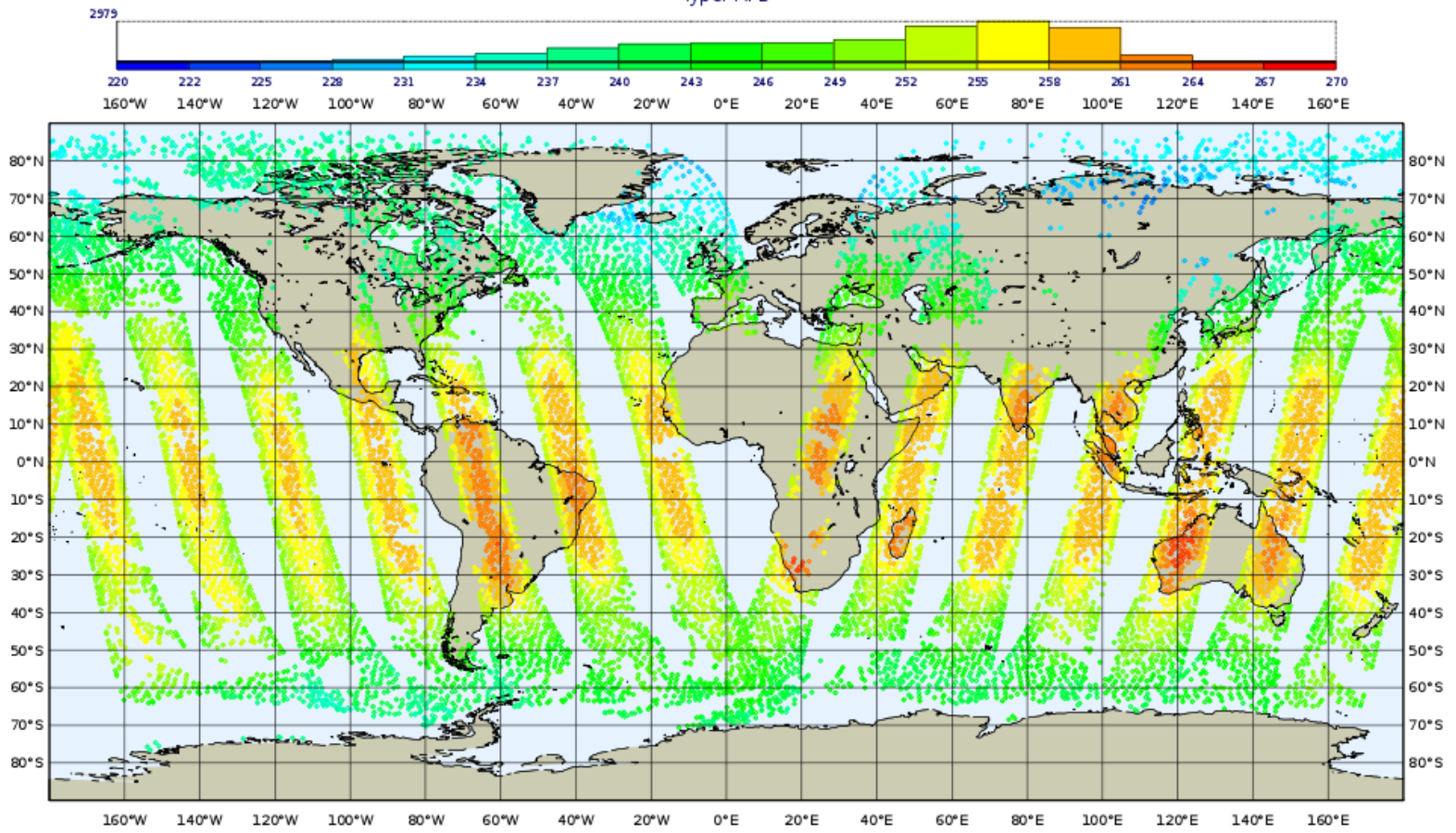
Histogram legend

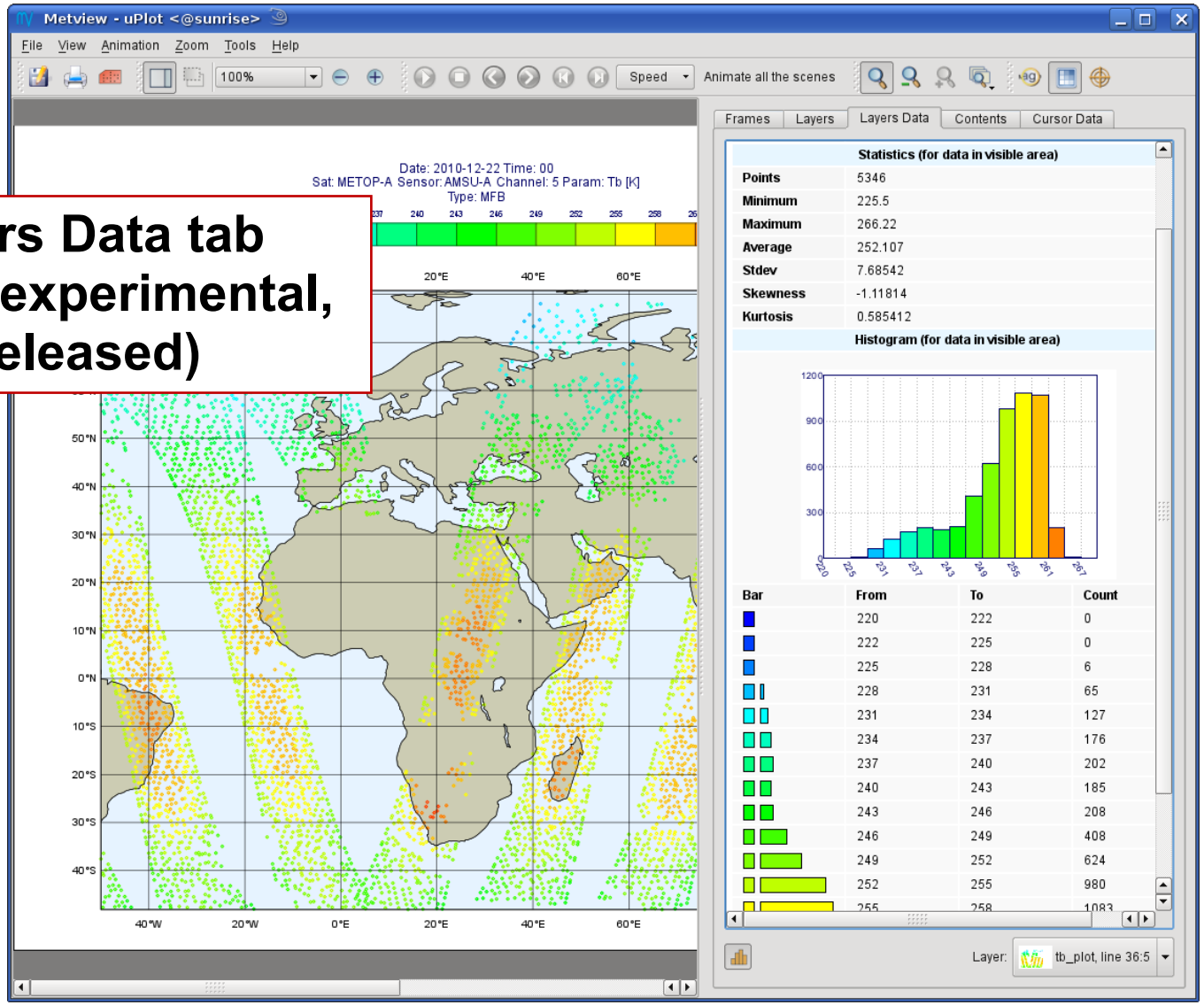
- New Magics feature





Layer meta-data

- **Layers Data tab (still experimental, not released)**



Metview 4 / ODB - Next Steps

- 10 Get more user feedback
- 20 Respond
- 30 goto 10

For More Information...

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Questions?