

REPORT ABOUT ENVISAT SCIAMACHY NRT OZONE PRODUCT (SCI_RV__2P) FOR DECEMBER 2005

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1. Key points for December 2005

- SCIAMACHY SCI_RV__2P data quality not stable
- Change in SCIAMACHY data on 15 December
- SCIAMACHY data are about 20 DU lower than ECMWF ozone values in the global mean from 15 December onwards
- Decrease of the standard deviations of SCIAMACHY data and of the mean departures in the global mean, on 15 December
- Relatively large ozone values in the latitude band 62.5°S-67.5°S
- This monitoring report was produced with the operational ECMWF model, CY29R2

2. Quality and amount of received data

This report covers SCIAMACHY NRT total column ozone data for December 2005. Amount of received data and their quality are shown in Figures 1-6 for various latitude bands. Geographical distributions and zonal means timeseries of number of data, observation values, first-guess departures, and of observations and first-guess departures standard deviations are presented in Figures 7-11 and Figures 12-16, respectively. Figures 17-19 present the scatter plots of SCIAMACHY ozone values against first-guess and latitude values, as well as the scatter plot of first-guess departures of SCIAMACHY ozone values against latitude.

The timeseries plots show that SCIAMACHY data quality was not stable in December. A sudden change to lower SCIAMACHY total ozone columns in the global mean occurred on 15 December. This change is clearly seen in the global and in the zonal mean timeseries plots (Figure 1 and Figures 13-16, respectively). After 15 December the global mean departures (SCIAMACHY-ECMWF) are about - 20 DU. The drift in the mean departures seen in November in the northern extratropics disappeared on 15 December, however there are still large (negative) departures in those latitudes, e.g. at high latitudes mean departures can reach -240 DU. Large (positive) mean departures (up to +240 DU) are also seen in the southern hemisphere in the latitude band 62.5°-67.5°S.

The standard deviations of the mean analysis and first-guess departures, and of SCIAMACHY data themselves, decreased almost everywhere on 15 December. In the global mean, the standard deviations of the departures have decreased from values about 60 DU before 15 December to values about 35 DU after 15 December. The SCIAMACHY data standard deviations have decreased from values about 95 DU to 35 DU.

The most noticeable decrease in the standard deviations is seen at the high latitudes, in particular in the southern hemisphere (from values above 100 DU before 15 December to values between 25 - 45 DU after 15 December).

The geo plots also illustrate that the largest model biases and the largest standard deviations of SCIAMACHY data and of the departures, are located in the high latitudes in both hemispheres (Figures 9-11). The relatively large biases south of 50°S along about 0° and 90°E meridians, which have been reported since last September, have disappeared this month.

The off-set in SCIAMACHY data observed on 15 December is also very clear in the Hovmoeller plots. These plots show that the unrealistically high ozone values (500-1000 DU) seen last month in the latitude belt 70°S-82.5°S disappeared after 15 December. However, relatively large ozone values in the latitude band 62.5°S-67.5°S are seen from that date onwards. The Hovmoeller plots further illustrate the large negative mean first-guess departures at the northern high latitudes as well as the large positive first-guess departures in the latitude band 62.5°S-67.5°S.

The scatter plot of SCIAMACHY ozone values against latitude (Figure 18) exhibit the unrealistically large ozone values observed before 15 December in the region 70°S-82.5°S as well as the relatively large ozone values in the latitude band 62.5°S-67.5°S that occurred from 15 December onwards. This plot also shows relatively low ozone values at the northern high latitudes. The large positive and negative mean first-guess departures seen at southern and northern latitudes, respectively, are also observed in the scatter plot of first-guess mean departures against latitudes (Figure 19).

Despite the improvement on the data quality observed from 15 December on, SCIAMACHY data have not reached yet the fairly good quality observed before 15 October, when the wrong handling of the season index of the operational processor IPF version 5.04 started. According to the product disclaimer (visit <http://envisat.esa.int/dataproducts/availability/disclaimers> for further information), this incorrect handling of the season index lasts until 31 December, therefore the improvement on the data quality to the levels seen before 15 October (i.e. mean first-guess departures about -5 DU in the global with standard deviations of about 15 DU) was not expected this month.

There are no data from 2 December at 18 UTC to 3 December at 12 UTC, on 24 December (06 and 12 UTC) and from 25 December at 06 UTC to 27 December at 00 UTC.

3. Remarks

This monitoring report was produced with the operational ECMWF model (CY29R2). In cycle CY29R2 ozone layers from SBUV/2 on NOAA-16 and SCIAMACHY total column ozone data produced by KNMI are actively assimilated. The comparison of SCLRV__2P data against the ECMWF ozone field does not give an independent validation.

All ozone values are in Dobson Units (DU).

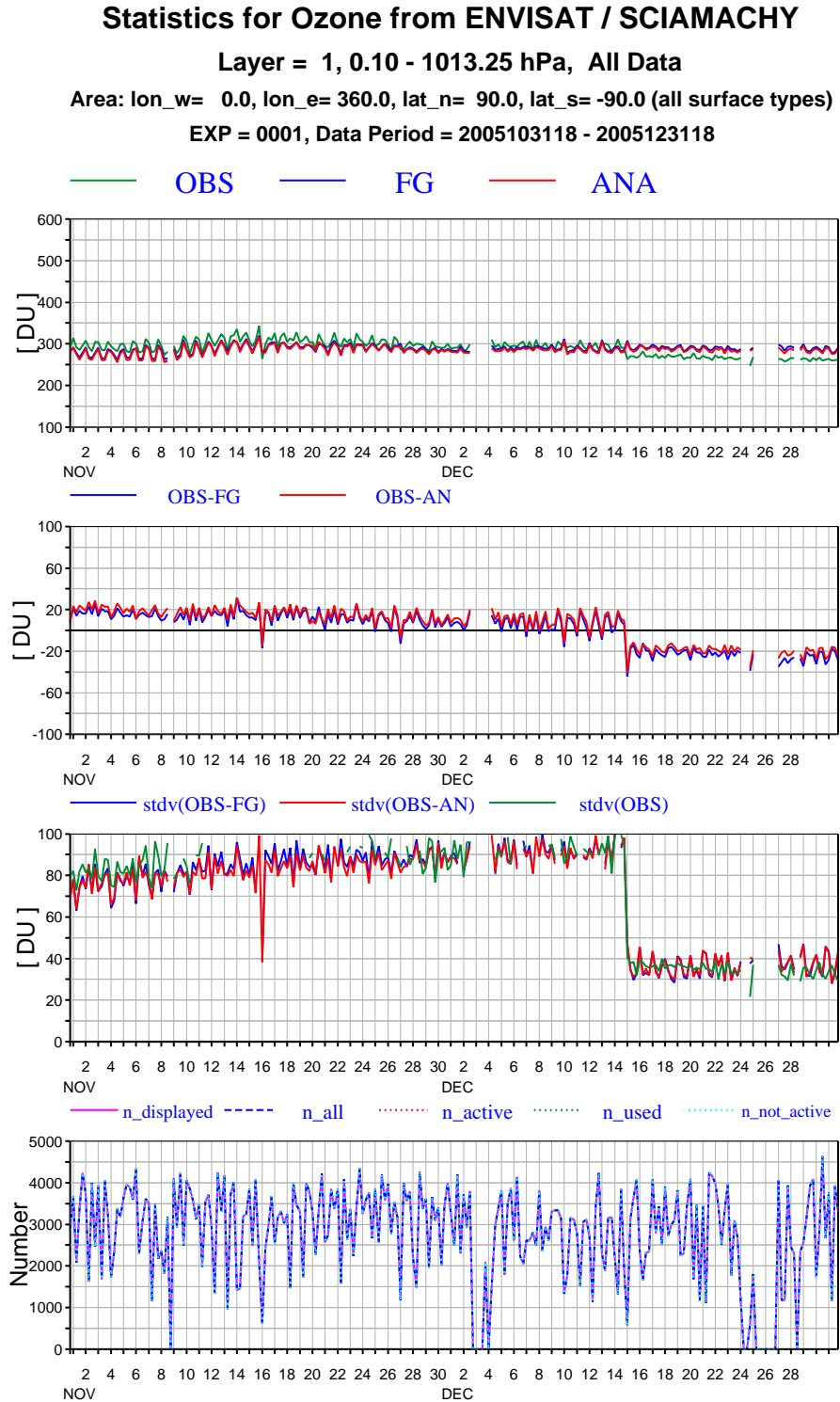


Fig. 1. Time series of mean observations, first guess and analysis values (top panel), first-guess and analysis departures (second panel), standard deviations (third panel) and number of data (bottom panel) per 6-hour cycle for ENVISAT SCIAMACHY NRT ozone data for November and December 2005 (Global means).

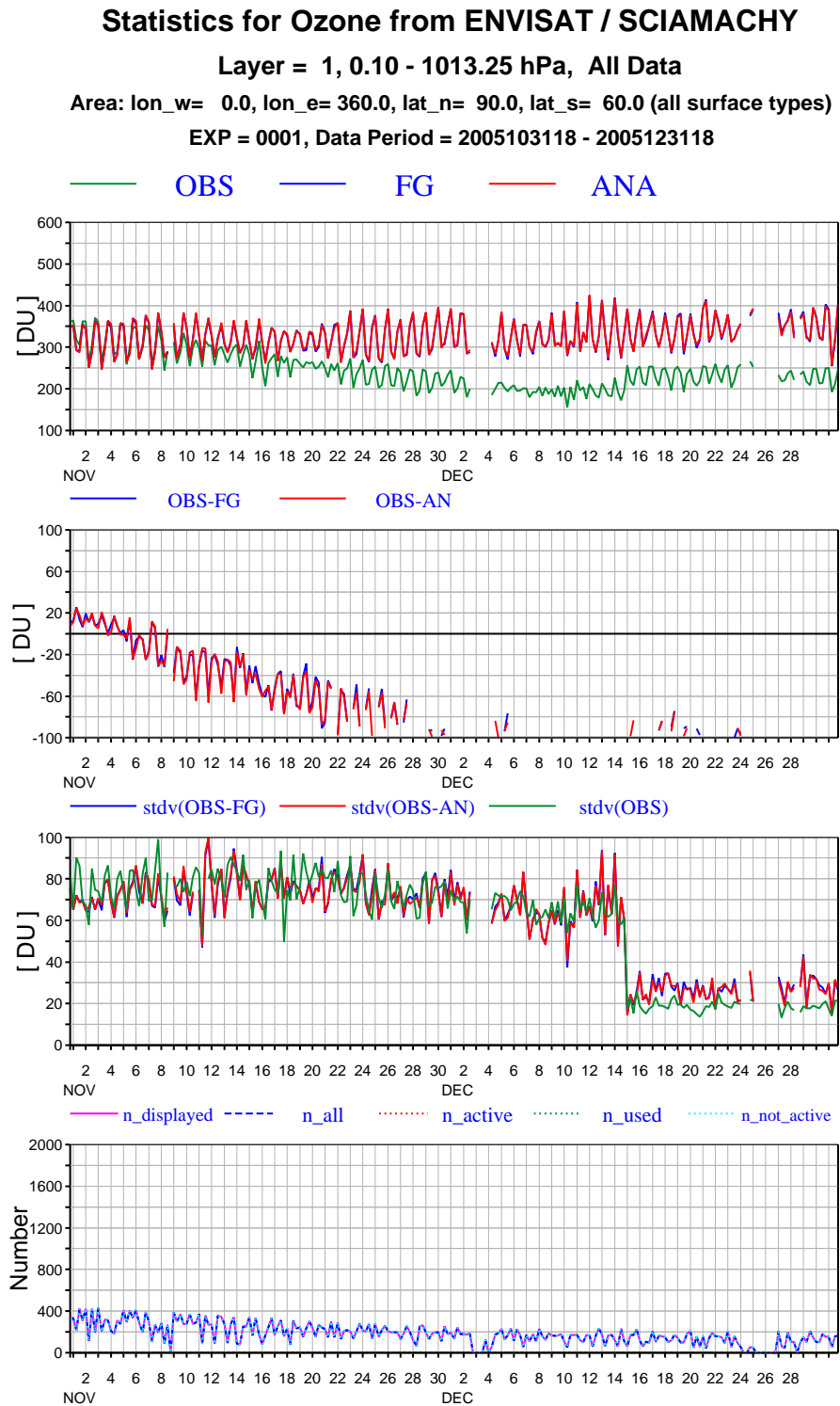


Fig. 2. As Fig.1 but for 90-60N.

Statistics for Ozone from ENVISAT / SCIAMACHY

Layer = 1, 0.10 - 1013.25 hPa, All Data

Area: lon_w= 0.0, lon_e= 360.0, lat_n= 60.0, lat_s= 30.0 (all surface types)

EXP = 0001, Data Period = 2005103118 - 2005123118

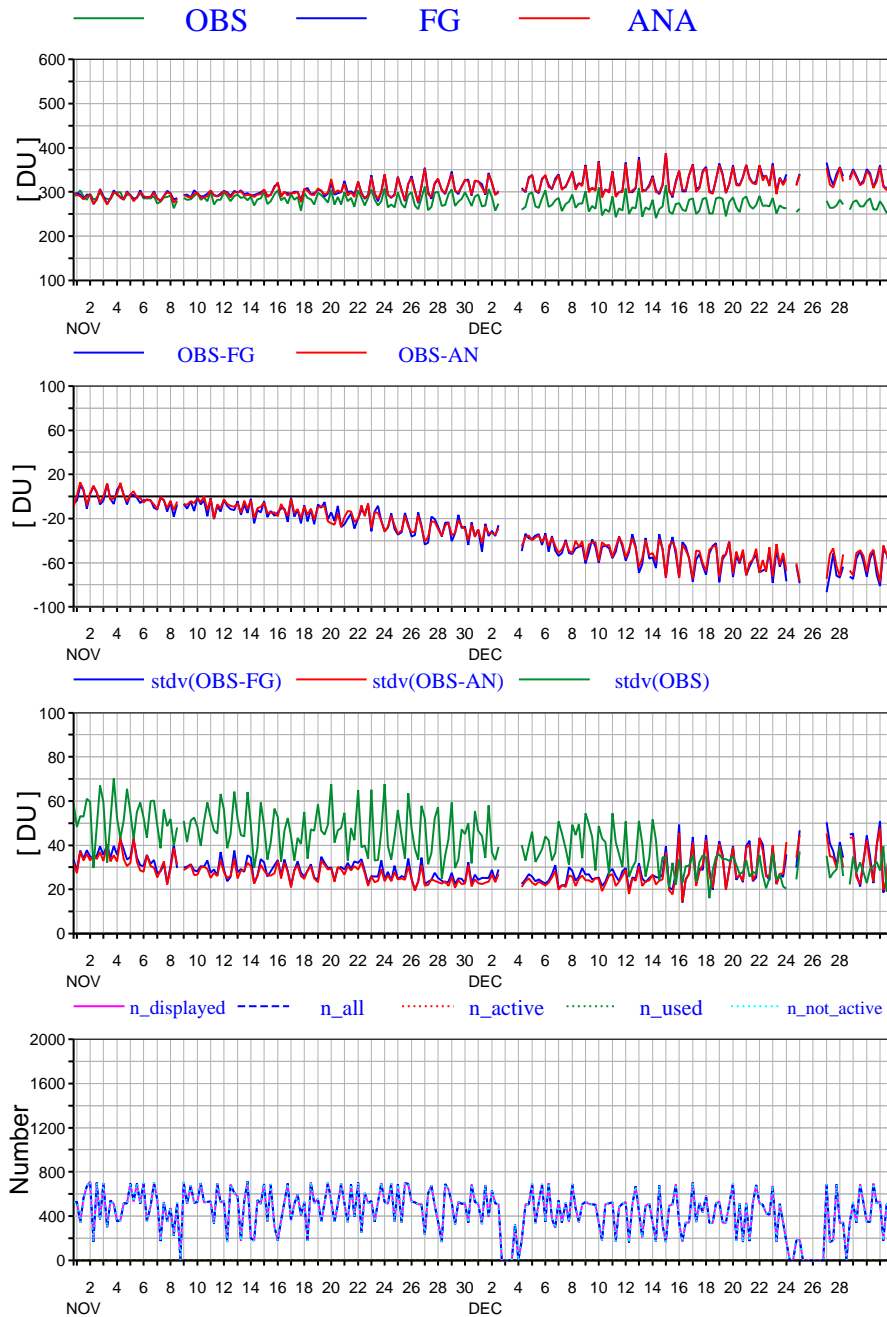


Fig. 3. As Fig. 1 but for 60-30N.

Statistics for Ozone from ENVISAT / SCIAMACHY

Layer = 1, 0.10 - 1013.25 hPa, All Data

Area: lon_w= 0.0, lon_e= 360.0, lat_n= 30.0, lat_s= -30.0 (all surface types)

EXP = 0001, Data Period = 2005103118 - 2005123118

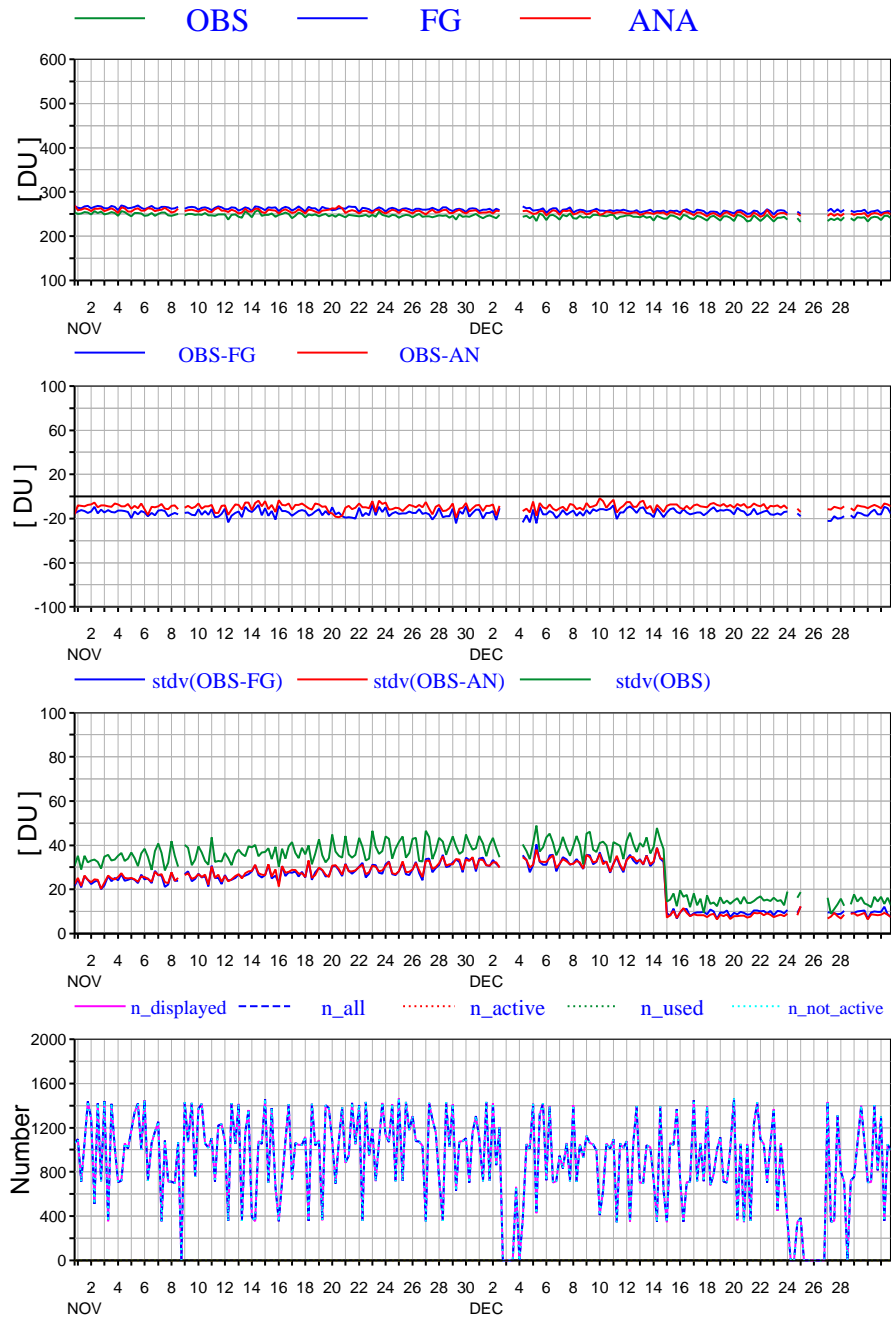


Fig. 4. As Fig. 1 but for 30N-30S.

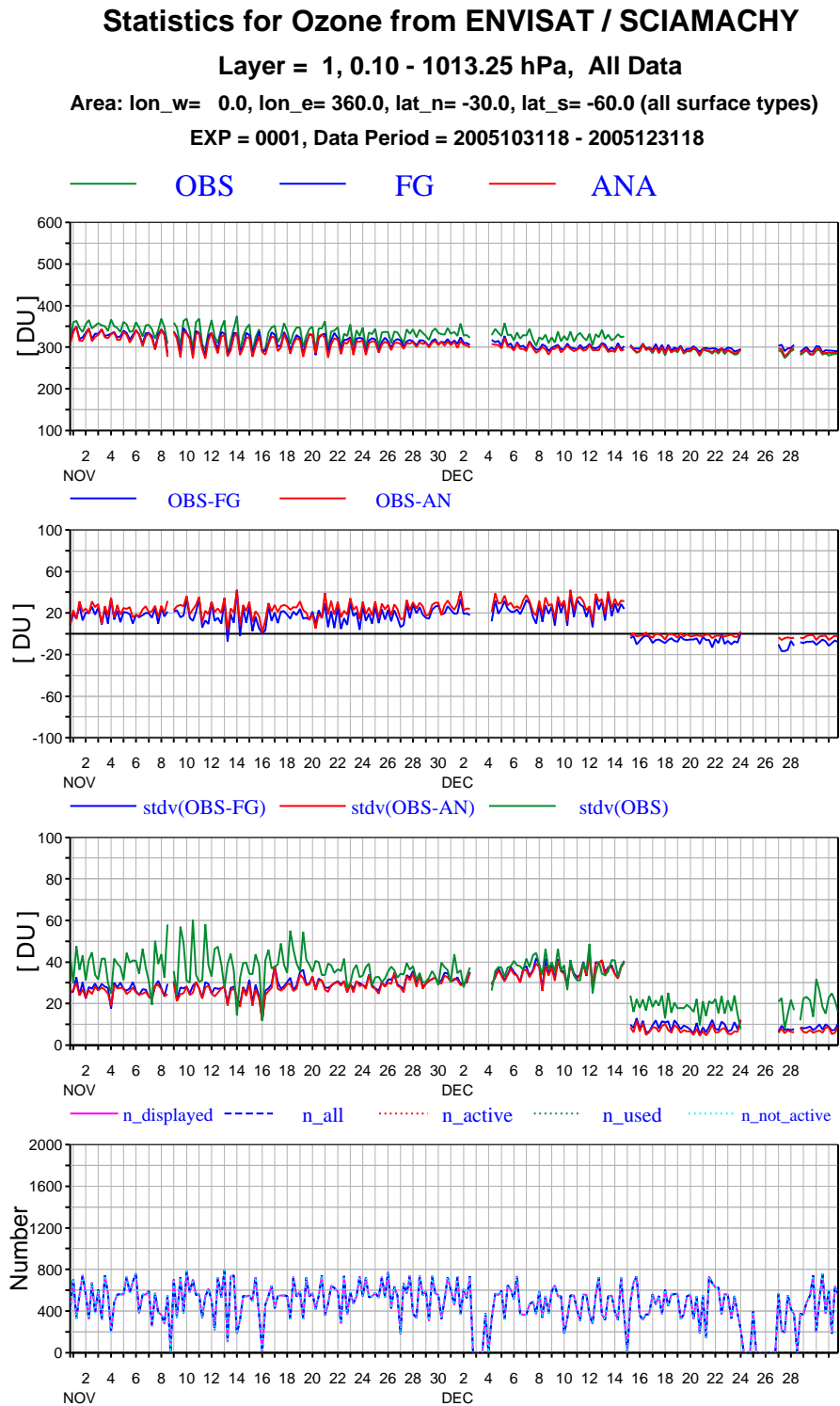


Fig. 5. As Fig. 1 but for 30-60S.

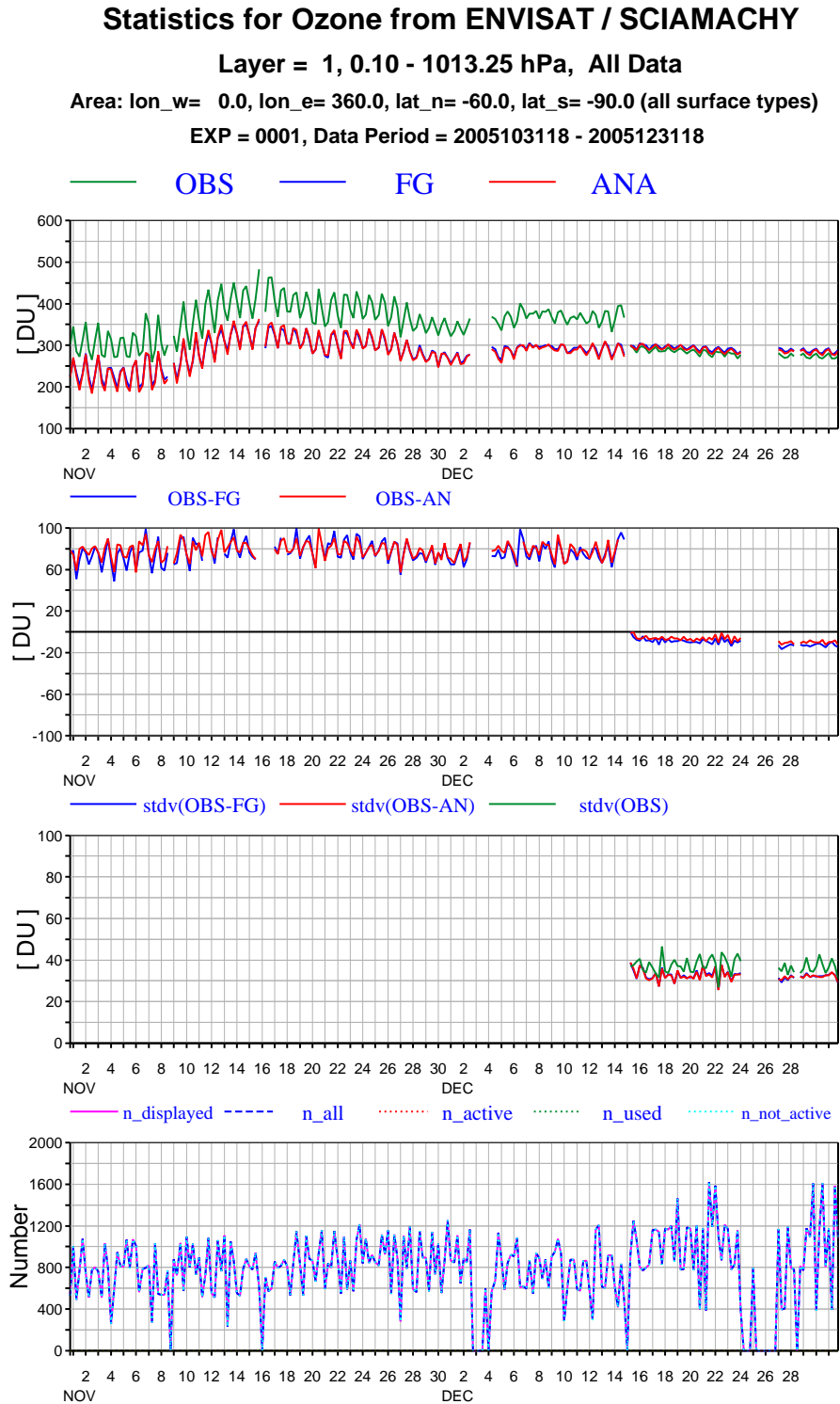


Fig. 6. As Fig. 1 but for 60-90S.

STATISTICS FOR OZONE FROM ENVISAT / SCIAMACHY
NUMBER OF OBSERVATIONS PER GRID SQUARE (ALL)
DATA PERIOD = 2005120100 - 2005123118
EXP = 0001, LAYER = 01, 0.10 - 1013.25 HPA
Min: 1 Max: 56 Mean: 5.7483

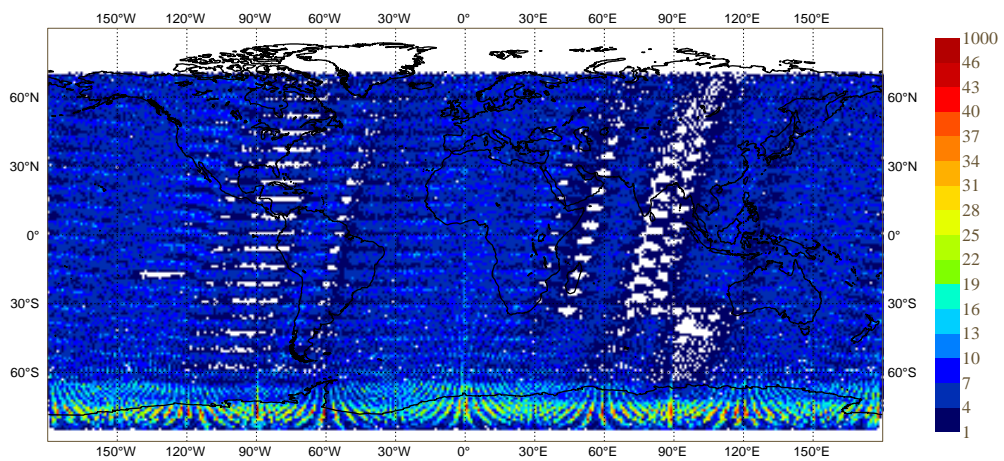


Fig. 7. Geographical distribution of mean number of data for ENVISAT SCIAMACHY NRT ozone data for December 2005.

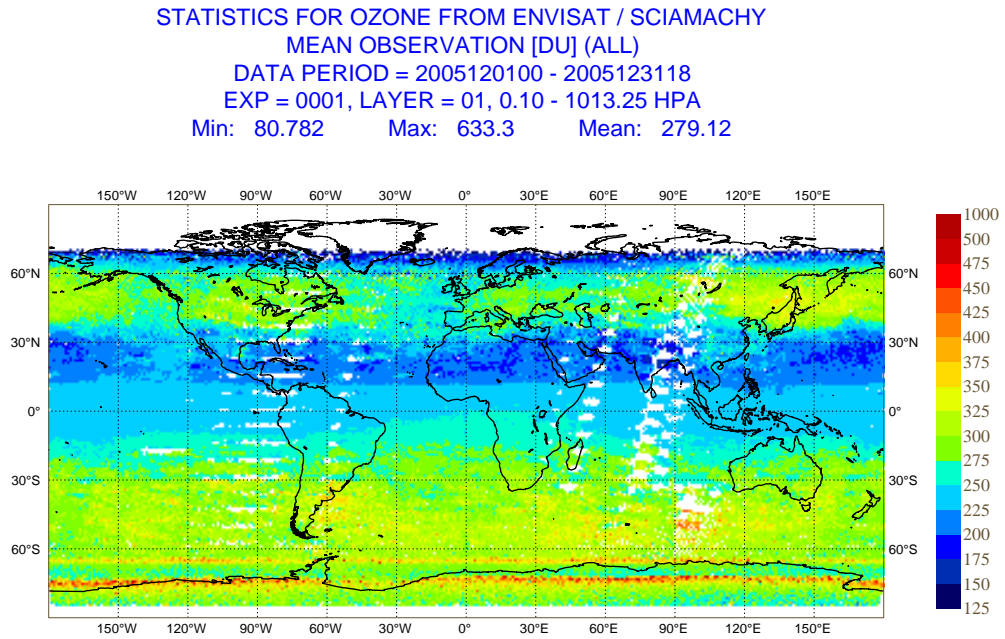


Fig. 8. Geographical distribution of mean observation values for ENVISAT SCIAMACHY NRT ozone data for December 2005.

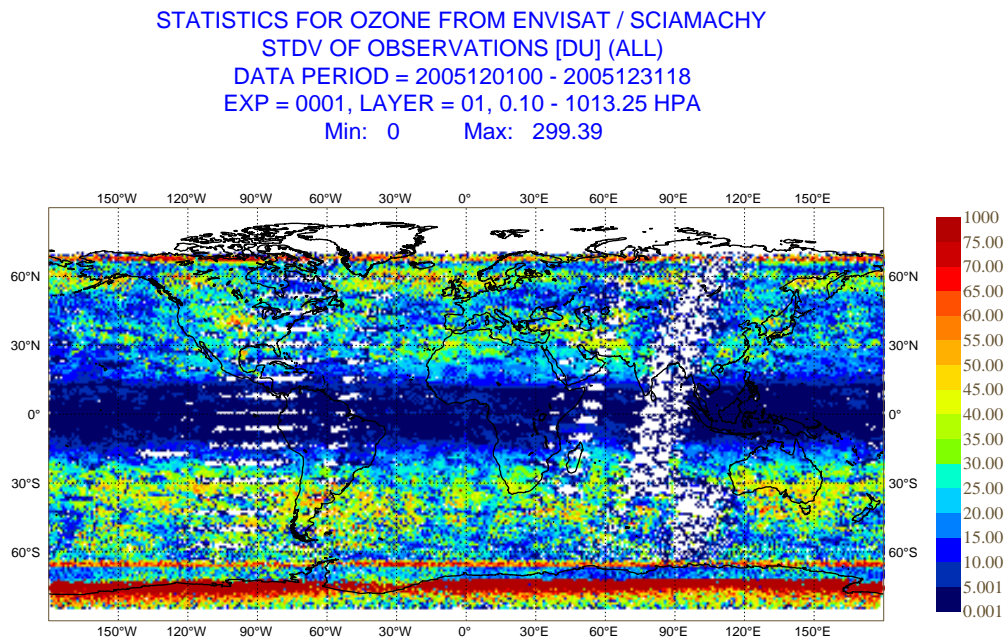


Fig. 9. Geographical distribution of the standard deviation of the mean observation values for ENVISAT SCIAMACHY NRT ozone data for December 2005.

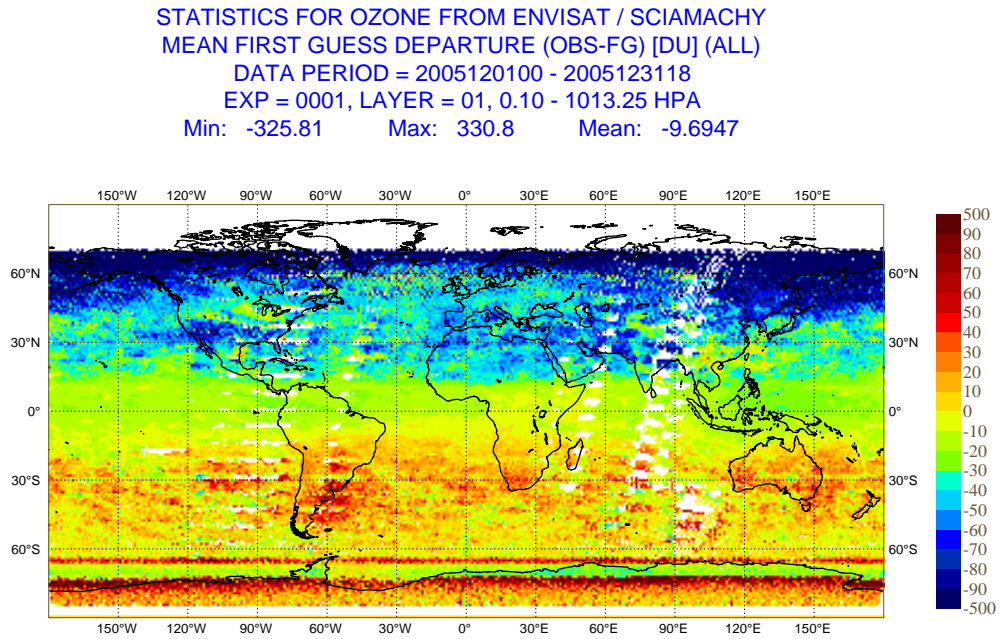


Fig. 10. Geographical distribution of mean first-guess departures for ENVISAT SCIAMACHY NRT ozone data for December 2005.

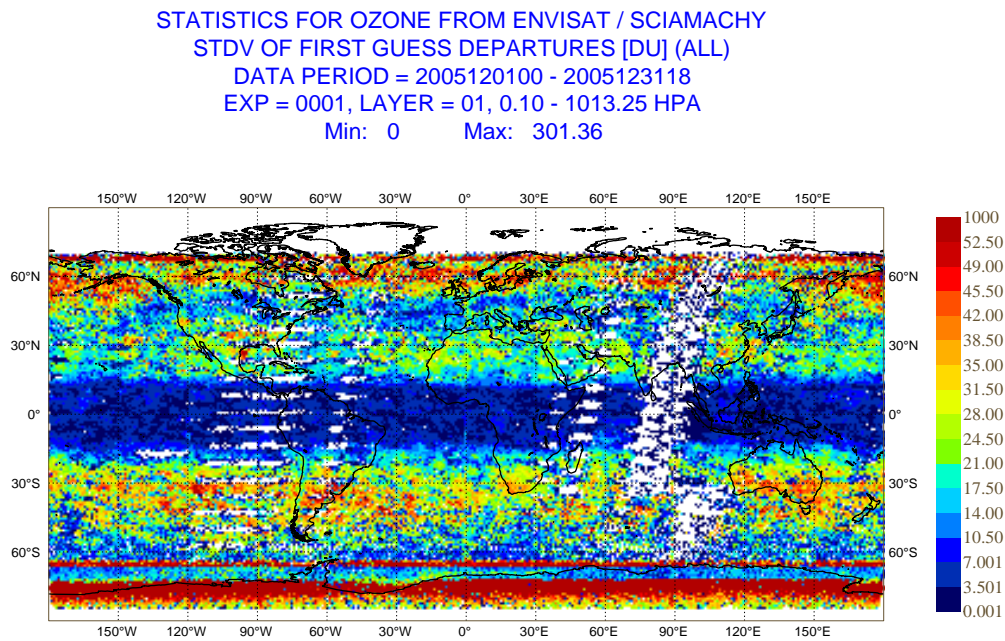


Fig. 11. Geographical distribution of the standard deviation of the mean first-guess departures for ENVISAT SCIAMACHY NRT ozone data for December 2005.

STATISTICS FOR OZONE FROM ENVISAT / SCIAMACHY
LAYER = 01, 0.10 - 1013.25 HPA (ALL)
NUMBER OF OBSERVATIONS IN AVERAGE
EXP = 0001, DATA PERIOD = 2005103118 - 2005123118
Min: 0 Max: 237 Mean: 38.584

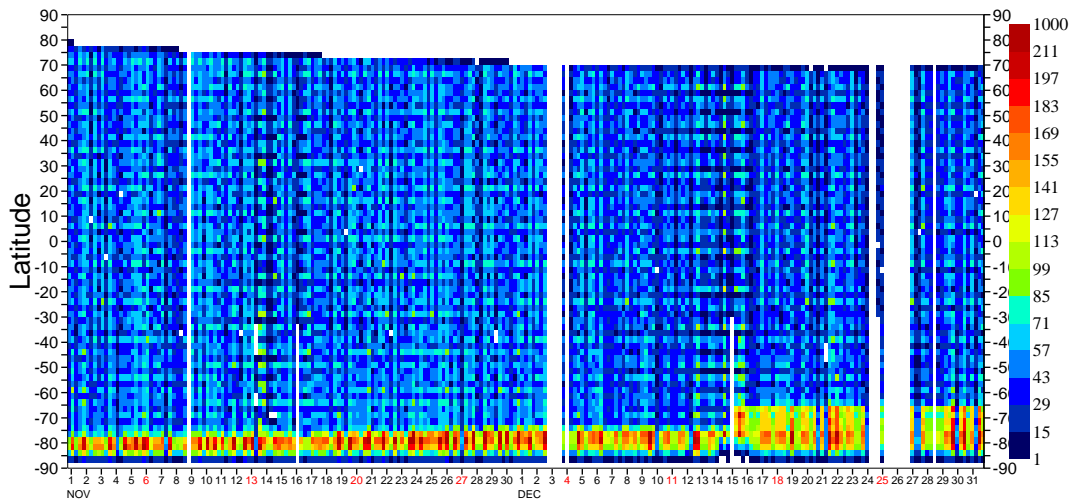


Fig. 12. Hovmoeller diagram of zonal mean number of data for ENVISAT SCIAMACHY NRT ozone data per 6-hour cycle for November and December 2005.

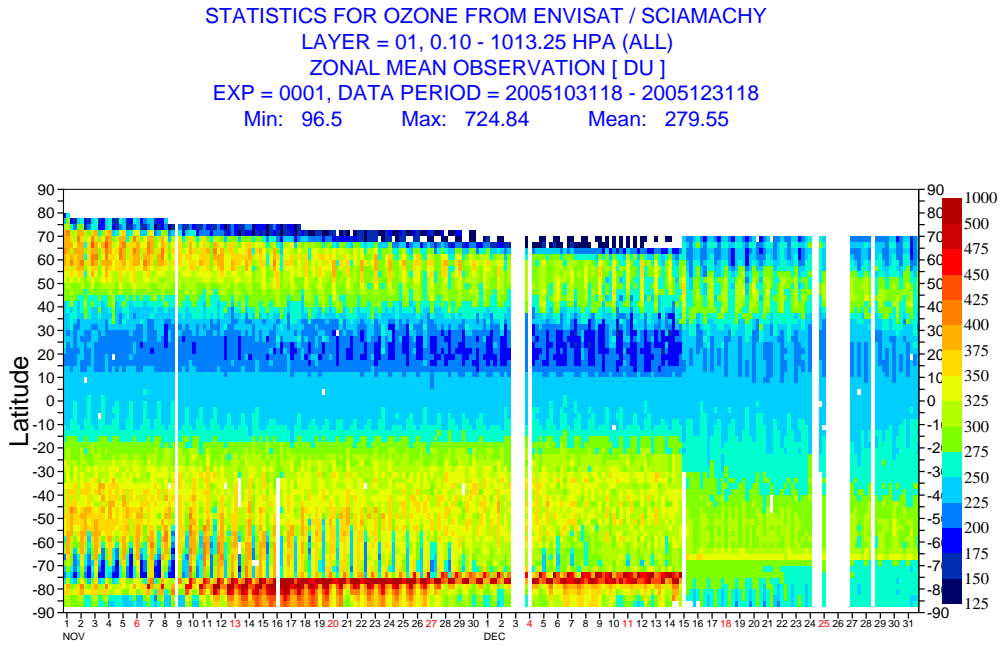


Fig. 13. Hovmoeller diagram of zonal mean observation values for ENVISAT SCIAMACHY NRT ozone data per 6-hour cycle for November and December 2005.

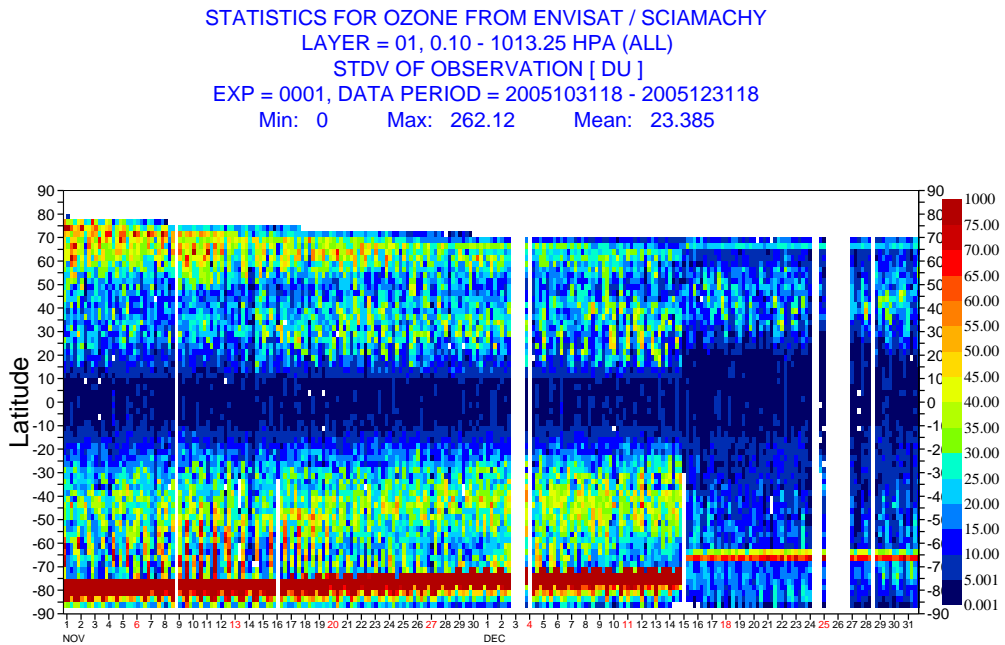


Fig. 14. Hovmoeller diagram of the zonal mean observation standard deviations for ENVISAT SCIAMACHY NRT ozone data per 6-hour cycle for November and December 2005.

STATISTICS FOR OZONE FROM ENVISAT / SCIAMACHY
LAYER = 01, 0.10 - 1013.25 HPA (ALL)
ZONAL MEAN FIRST GUESS DEPARTURE (OBS-FG) [DU]
EXP = 0001, DATA PERIOD = 2005103118 - 2005123118
Min: -312.1 Max: 378.54 Mean: -9.3926

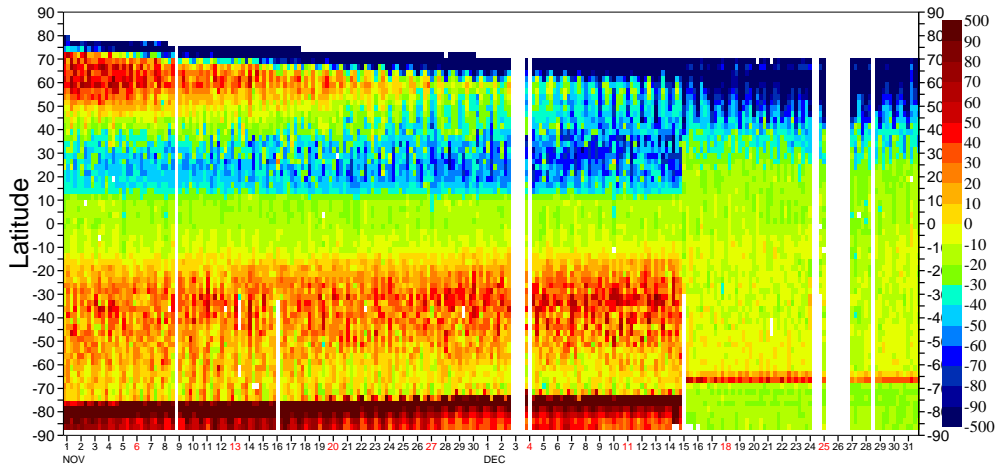


Fig. 15. Hovmoeller diagram of zonal mean first-guess departures for ENVISAT SCIAMACHY NRT ozone data per 6-hour cycle for November and December 2005.

STATISTICS FOR OZONE FROM ENVISAT / SCIAMACHY
LAYER = 01, 0.10 - 1013.25 HPA (ALL)
STDV OF FIRST GUESS DEPARTURES (OBS-FG) [DU]
EXP = 0001, DATA PERIOD = 2005103118 - 2005123118
Min: 0 Max: 277.0 Mean: 21.367

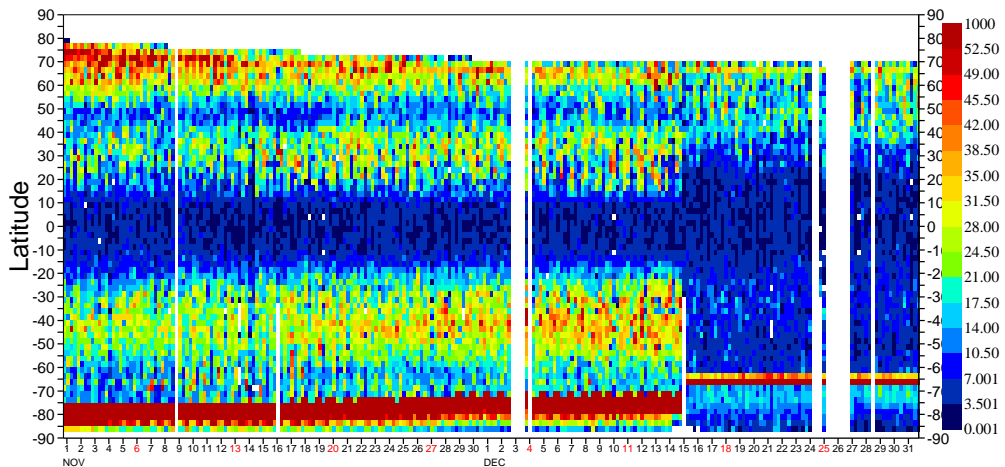


Fig. 16. Hovmoeller diagram of zonal mean first-guess departures standard deviations for ENVISAT SCIAMACHY NRT ozone data per 6-hour cycle for November and December 2005.

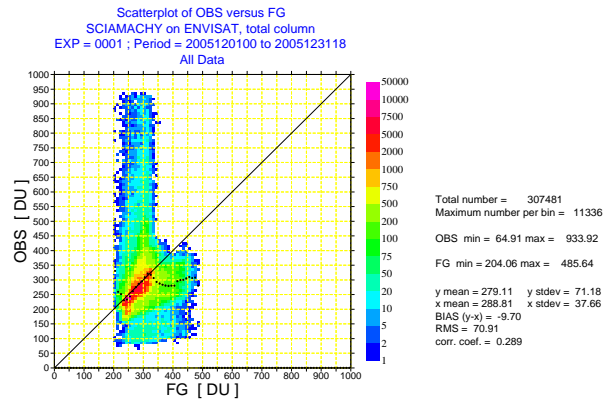


Fig. 17. Scatter plot of ENVISAT SCIAMACHY ozone values against first-guess for December 2005. The colours show the number per bin, the black dots the mean values per bin.

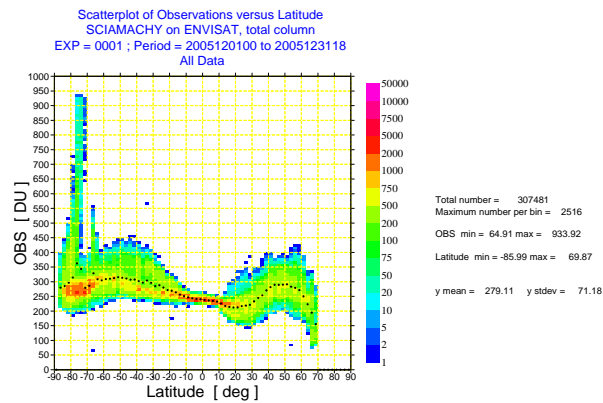


Fig. 18. Scatter plot of ENVISAT SCIAMACHY ozone values against latitude for December 2005. The colours show the number per bin, the black dots the mean values per bin.

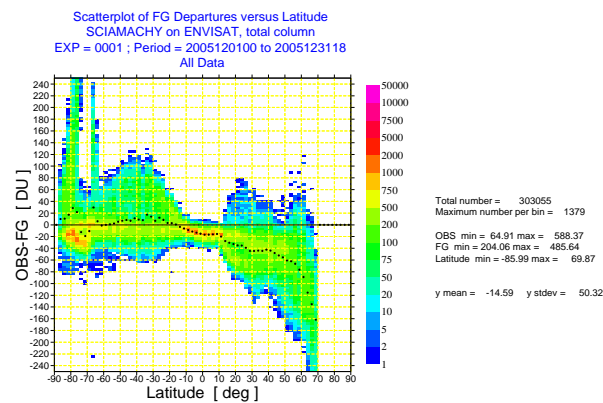


Fig. 19. Scatter plot of first-guess departures of ENVISAT SCIAMACHY ozone against latitude for December 2005. The colours show the number per bin, the black dots the mean values per bin.