

# OBSTAT Tutorial

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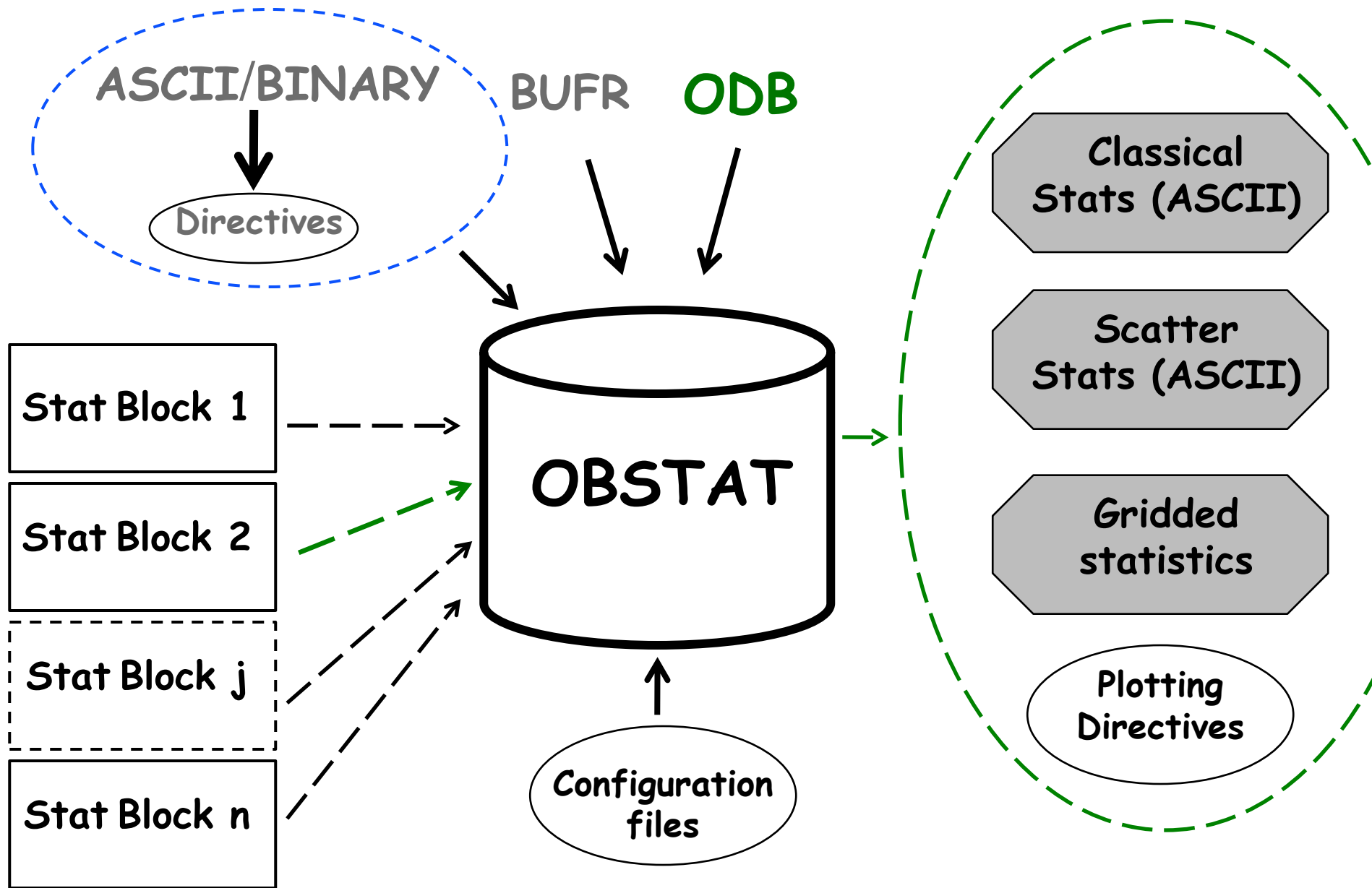
- documentation available :

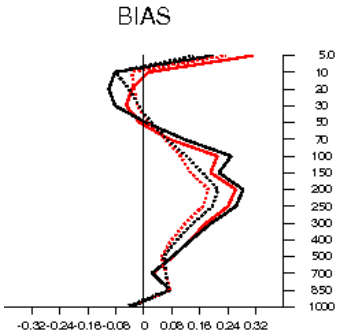
`/home/mo/obstat/doc/obstat_userguide.pdf`

- Detailed tutorial to be done in the Autumn

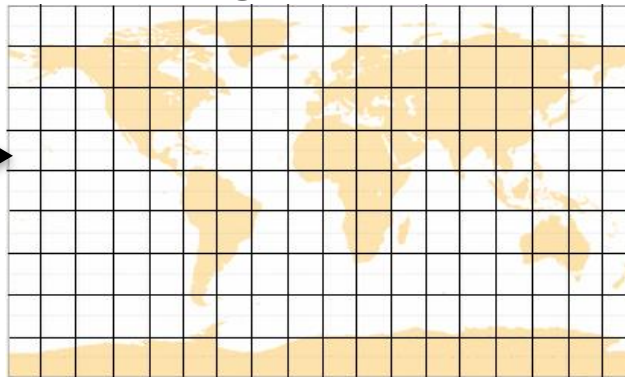
# OBSTAT purpose:

- Production of statistics for various observation quantities (departures, bias correction, etc.)
- Production of statistics according to various data selection criteria
- Production of statistics according to various dimensions (time, vertical, latitudes, FOV, etc.)
- Generic plotting of statistics for comparisons purposes

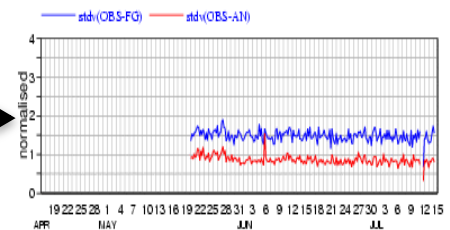
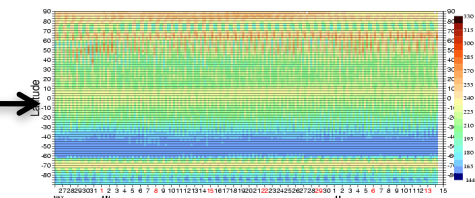
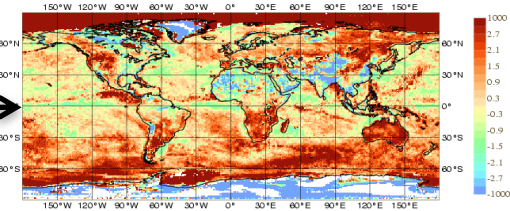
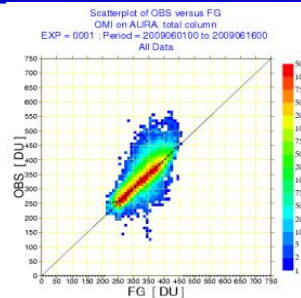
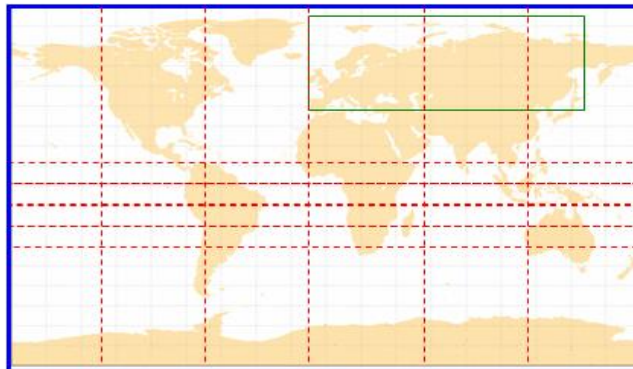




High resolution



Low resolution



OBSTAT

ASCII files

# Statistics definition

Stat Block 1

Stat Block 2

Stat Block j

Stat Block n

```
BEGIN STATDEF
comment= 'MHS/AMSUB Tb'
statkind= 8
areaNSEW= GLOBE
grid= REGULAR 2. 360. 2.5
surfaces= 2 4
tslot= 6
types= 54 55
params= 12062
items= 8 9 10 18
instrument= 20604 20704 20804
datastream= 0 1 2
flagfilter= 2 5 40 11
nbbin= 5
END STATDEF
```

# How to run OBSTAT

- **On-line mode : Through preIFS (done systematically after each analysis)**
- **Off-line mode to plot pre-computed statistics**
- **Off-line mode (via scripts) to compute and plot statistics**
- **Off-line mode (via XCDP) to compute statistics**

# Exercises: Preparations

- copy the directory `obstat_tutorial` into your `$HOME`

```
cp -r /home/mo/obstat/obstat_tutorial $HOME  
cd $HOME/obstat_tutorial
```



## Example 1: Generate vertical profile, histogram and gridded statistics for SBUV-2 onboard NOAA-17 and NOAA-18.

- edit (e.g. using vi) the script **dobstat** and check the following variables:

<b>FIRSTCYCLE=2011010800</b>	<b>#First cycle date</b>
<b>LASTCYCLE=2011011200</b>	<b>#Last cycle date</b>
<b>EXPVER1=fizk</b>	<b>#Experiment ID</b>
<b>CLASS1=rd</b>	<b>#Experiment Class</b>
<b>STREAM1=DCDA</b>	<b>#Experiment stream</b>
<b>STATDEF=\$(pwd)/stat_\$1.ref</b>	<b>#Statistics definition file</b>
<b>ODBFILTYPE=MFB</b>	<b>#ODB file type</b>
<b>datalist="resat"</b>	<b>#List of observation groups</b>
<b>GRIBDIR="\$SCRATCH/output_\$1"</b>	<b>#Where to store outputs (optional)</b>
<b>ODBDIR="/scratch/mo/obstat/data"</b>	<b>#storage location for input data</b>
<b>ARCHIVE_TXT_STAT=true</b>	<b>#true: save obstat output ascii files</b>

```
#####  
BEGIN STATDEF  
comment= 'Ozone SBUV-2'  
statkind= 2  
areaNSEW= NH.Tr.SH  
types= 206  
params= 15020  
items= 9 10  
instrument= 208624001 209624001  
flagfilter= 5  
sizebin= 2.0  
nbbin= 40  
END STATDEF  
#####  
BEGIN STATDEF  
comment= 'Ozone SBUV-2'  
statkind= 1  
areaNSEW= NH.Tr.SH  
types= 206  
params= 15020  
items= 9 10 18  
instrument= 208624001 209624001  
flagfilter= 5  
Nbbin= 6  
END STATDEF  
#####
```

Histogram

Vertical prof

```
#####  
BEGIN STATDEF  
comment= 'Ozone NOAA SBUV'  
statkind= 8  
areaNSEW= GLOBE  
grid= REGULAR 3. 360. 2.5  
tslot= 6  
types= 206  
params= 15020  
items= 8 9 10 18  
instrument= 208624001 209624001  
flagfilter= 5  
nbbin= 6  
END STATDEF  
#####
```

Gridded stats in  
GRIB

# Example 1: statistics generation

- Run **dobstat** script using the **stat\_exp1.ref**

```
./dobstat exp1
```

## Result

- classical obstat plots. Ascii files are saved under **\$SCRATCH/output\_exp1**. They can be re-plotted using the script **dobstat\_quick**
- Gridded statistics are generated and saved under **\$SCRATCH/output\_exp1**
- A plotting directives are also generated and saved under **\$SCRATCH/output\_exp1**

# Example 1 : Statistics plotting

- edit (e.g. using vi) the script `obstat_plot` and check the following variables:

<code>EXPVER=fizk</code>	<code>#Experiment ID</code>
<code>CLASS=rd</code>	<code>#Experiment Classe</code>
<code>STREAM=DCDA</code>	<code>#Experiment stream</code>
<code>LASTTIME=2011011300</code>	<code># Last time of the period to plot</code>
<code>PLOT_OPTIONS=\$2</code>	<code>#Plotting directive file</code>
<code>GRIBDIR="\$SCRATCH/output_\$1"</code>	<code>#Where statistics are stored</code>
<code>OPTIONDIR="\$SCRATCH/output_\$1"</code>	<code>#Where plotting directive stored</code>
<code>PLOTDIR= "\$SCRATCH/plot_\$1"</code>	<code>#where to store the output plots</code>

- Run the plotting script

```
./obstat_plot exp1 fizk_DCDA_ozone_o3_208_624.opt
```

# 2D map (3x3)

Statistics for OZONE from NOAA-18/SBUV-2

MEAN OBSERVATION [DU ] (Used)

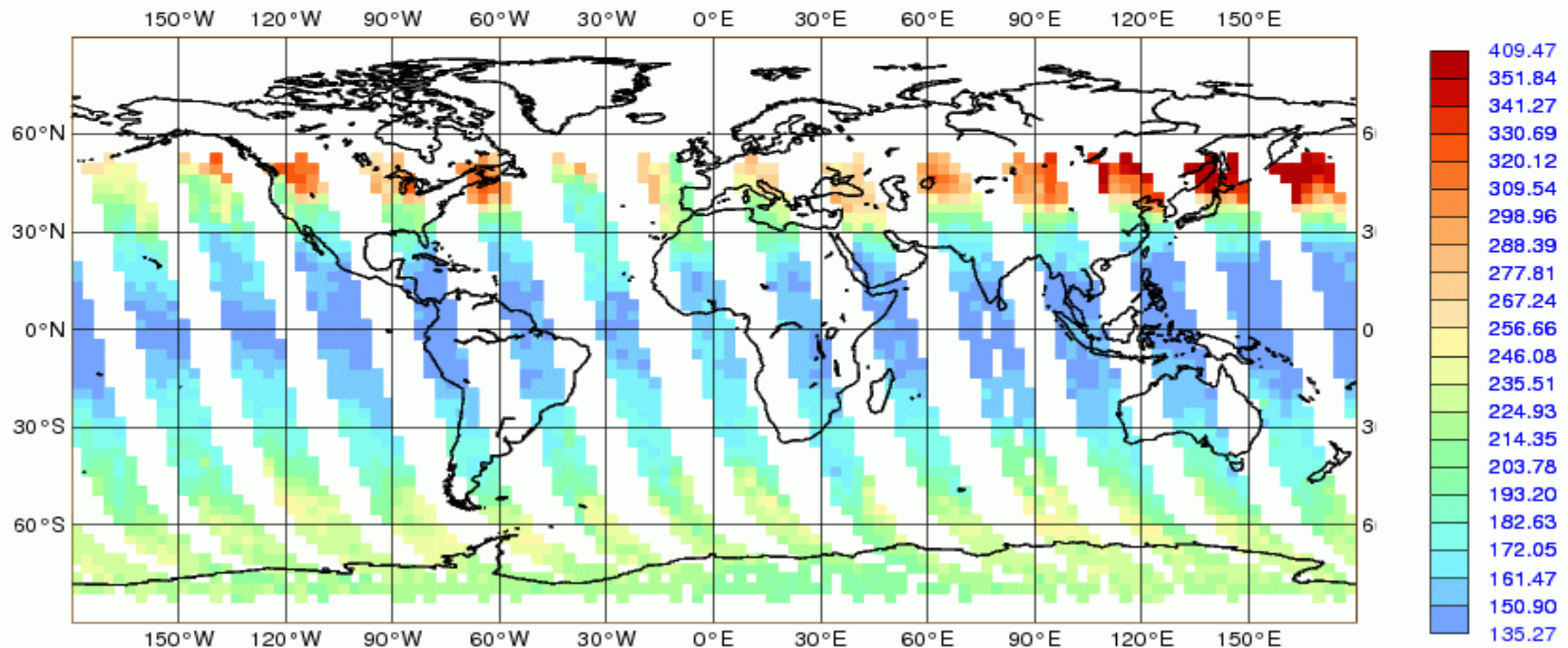
Data Period = 2011-01-08 03 - 2011-01-12 03

EXP = fizk, Level = 16.00 - 1013.25 hPa

Min: 135.269

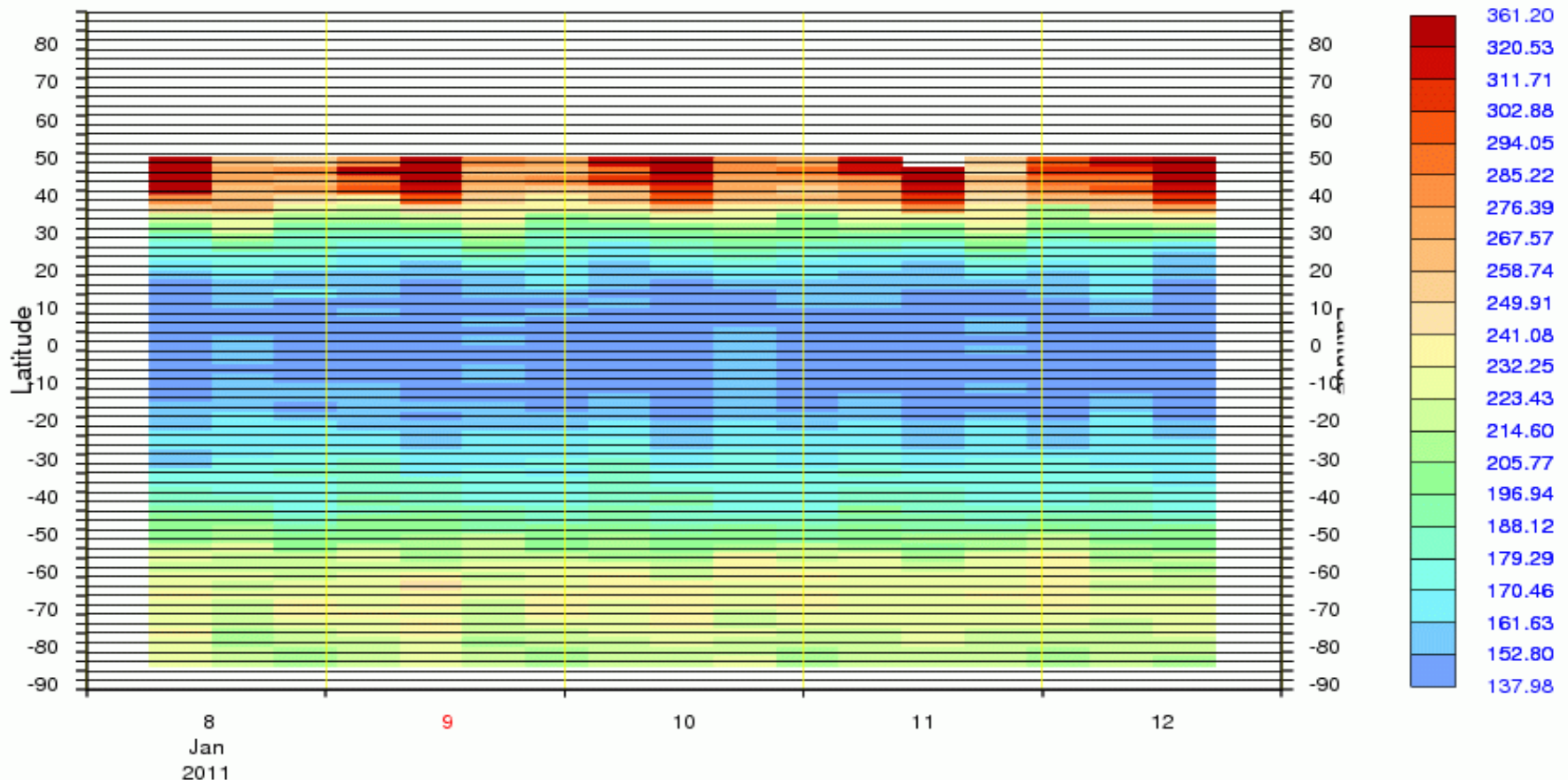
Max: 409.467

Mean: 196.71



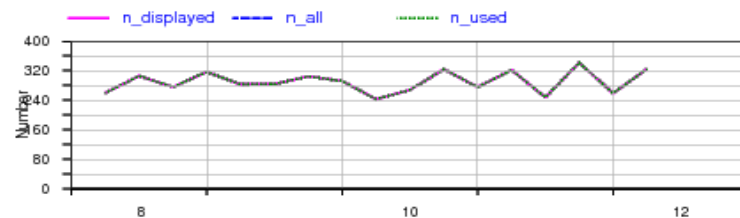
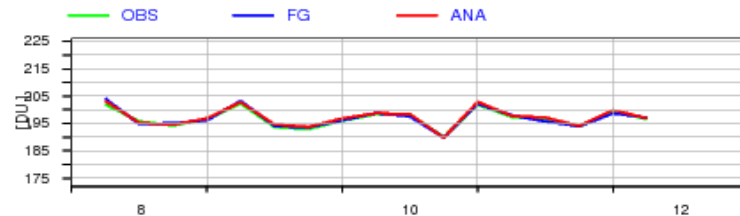
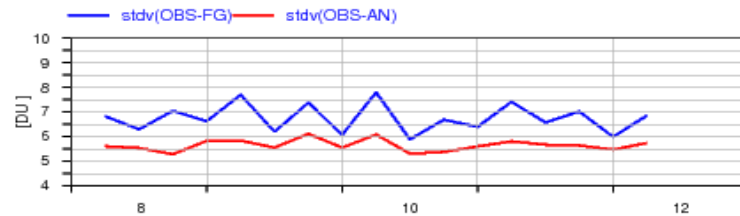
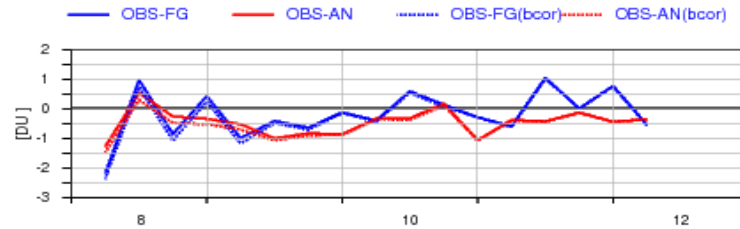
# HOVMOELLER (latitudes vs time)

Statistics for OZONE from NOAA-18/SBUV-2  
Level = 16.00 - 1013.25 hPa [ time step = 6 hours ]  
MEAN OBSERVATION [DU ], Used  
EXP = fizk, Data Period = 2011010800 - 2011011300  
Min: 137.984      Max: 361.195      Mean: 196.652



# Area averages time series

Statistics for OZONE from NOAA-18/SBUV-2  
Level = 16.00 - 1013.25 hPa, Used data [ time step = 6 hours ]  
Area: lon\_w= 0.0, lon\_e= 360.0, lat\_s= -90.0, lat\_n= 90.0 (over All\_surfaces)  
EXP = fizk



2011

# Example 2 : “All data” mode

- edit (e.g. using vi) the script dobstat and set the variable LALLDATA to yes
- optionally, you can specify a statistics definition template to be applied to all the data not already defined in the statistics definition file

*This stat block can be used by its own or added to an existing stat.ref file*

Not effective

```
#####  
BEGIN STATDEF  
comment= 'speciemen'  
statkind= 2  
areaNSEW= NH.Tr.SH  
types= 206  
params= 15020  
items= 9 10  
instrument= 77777  
flagfilter= 5  
sizebin= 2.0  
nbbin= 40  
END STATDEF  
#####
```

template



# Example 2 : “All data” mode

- Run dobstat script using the stat\_exp2.ref

```
./dobstat exp2
```

## Result

- Statistics for all “used” data present in the input MFB file

# Example 3: density stats + user defined pressure binning

- *Switch off the low res gridded stats*
- *Definition of 4 pressure layers*
- *Production of density statistics*

```
#####  
BEGIN STATDEF  
comment= 'SATOB MET-9 wind'  
statkind= 8  
lowresgrib= n  
areaNSEW= GLOBE  
grid= REGULAR 2. 360. 2.5  
types= 82 83 85 86 87  
params= 11003 11004  
items= 8 9 10  
instrument= 56301  
flagfilter= 5  
nbbin= 4  
pres_t= 100 40000 70000 100  
pres_b= 40000 70000 110000 110000  
scatwrite= y  
scatitems= 9 46 10 46 9 47 10 47  
scatareas= GLOBE  
END STATDEF  
#####  
BEGIN SCATITEM 9 10  
#bin min max incr  
9999 -5 5 0.5  
END SCATITEM  
BEGIN SCATITEM 46 47  
#bin min max incr  
9999 20 100 5.0  
END SCATITEM
```

# Example 3 :

- Run dobstat script using the stat\_exp3.ref

Edit the script dobstat and set back LALLDATA to no

Set the datalist to satob (instead of resat)

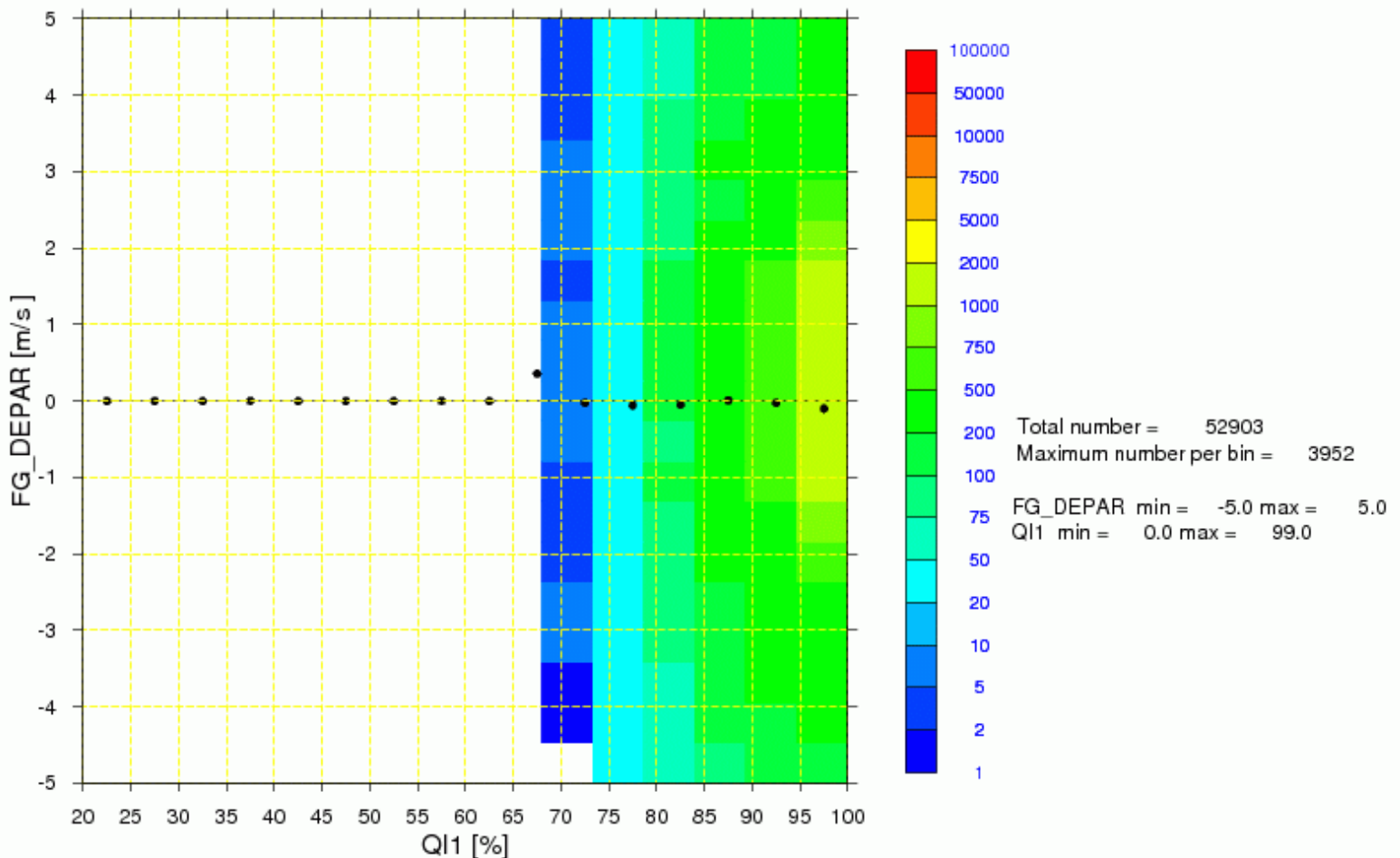
```
./dobstat exp3
```

- Run the plotting

```
./obstat_plot exp3
```

# Example 3: density plot

SCATTER PLOT OF QI1 VERSUS FG\_DEPAR  
WINDSPEED FROM METEOSAT-9 IR3, LAYER 1.00 - 1100.00 HPA  
EXP = FIZK ; PERIOD = 2011010800 - 2011011200  
USED - GLOBE



# Example 4 : Alternative/additional dim

- *Production of high res gridded stats with FOV dimension enabled*
- *Production of area averages scan dependent stats for METOP-A/MHS channel 4*

```
BEGIN STATDEF
comment= 'MHS/AMSUB Tb'
statkind= 8
lowresgrib= n ← Low res gridded stat off
areaNSEW= GLOBE
grid= REGULAR 2. 360. 2.5
surfaces= 2 4 ← For land and over all surfaces
types= 54 55
params= 12062
items= 8 9 10 18
instrument= 415
flagfilter= 5
nbbin= 5
sizebin2= 30.
nbbin2= 3
coorditem2= 38
END STATDEF
#####
BEGIN STATDEF
comment= 'MHSTb'
statkind= 1
areaNSEW= NH.Tr.SH 3.9 4.1
types= 55
params= 12062
items= 9 10 18
instrument= 415
flagfilter= 5
sizebin= 3
refval= 0.5
nbbin= 30
coorditem= 38
END STATDEF
```

# Example 4 :

- Run dobstat script using the stat\_exp4.ref

Set the datalist to mhs

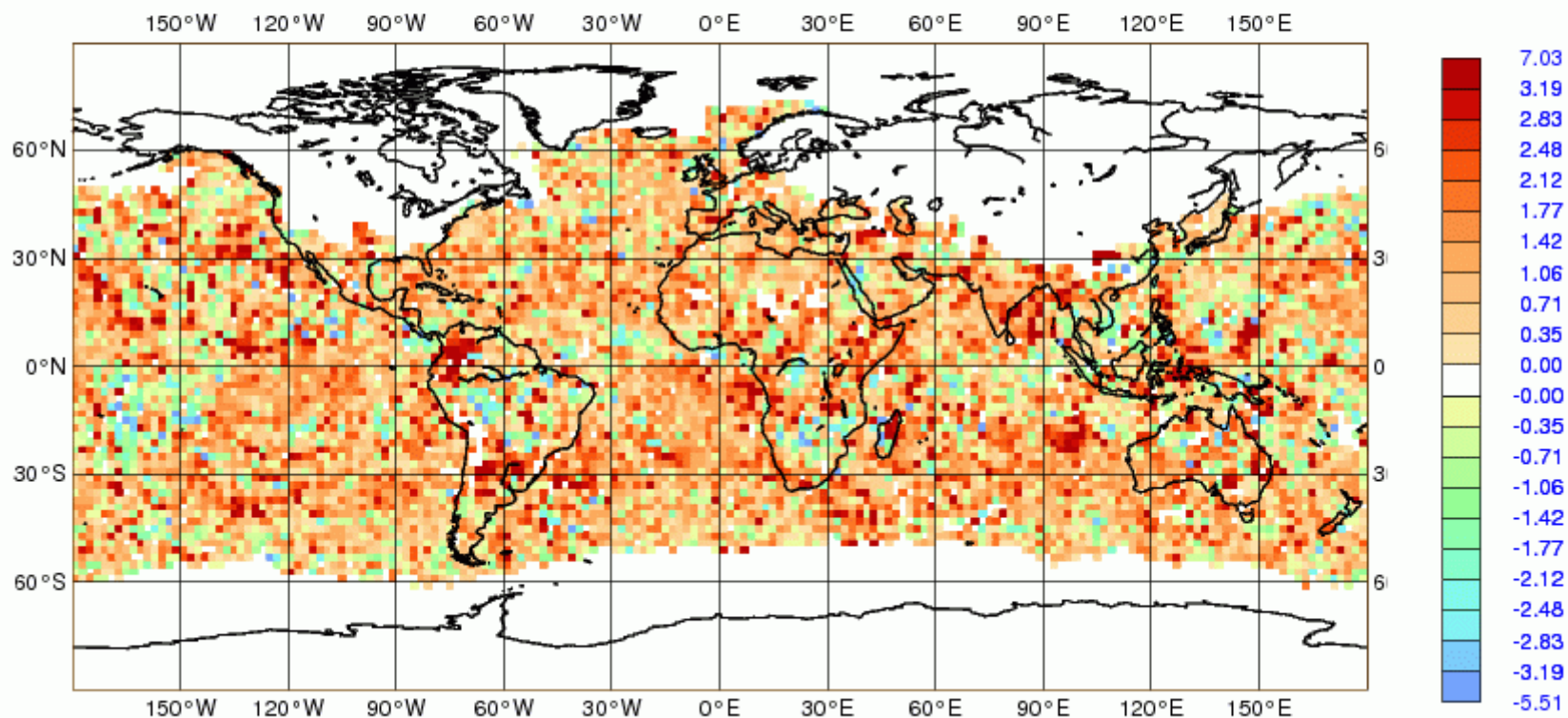
```
./dobstat exp4
```

- Run the plotting

```
./obstat_plot exp4
```

# Example 4 :

Statistics for RADIANCES from METOP-A/MHS  
MEAN FIRST GUESS DEPARTURE (OBS-FG) [K] (Used)  
Data Period = 2011-01-08 09 - 2011-01-12 09  
EXP = fizk, Channel = 3 (FOVS: 00-30)  
Min: -5.51071      Max: 7.0281      Mean: 0.833265



## Example 4 :

exp:fizk /DCDA 2011010800-2011011200(12)

MHSTb N.Hemis Layer= 4

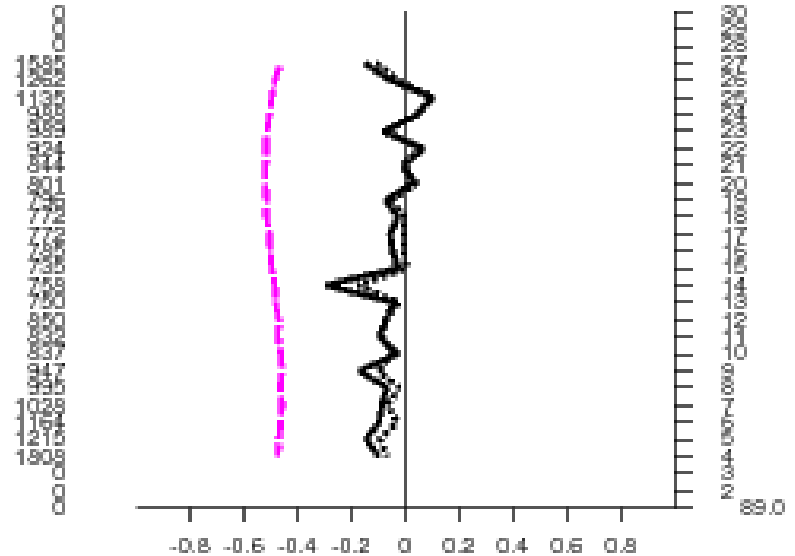
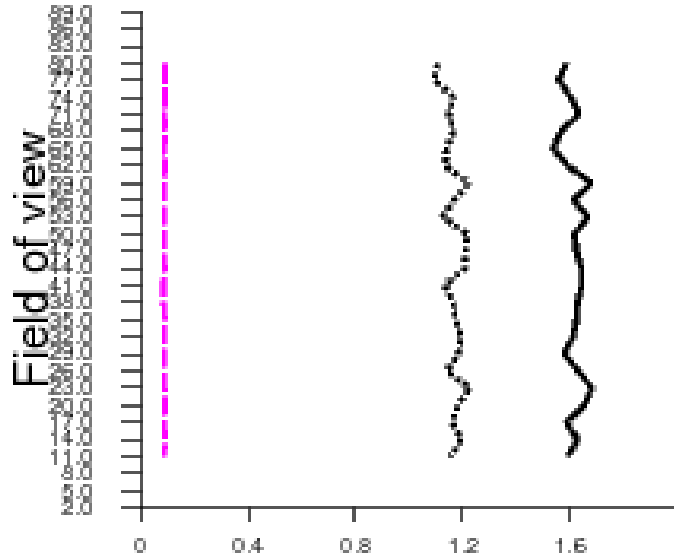
used Tb METOP-A MHS

STD.DEV

nobsexp

BIAS

- - - - - Bias correction of obs  
 ..... Analysis departure (o-a)  
 \_\_\_\_\_ Background departure (o-b)





# Example 5 : User defined diags and flags

- The user can, via config files, define new flags and observation quantities to monitor (The ODB should contain the requested info)

```
# This file contains the definition of the additional obstat
# paramters (not present in the original SQL query)
# A maximum of 5 parameters can be defined for each obstat run
#####
# Param          SQLflag          Number  GribNumber  CompMethod  Datalist
# -----
emis_retr e mis_fg@radiance_body  103      228          0          mhs,amsua
emis_atlas emis_atlas@radiance_body 104      230          0          mhs,amsua
orography orography@modsurf      106      232          0          mhs,amsua
fgvalue         0                100      234          (itm_8-itm_9) all
anvalue         0                110      236          (itm_8-itm_10) all
```

*New diags*

```
# This file contains the definition of the additional flags
# A maximum of 5 flags can be defined for each obstat run
#-----
# flag   Number   Definition   Datalist
# ----   -GE 200-   -----
SeaData  200      (itm_84==0) all
```

*New flags*

```
#####
BEGIN STATDEF
comment= 'METOP-A/AMSUA Tb'
statkind= 8
areaNSEW= GLOBE
grid= REGULAR 3. 360. 2.5
types= 54 55
params= 12062
items= 8 9 10 18 110 ← New diag
instrument= 415
flagfilter= 5 200 ← New flag
nbbin= 5
END STATDEF
```

# Example 5 :

- Run dobstat script using the stat\_exp5.ref

Edit the dobstat script and un-comment the variables **PARAMS** and **FLAGS**

```
./dobstat exp5
```

- Run the plotting

```
./obstat_plot exp5
```

# Example 5 :

Statistics for RADIANCES from METOP-A/MHS

MEAN OBSERVATION [K] (seaData)

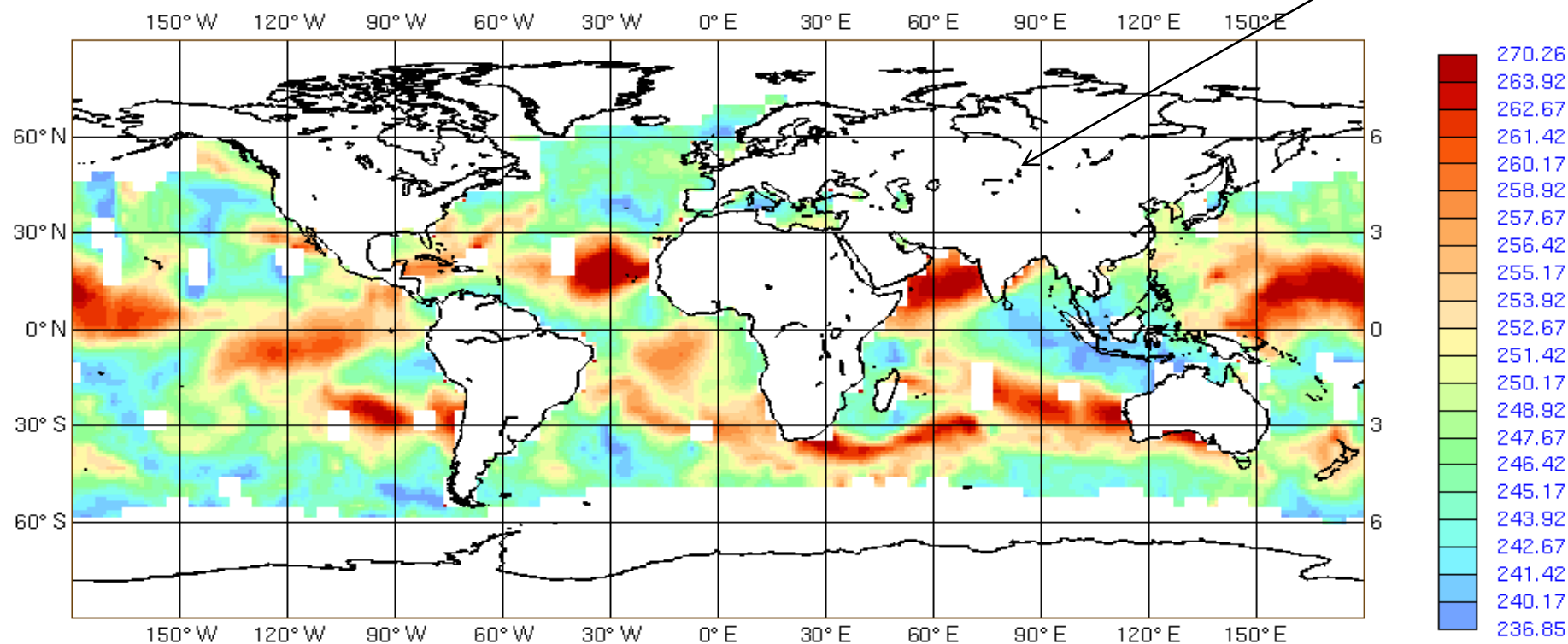
Data Period = 2011-01-08 09 - 2011-01-09 09

EXP = fizk, Channel = 3

Min: 236.848

Max: 270.264

Mean: 250.16



# OBSTAT grib2 and METVIEW4

- **Examination**
- **Visualization (using contours)**
- **Manipulation using Metview Icons**
- **Usage of macros**

# OBSTAT grib and METVIEW4

Metview - Grib Examiner

File View Profiles Help

Key profile: obstat

File: /home/mo/mo3/metview/GE0grib\_fizk\_DCDA\_tovs\_tb\_223\_015\_0\_000004\_000004\_1  
Permissions: -rw-r----- Owner: mo3 Group: mo Size: 623KB Modified: 2011-06-05 10:33  
Total number of messages: 36

Messages

platform	instrument	phase	observationDiagnostic	dataSelection	scanPosition	mask	dataDate	dataTime	dayOfEndOfOverallTimeInterval	hourOfEndOfOverallTimeInterval
NOAA-19	MHS	0	obs	Used	0	All_surfaces	20110108	0300	12	9
NOAA-19	MHS	0	obs	Used	0	All_surfaces	20110108	0900	11	15
NOAA-19	MHS	0	obs	Used	0	All_surfaces	20110108	1500	11	21
NOAA-19	MHS	0	obs	Used	0	All_surfaces	20110107	2100	12	3
NOAA-19	MHS	0	obs_stdv	Used	0	All_surfaces	20110108	0300	12	9
NOAA-19	MHS	0	obs_stdv	Used	0	All_surfaces	20110108	0900	11	15
NOAA-19	MHS	0	obs_stdv	Used	0	All_surfaces	20110108	1500	11	21
NOAA-19	MHS	0	obs_stdv	Used	0	All_surfaces	20110107	2100	12	3
NOAA-19	MHS	0	fgdep	Used	0	All_surfaces	20110108	0300	12	9
NOAA-19	MHS	0	fgdep	Used	0	All_surfaces	20110108	0900	11	15
NOAA-19	MHS	0	fgdep	Used	0	All_surfaces	20110108	1500	11	21
NOAA-19	MHS	0	fgdep	Used	0	All_surfaces	20110107	2100	12	3
NOAA-19	MHS	0	fgdep_stdv	Used	0	All_surfaces	20110108	0300	12	9
NOAA-19	MHS	0	fgdep_stdv	Used	0	All_surfaces	20110108	0900	11	15
NOAA-19	MHS	0	fgdep_stdv	Used	0	All_surfaces	20110108	1500	11	21
NOAA-19	MHS	0	fgdep_stdv	Used	0	All_surfaces	20110107	2100	12	3
NOAA-19	MHS	0	andep	Used	0	All_surfaces	20110108	0300	12	9
NOAA-19	MHS	0	andep	Used	0	All_surfaces	20110108	0900	11	15
NOAA-19	MHS	0	andep	Used	0	All_surfaces	20110108	1500	11	21
NOAA-19	MHS	0	andep	Used	0	All_surfaces	20110107	2100	12	3

Meta data of the selected message

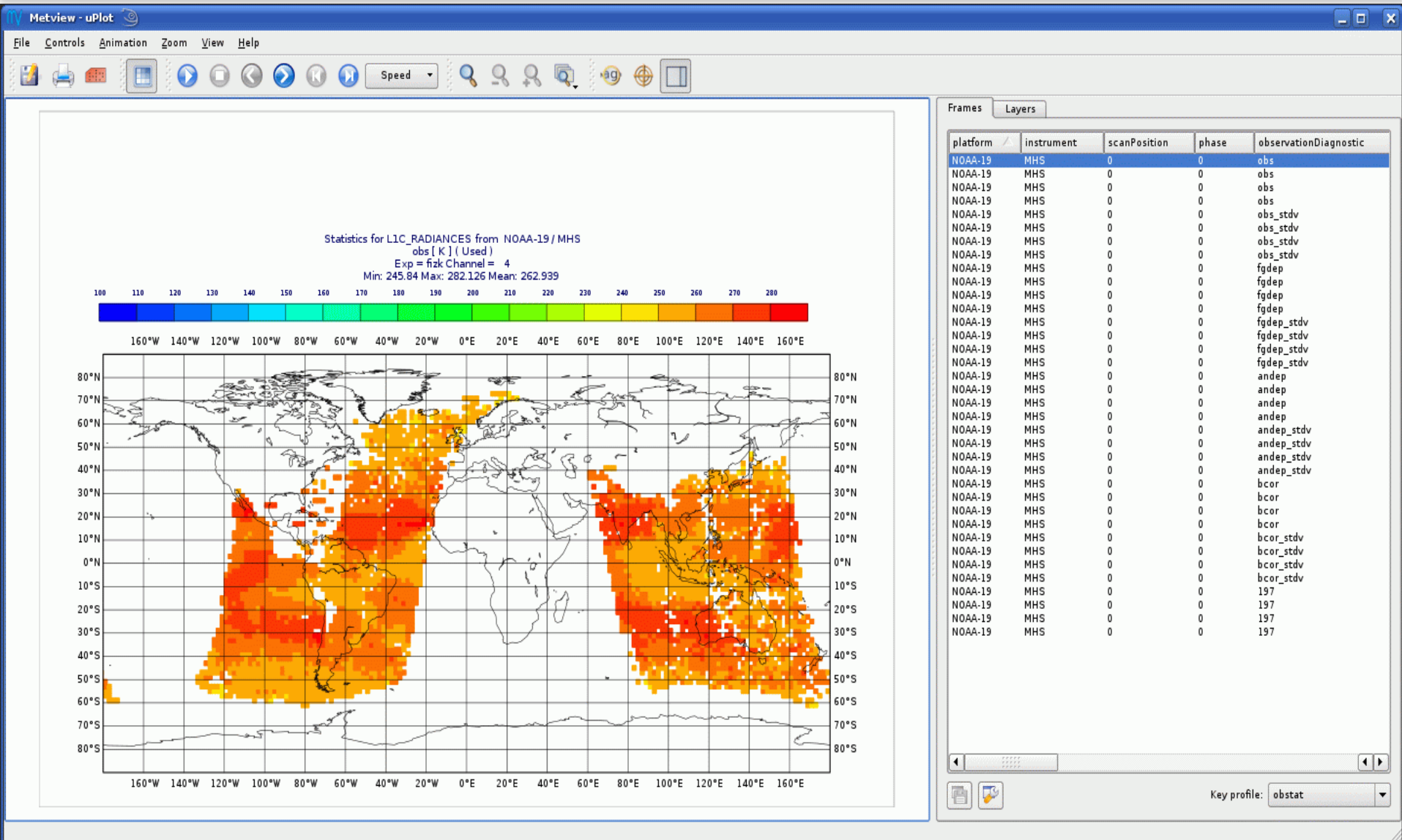
Dump mode: WMO-style dump

Tree view Plain text

Position	Key name (GRIB API)	Value
+	Section 1	
+	Section 2	
+	Section 3	
+	Section 4	
+	Section 5	
+	Section 6	
+	Section 7	
+	Section 8	

Status: OK

# OBSTAT gribbs and METVIEW4



# OBSTAT grib manipulation tools

- **Dump data over an area**
- **Normalize statistics (high res)**
- **Split grib**
- **merge statistics**