

ODB Usage in Magics++ and Metview 4



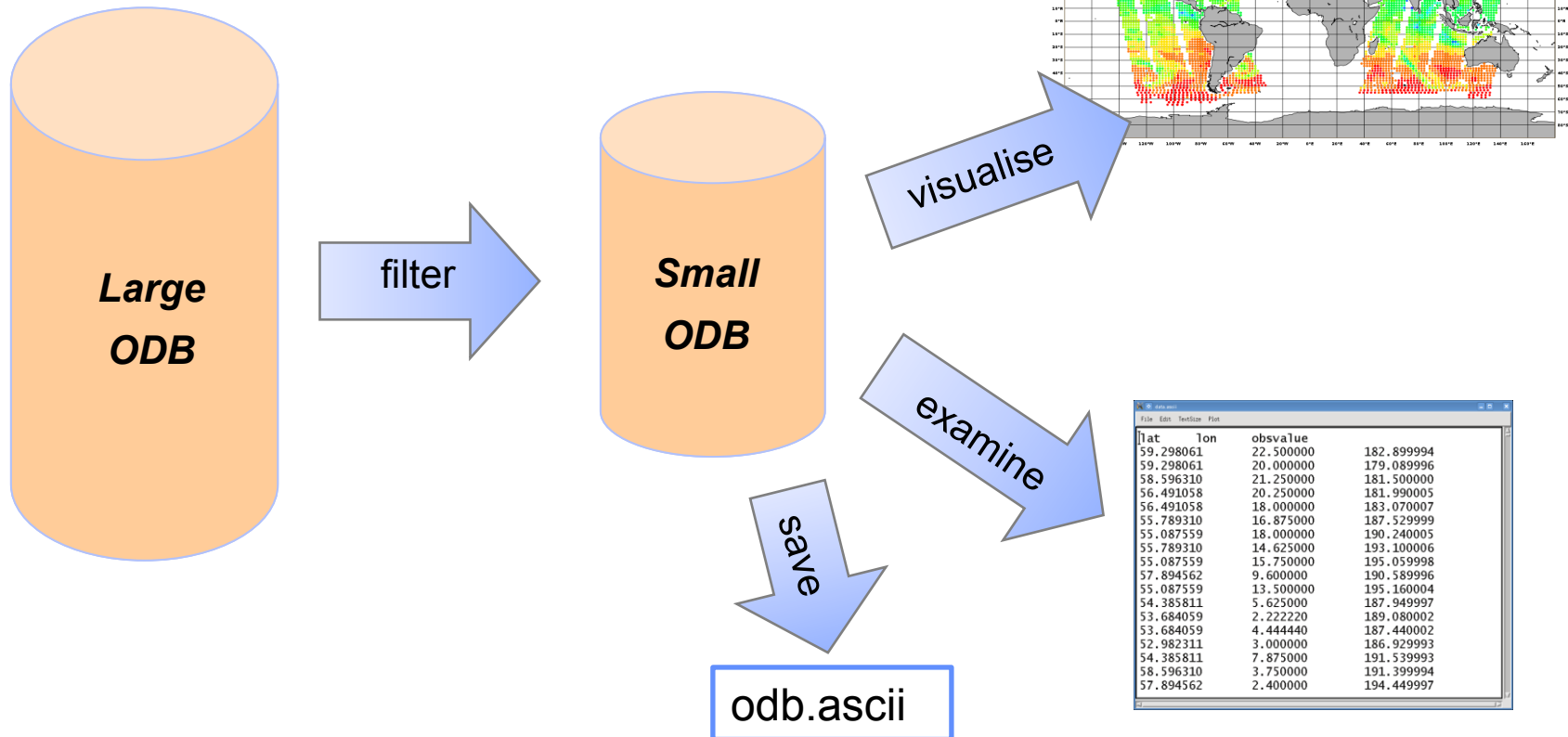
Meteorological Visualisation Section

OdbViewer

- Based on the [python](#) interface of [Magics++](#)
- Not a command line tool but an API: users can write their own scripts
- A flexible solution allowing full access to Magics++ and making benefit of its advanced features e.g.:
 - Customisation of the plots
 - Advanced symbol and legend plotting
 - Various output formats: e.g. PNG, PS, EPS, PDF, SVG and KML
 - Overlay with other data
- Metview-like syntax (similar to Metview macro)
- Supported by the [MetVis Section](#)

The functionalities

Encapsulates filtering, visualisation and data inspection in a python script ...

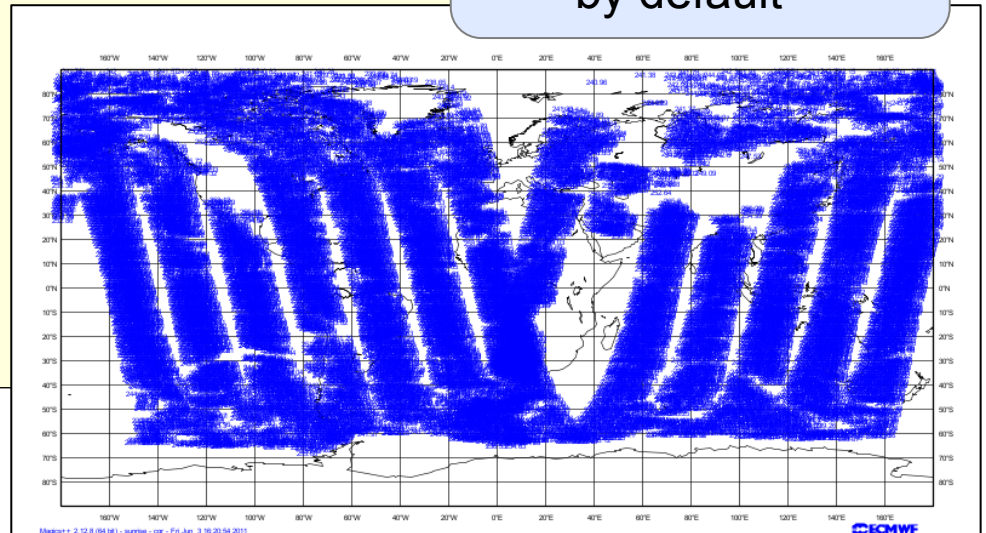


An example script

To plot Tb
for AMSUA
channel 5

```
from magmacro import *  
out = output({'output_formats':['ps'],'output_name':'symbol'});  
db = odb_filter( {'path' : 'amsua.odb',  
                  'query': 'select lat,lon,obsvalue where vertco_reference_1=5'})  
examine(db)  
gpt = odb_geopoints({'odb_data' : db,  
                     'odb_latitude' : 'lat',  
                     'odb_longitude' : 'lon',  
                     'odb_value': 'obsvalue'});  
plot(out, pcoast(),  
      gpt, psymb())
```

Data values plotted
by default



Change symbol plotting

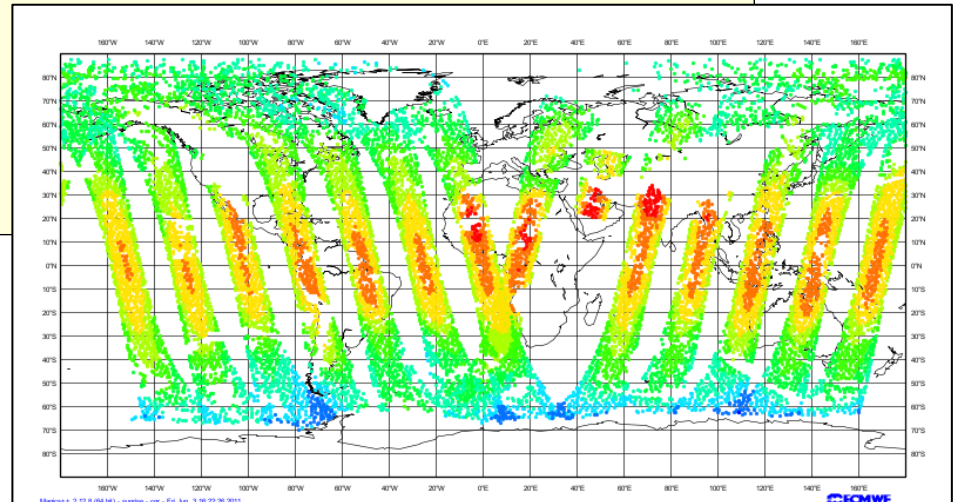
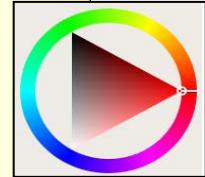
...

```
symbol = psymb({'symbol_table_mode' : 'advanced',  
               'symbol_type':'marker',  
               'symbol_advanced_table_marker_list': 15,  
               'symbol_advanced_table_min_level_colour': 'blue',  
               'symbol_advanced_table_max_level_colour': 'red',  
               'symbol_advanced_table_colour_direction': 'clockwise'})
```

...

```
plot(out, pcoast(),  
     gpt, symbol)
```

Colour wheel



Add legend and title

...

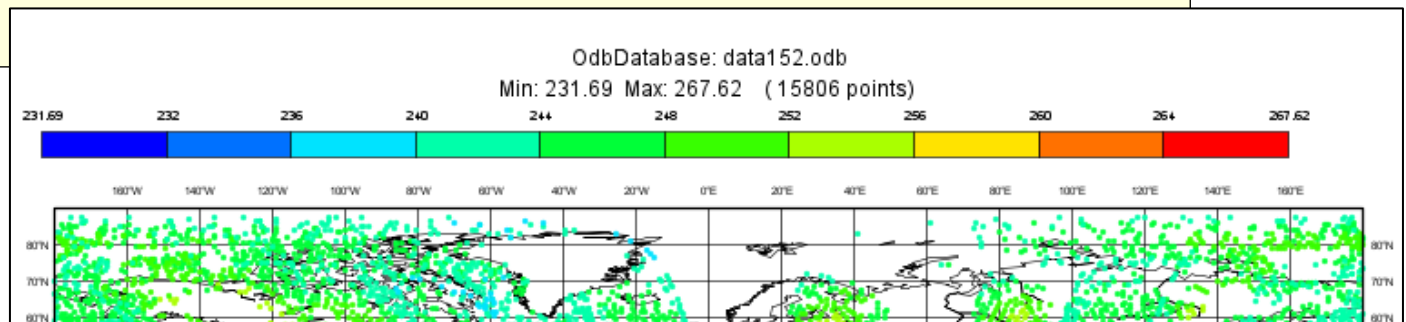
```
legend = plegend({'legend' : 'on',  
                'legend_text_colour': 'black',  
                'legend_display_type': 'continuous'})
```

```
title = ptext({'text_colour': 'black'})
```

...

```
plot(out, pcoast(),  
     gpt, symbol, legend,  
     title)
```

Automatic
title



Add custom title

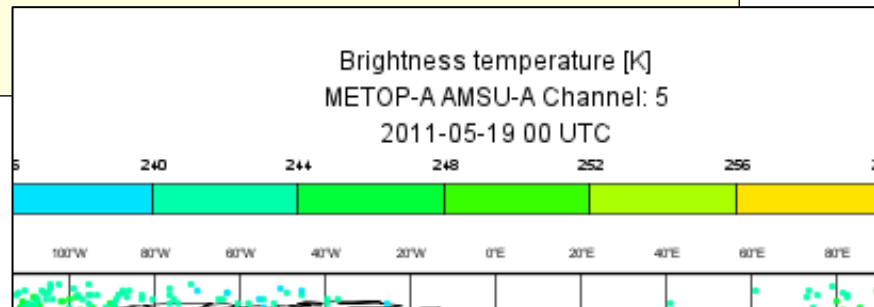
...

```
title = ptext({'text_colour':'black',  
              'text_lines' : ['Brightness temperature [K]',  
                              'METOP-A AMSU-A Channel: 5',  
                              '2011-05-19 00 UTC']})
```

...

```
plot(out, pcoast(),  
      gpt, symbol, legend,  
      title)
```

List of title
lines



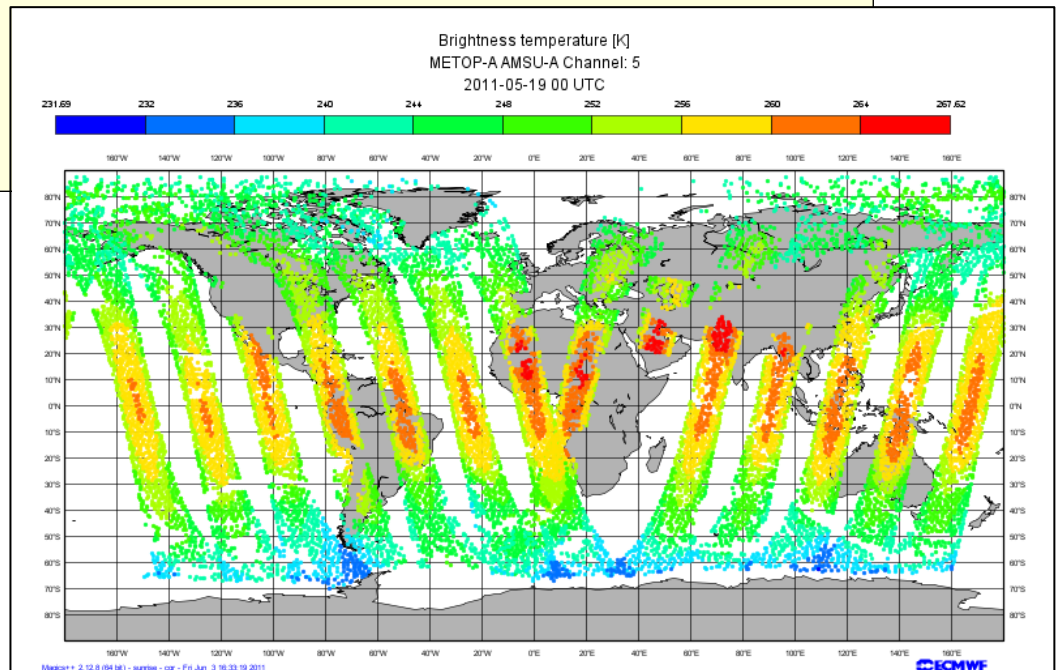
Change coastlines

...

```
coastlines = pcoast({'map_coastline_land_shade' : 'on',  
                    'map_coastline_land_shade_colour' : 'grey'})
```

...

```
plot(out, coastlines,  
     gpt, symbol, legend,  
     title)
```



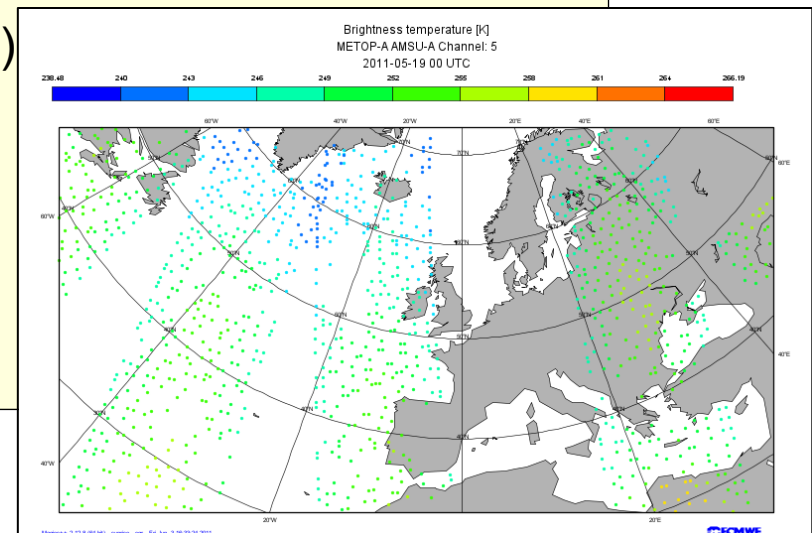
Change projection and area

...

```
europa = pmap({ "subpage_map_projection": "polar_stereographic",  
  "subpage_map_vertical_longitude": 0.,  
  "subpage_lower_left_longitude": -37.27,  
  "subpage_lower_left_latitude": 21.51,  
  "subpage_upper_right_longitude": 65.,  
  "subpage_upper_right_latitude": 51.28, })
```

...

```
plot(out, europa, coastlines,  
  gpt, symbol, legend,  
  title)
```



Practicals

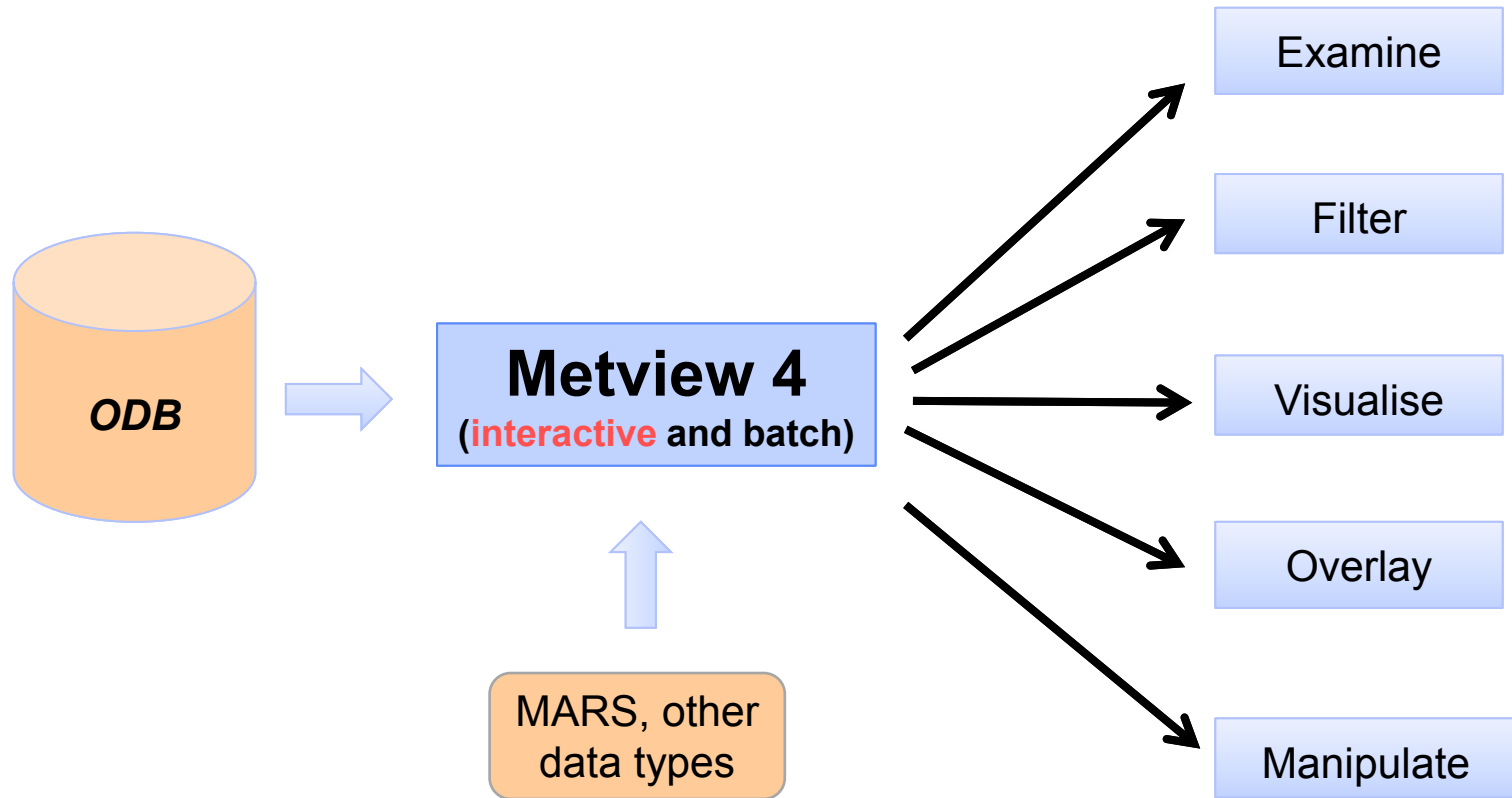
- How to run it at ECMWF?
 1. use odb
 2. use magics++
 3. `python your_python_script`

Metview 4



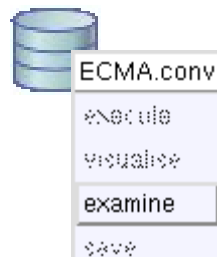
- New Metview version with many advanced features e.g.:
 - It uses **Magics++**
 - New data examiners
 - New macro editor
- It has a new **ODB interface** (using the latest ODB API)

Metview 4 - ODB interface

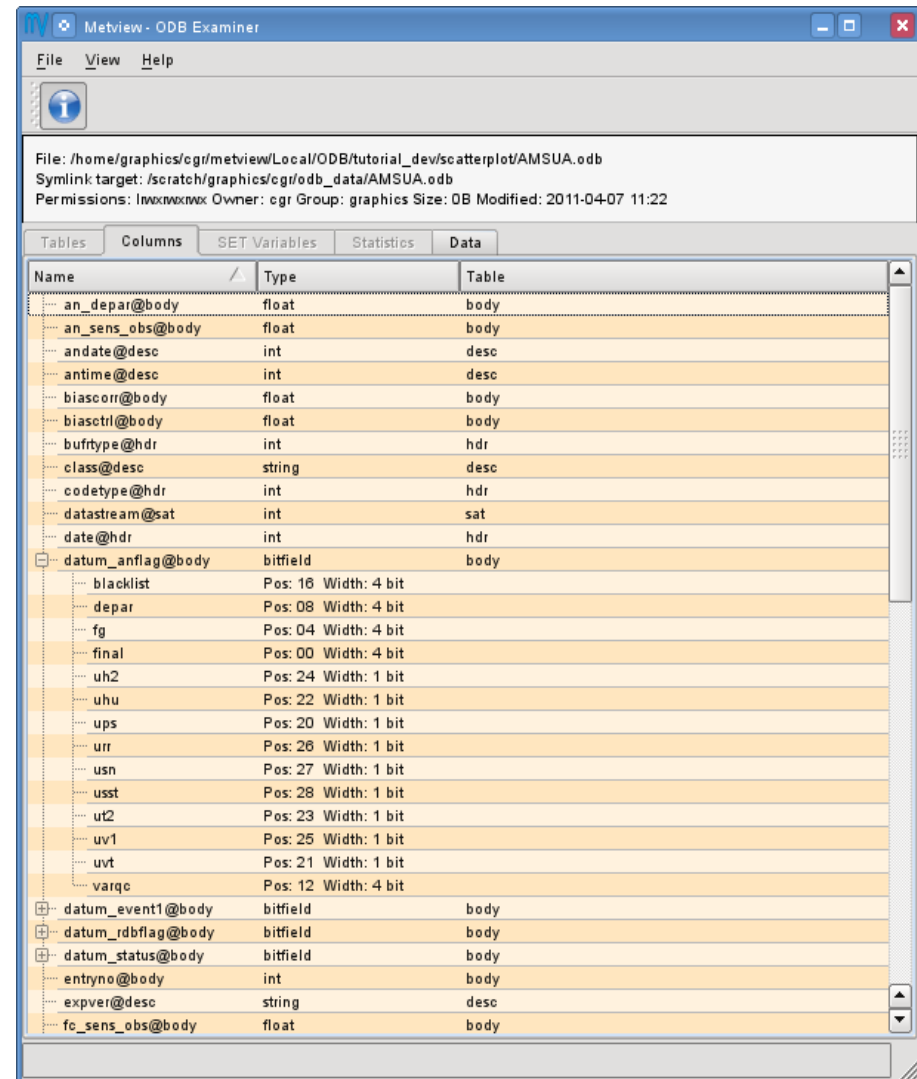


ODB Examiner

- Right-click
“Examine”



- Features:
 - Columns
 - Bitfields
 - Data values



ODB Examiner – Data values

Metview - ODB Examiner

File View Help

File: /home/graphics/egr/metview/Local/ODB/obsmon_tutorial/fizk_DCDA_amsre_as_20110108_00.odb
 Symlink target: /scratch/graphics/egr/fizk_DCDA_amsre_as_20110108_00.odb
 Permissions: lwxwxwx Owner: egr Group: graphics Size: 0B Modified: 2011-06-01 14:10

Tables Columns SET Variables Statistics **Data**

| Row | varno | lat | lon | lsm | vertical_reference_1 | obsvalue | fg_depar | an_depar |
|-----|-------|---------|-------|-----|----------------------|----------|------------|-----------|
| 1 | 119 | 59.2981 | 22.5 | 0 | 5 | 182.9 | 3.13639 | -2.14748e |
| 2 | 119 | 59.2981 | 22.5 | 0 | 6 | 104.2 | 5.62488 | -2.14748e |
| 3 | 119 | 59.2981 | 22.5 | 0 | 7 | 195.94 | 2.98623 | -2.14748e |
| 4 | 119 | 59.2981 | 22.5 | 0 | 8 | 121.8 | 5.16572 | -2.14748e |
| 5 | 119 | 59.2981 | 22.5 | 0 | 9 | 206.16 | 0.553302 | -2.14748e |
| 6 | 119 | 59.2981 | 22.5 | 0 | 10 | 133.5 | 0.41804 | -2.14748e |
| 7 | 119 | 59.2981 | 20 | 0 | 5 | 179.09 | -0.383887 | -0.717043 |
| 8 | 119 | 59.2981 | 20 | 0 | 6 | 98.29 | 0.712686 | 0.365555 |
| 9 | 119 | 59.2981 | 20 | 0 | 7 | 192.13 | -0.447453 | -1.09926 |
| 10 | 119 | 59.2981 | 20 | 0 | 8 | 115.13 | -0.144909 | -1.26399 |
| 11 | 119 | 59.2981 | 20 | 0 | 9 | 204.28 | -1.22257 | -1.517 |
| 12 | 119 | 59.2981 | 20 | 0 | 10 | 130.08 | -1.94118 | -2.32975 |
| 13 | 119 | 58.5963 | 21.25 | 0 | 5 | 181.5 | 1.60814 | -2.14748e |
| 14 | 119 | 58.5963 | 21.25 | 0 | 6 | 102.49 | 4.21021 | -2.14748e |
| 15 | 119 | 58.5963 | 21.25 | 0 | 7 | 194.95 | 1.28281 | -2.14748e |
| 16 | 119 | 58.5963 | 21.25 | 0 | 8 | 120.22 | 2.74831 | -2.14748e |
| 17 | 119 | 58.5963 | 21.25 | 0 | 9 | 205.72 | -0.0861898 | -2.14748e |
| 18 | 119 | 58.5963 | 21.25 | 0 | 10 | 132.9 | 0.381107 | -2.14748e |
| 19 | 119 | 56.4911 | 20.25 | 0 | 5 | 181.99 | -0.58595 | -1.09463 |
| 20 | 119 | 56.4911 | 20.25 | 0 | 6 | 102.59 | -0.38426 | -1.00933 |
| 21 | 119 | 56.4911 | 20.25 | 0 | 7 | 198.13 | -0.343404 | -1.13174 |
| 22 | 119 | 56.4911 | 20.25 | 0 | 8 | 125.87 | -0.840455 | -2.16324 |
| 23 | 119 | 56.4911 | 20.25 | 0 | 9 | 207.65 | -3.25921 | -3.95474 |
| 24 | 119 | 56.4911 | 20.25 | 0 | 10 | 135.67 | -7.41921 | -8.68761 |
| 25 | 119 | 56.4911 | 18 | 0 | 5 | 183.07 | -0.1904 | -2.14748e |
| 26 | 119 | 56.4911 | 18 | 0 | 6 | 105.24 | 0.637987 | -2.14748e |
| 27 | 119 | 56.4911 | 18 | 0 | 7 | 200.61 | 0.281609 | -2.14748e |
| 28 | 119 | 56.4911 | 18 | 0 | 8 | 132.14 | 1.06234 | -2.14748e |
| 29 | 119 | 56.4911 | 18 | 0 | 9 | 209.67 | -1.45025 | -2.14748e |
| 30 | 119 | 56.4911 | 18 | 0 | 10 | 140.11 | 1.23704 | -2.14748e |

Total number of rows: 97796

ODB Examiner

- Can be started up from the command line
- Just open a terminal window and type in the following command:

```
metview -e odb your_odb_database
```

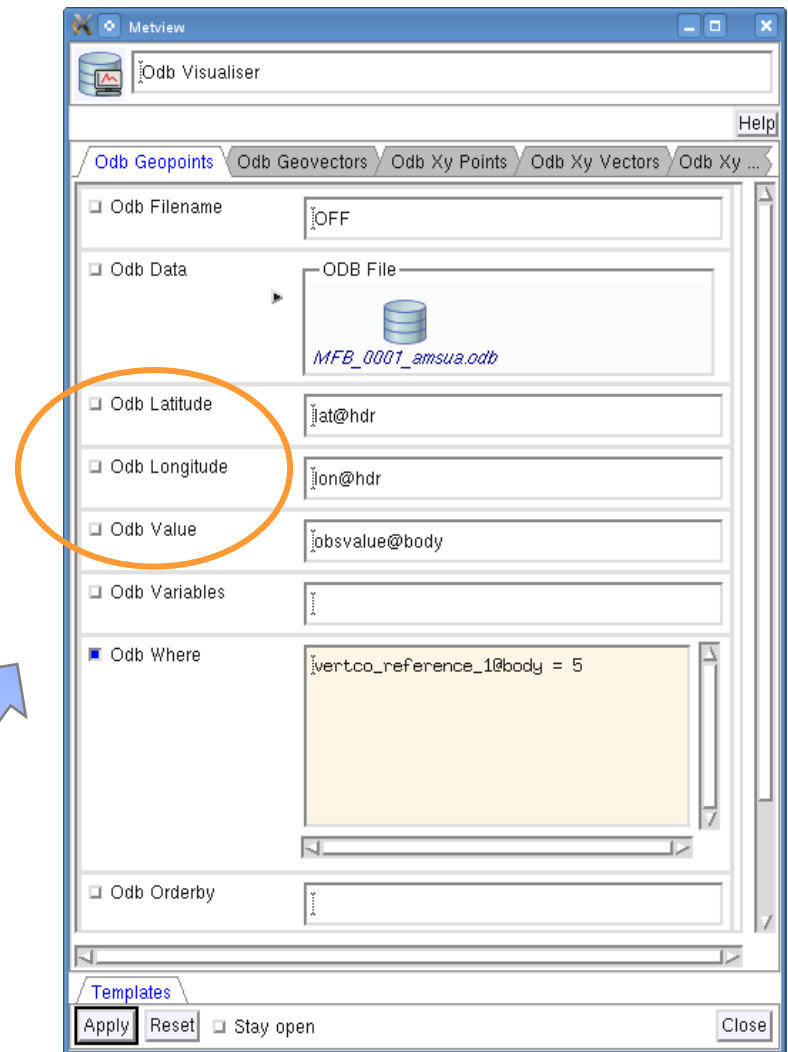
- Working for GRIB (-e **grib**) and BUFR (-e **bufr**) as well

ODB Visualiser

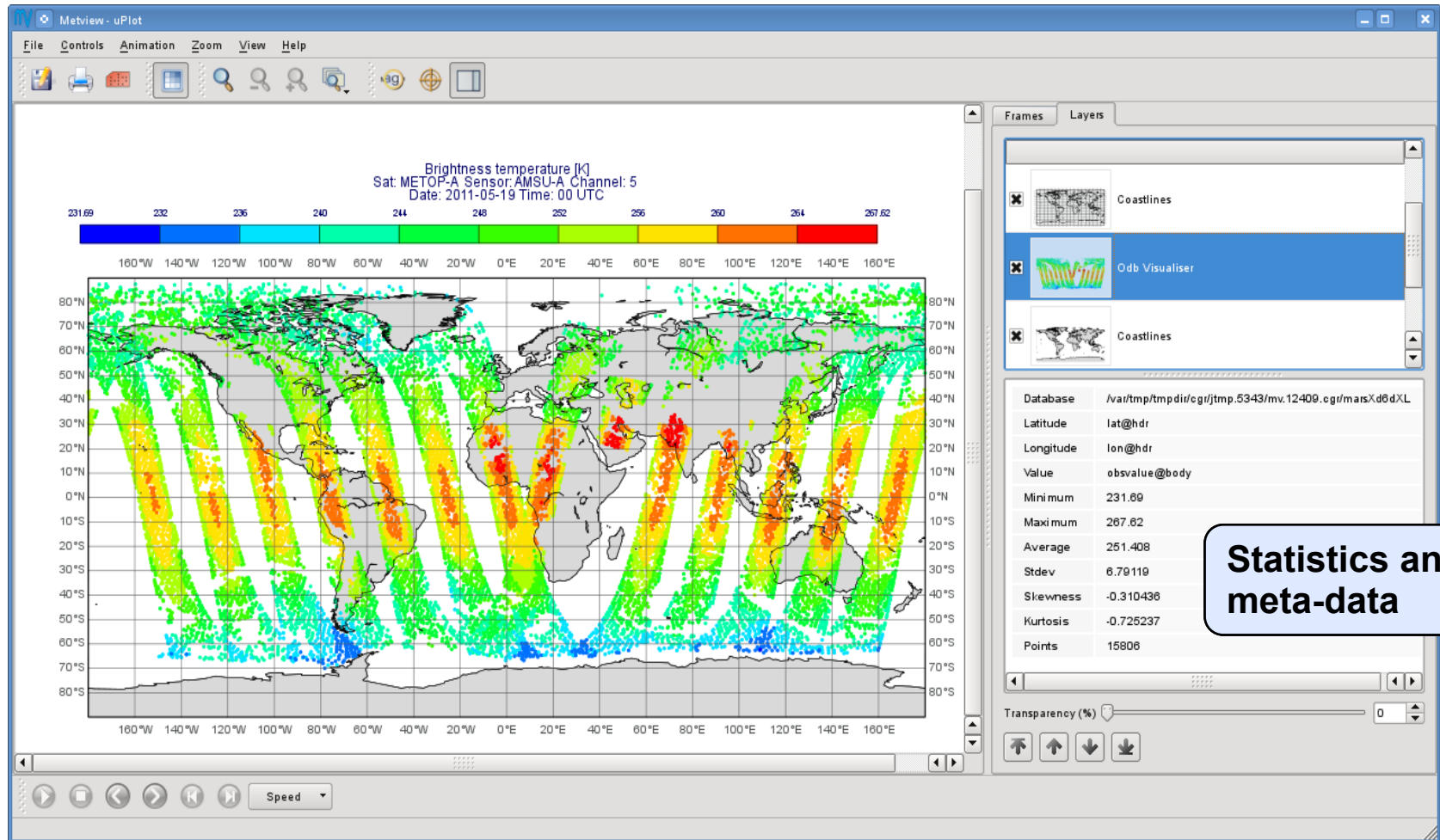
- **ODB Visualiser:** we have to tell Metview what to plot



- Defines the plot type and the columns to be used to generate the plot
- Filter option is available (**WHERE** statement)
- E.g. for a map-based plot we need: latitude, longitude, value
- Can be visualised directly

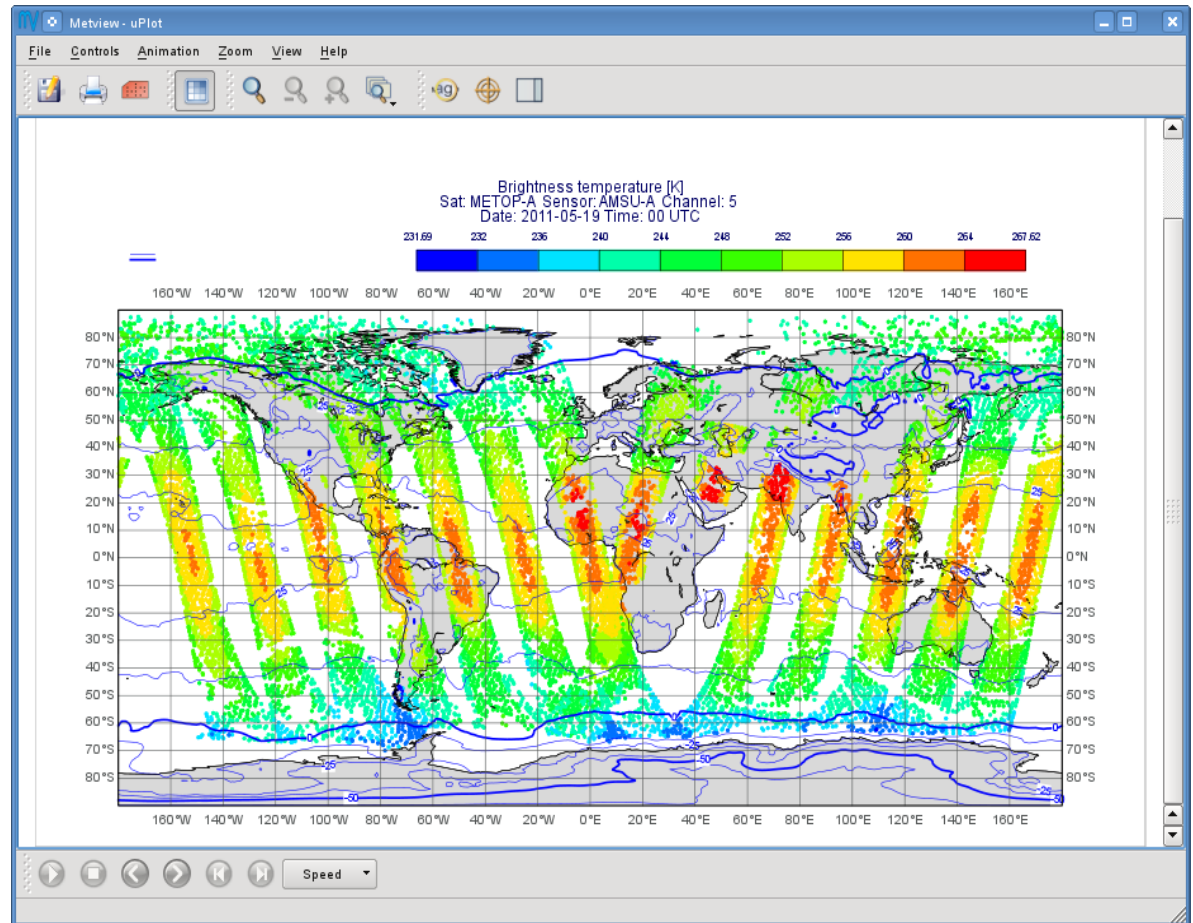


The resulting ODB plot



Overlay with other data types

- ODB data can be overlaid with other data (GRIB, NetCDF, Geopoints etc.)
- Just **drop** a data file icon into the ODB plot (or vice versa)
- Example: ODB brightness temperature overlaid with T2 field from MARS



Metview Macro

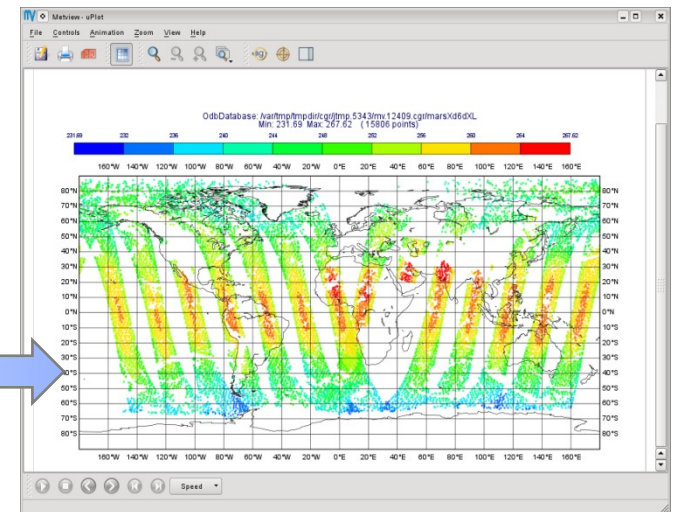
```
Macro* - /home/graphics/cgr/metview/Local/ODB/obsmon_tutorial/Macro
File Edit View Insert Program Settings Help

1 #Metview Macro
2
3 # Define database
4 db = read("amsre.odb")
5
6 #Define plot
7 gpt = odb_geopoints(
8     odb_latitude   : "lat",
9     odb_longitude  : "lon",
10    odb_value      : "obsvalue",
11    odb_where      : "vertco_reference_1 = 5",
12    odb_data       : db
13 )
14 #Define symbol plotting
15 symbol = msymb(
16     symbol_type    : "marker",
17     symbol_table_mode : "advanced",
18     symbol_advanced_table_max_level_colour : "red",
19     symbol_advanced_table_min_level_colour : "blue",
20     symbol_advanced_table_colour_direction : "clockwise",
21     symbol_advanced_table_marker_list    : 3,
22     symbol_advanced_table_height_list    : 0.15
23 )
24
25 #Plot
26 plot(gpt,symbol)

Program finished (OK) : 442 ms [Finished at 16:27:26] L: 25, C: 1
```

New Macro editor in Metview 4

All the previously presented functionalities are available in Macro!

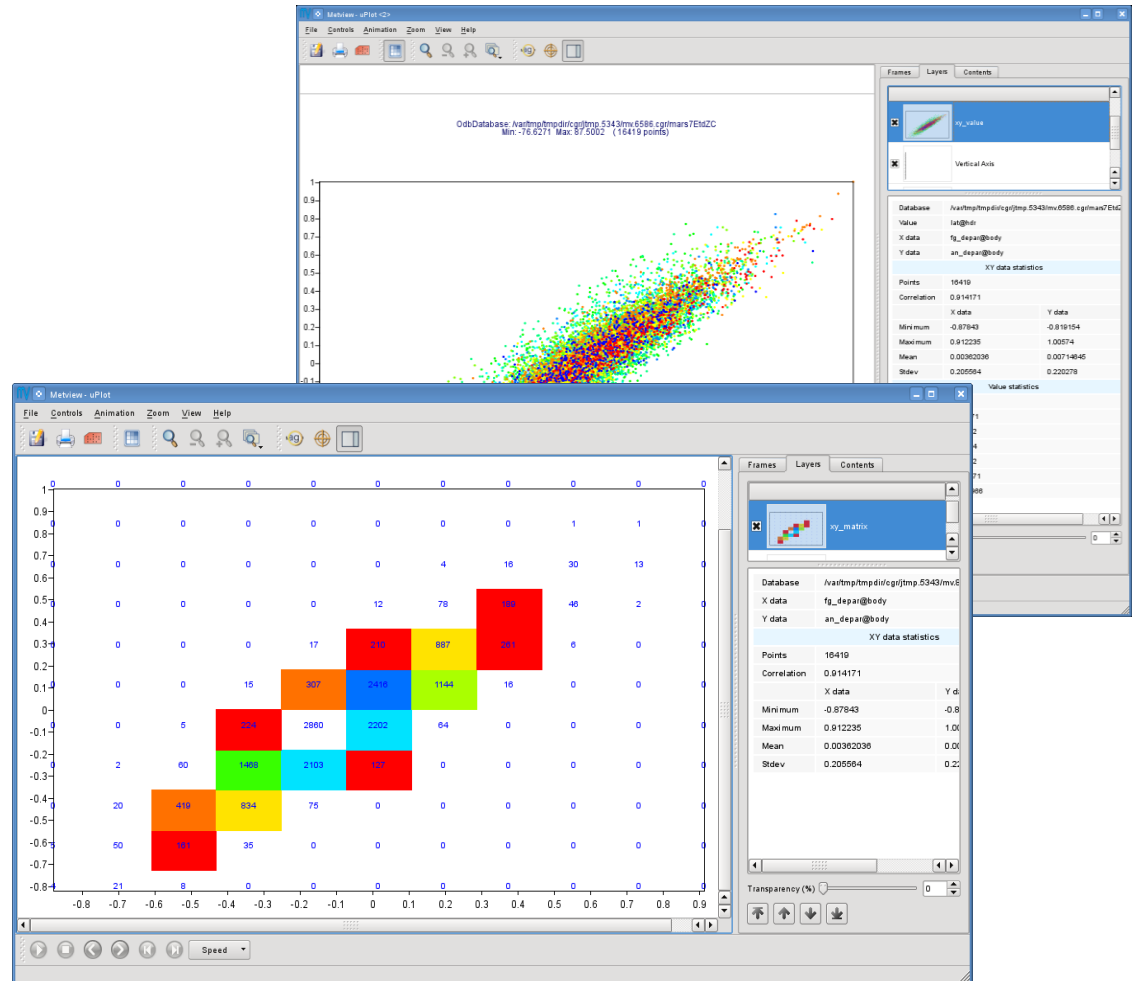


Exercises

- Please do Exercise 1, 2 and 3

Short term plans

- **OdbViewer (Magics++) & Metview 4**
 - Scatterplots
 - Histograms
 - Curves
- **Metview 4**
 - **ODB MARS client**



Tutorials

- **OdbViewer:**

<http://intra.ecmwf.int/publications/cms/get/graphics>

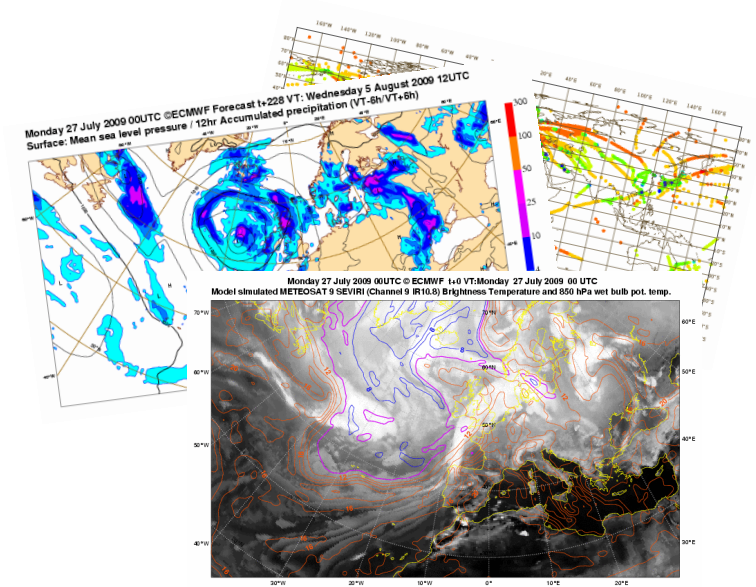
- **Metview ODB tutorial:**

<http://www.ecmwf.int/publications/manuals/metview/training/index.html>

Contact details

Metview: `metview@ecmwf.int`

Magics++: `magicsplus@ecmwf.int`



🖱 <http://www.ecmwf.int/publications/manuals/metview/>

🖱 <http://www.ecmwf.int/publications/manuals/magics/>

Come and talk to us to give us feedback
or to ask for help!