

REPORT ABOUT ENVISAT SCIAMACHY NRT OZONE PRODUCT (SCI_RV_2P) FOR APRIL 2006

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1. Key points for April 2006

- Degraded SCIAMACHY SCI_RV_2P data quality following the ENVISAT anomaly on April, 6th, and the switches off and restarts of SCIAMACHY during April 2006.
- On global average, the departures between the SCIAMACHY ozone data and the ECMWF ozone analyses degraded from -10DU in March to -15DU during the week between 10th and 17th of April. A further degradation (from -15DU to -20DU) was seen during the last week of April.
- Large scatter of SCIAMACHY ozone data, in particular at high latitudes in the northern hemisphere.
- Large scatter of the first guess departures vs. latitudes, at high latitudes in both hemispheres.
- The monitoring statistics for April were produced with the operational ECMWF model, CY30R1.

2. Quality and amount of received data

This report covers SCIAMACHY NRT total column ozone data for April 2006. 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 diagrams of SCIAMACHY ozone values against first-guess and latitude values, as well as the scatter diagram of first-guess departures of SCIAMACHY ozone values against latitude.

In the global mean, the timeseries plots of the first-guess and analysis departures did not exhibit any noticeable offset during the first week of April, compared with those obtained for March. A progressively degradation of the SCIAMACHY data was found after the first week of April. The timeseries plots showed that the departures between SCIAMACHY data and the ECMWF ozone analyses reached values of about -15 DU between 10th and 17th of April, and of about -20 DU during the last week of April, on global average. The anomaly occurred on board of ENVISAT on April, the 6th, which triggered a switch-off of the complete payload, as well as the following switches off/restarts of SCIAMACHY between the 13th and 19th of April might have induced a bias in the data responsible for this poorer agreement. The increase in the first-guess departures was seen both in the global mean and in the mean over latitudinal bands, with only one exception at high latitudes in the southern hemisphere where the first guess departures were still about -10 DU as they were at the end of March.

The standard deviations of the global mean departures were found stable during April, with values of about +15 DU.

The geographical distribution of the mean first-guess departures (Fig. 10) showed large positive bias (20-30 DU) between 45°-70°N, but mainly restricted to Canada and sporadically to western Europe. Large negative bias (about -40 DU) were still seen at high latitudes in the northern hemisphere between 0° and 60°E. Large negative bias (between -30 and -40 DU) were also seen around the Antarctic region at about 60°S. The mean first-guess departures were found to be generally negative (SCIAMACHY data lower than ECMWF ozone analyses) and between -10 and -20 DU elsewhere.

The Hovmoeller diagram of the zonal mean first-guess departures (Fig. 15) further illustrates the large positive departures north of 45°N, especially between the 10th and the 13th of April, as well as at the southern end of the orbits, and the negative bias at 60°S.

The scatter plot of SCIAMACHY ozone values against the first-guess (Fig. 17) showed, in general, a good agreement on average although with a significant scatter around the mean.

The scatter plot of the first-guess departures against latitude (Fig. 19) showed that while the data agree well in the tropical region, the differences are larger in the extra-tropics, especially at high latitudes in the northern hemisphere where the departures ranged from -100 to +100DU. In this region, the observations themselves were found to have a large scatter (from 350 DU up to 550 DU).

3. Remarks

This monitoring report was produced with the operational ECMWF model (CY30R1). Ozone layers from SBUV/2 on NOAA-16 and SCIAMACHY total column ozone data produced by KNMI (TOSOMI) were actively assimilated. The comparison of SCI_RV_2P data against the ECMWF ozone field does not provide an independent validation, because of the assimilation of the TOSOMI retrievals.

All ozone values are in Dobson Units (DU).

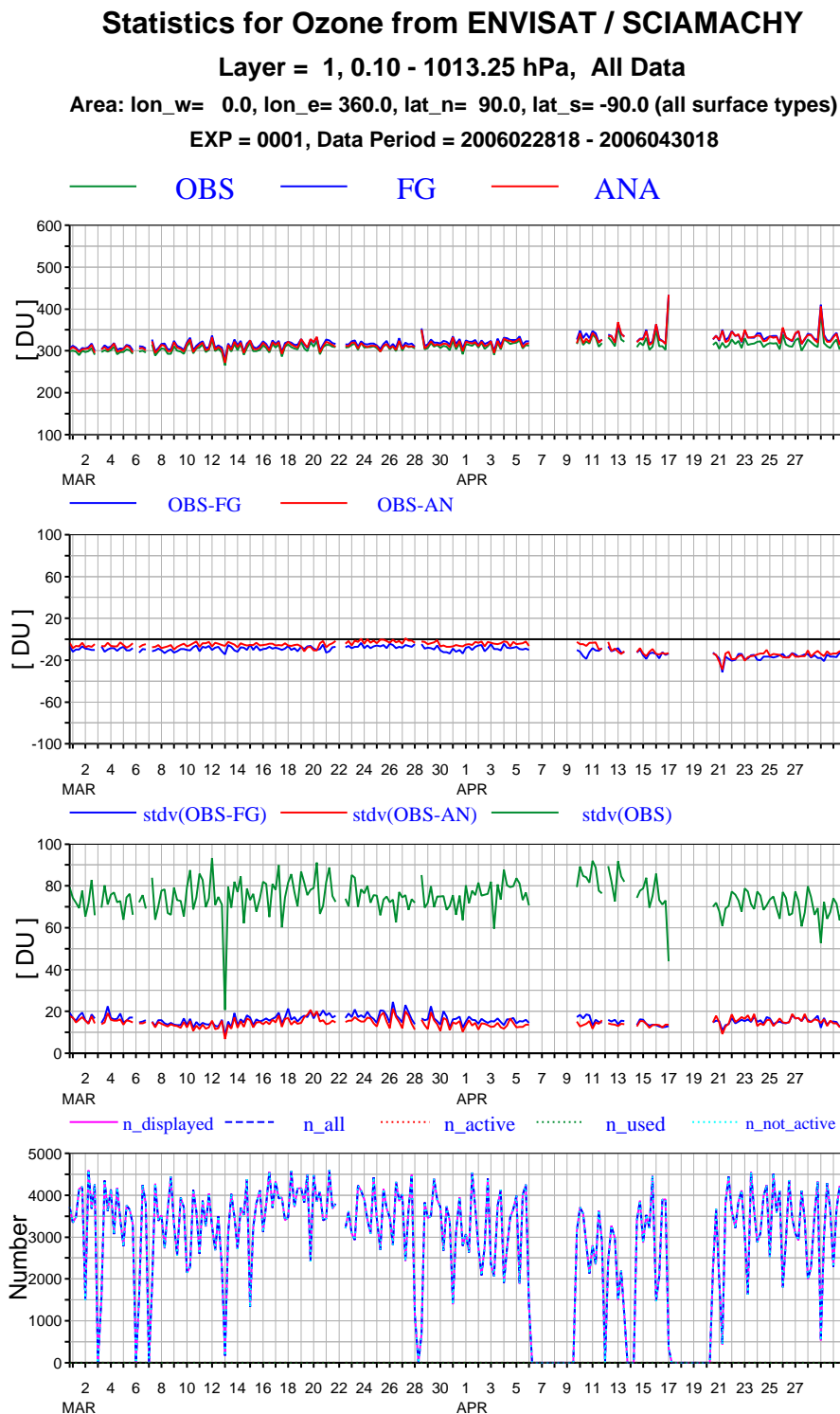


Fig. 1. Time series of mean observations, first guess and analysis values (top panel), first-guess and analysis departures (second panel), standard deviations (third panel) and number of data (bottom panel) per 6-hour cycle for ENVISAT SCIAMACHY NRT ozone data for March and April 2006 (Global means).

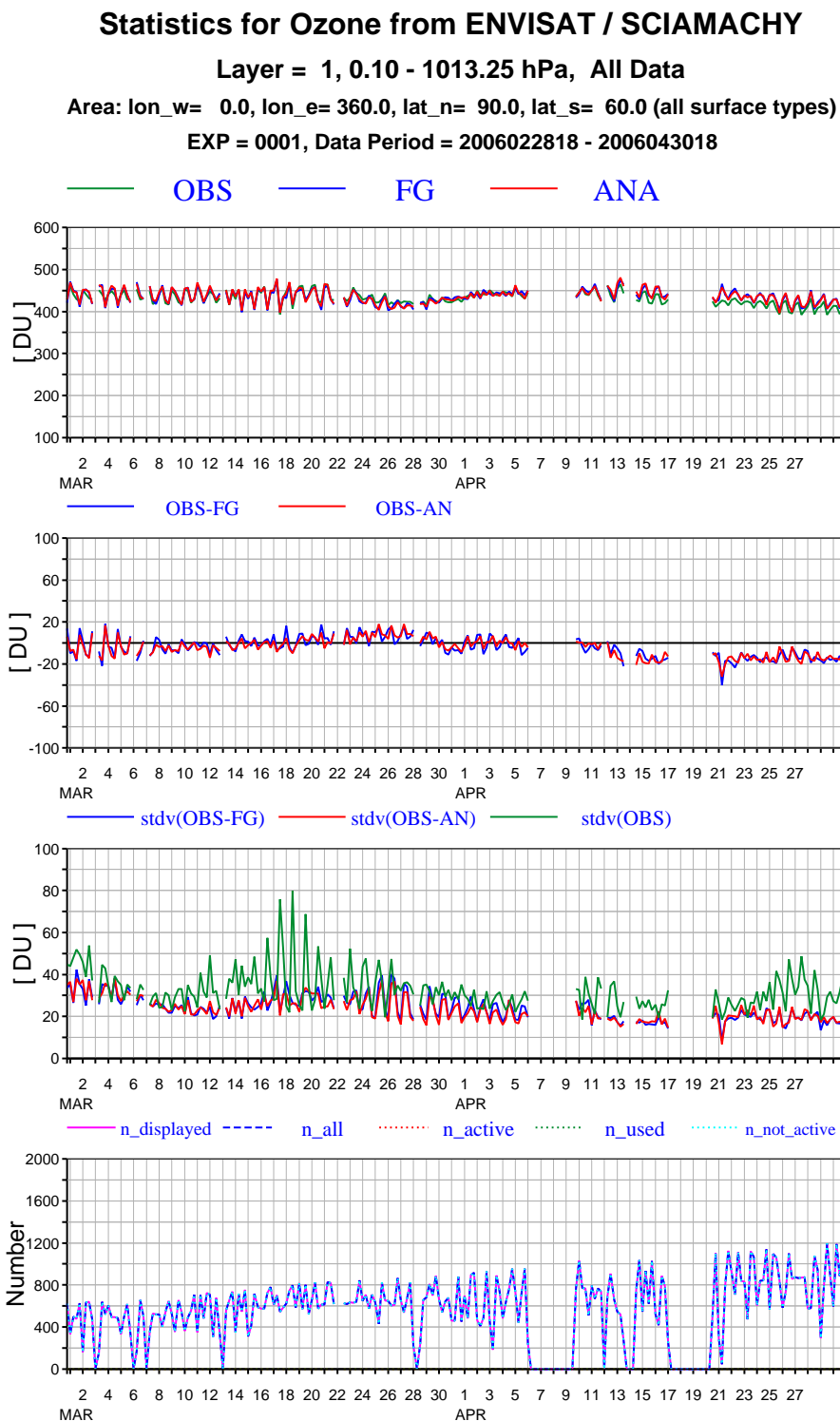


Fig. 2. As Fig.1 but for 90-60N.

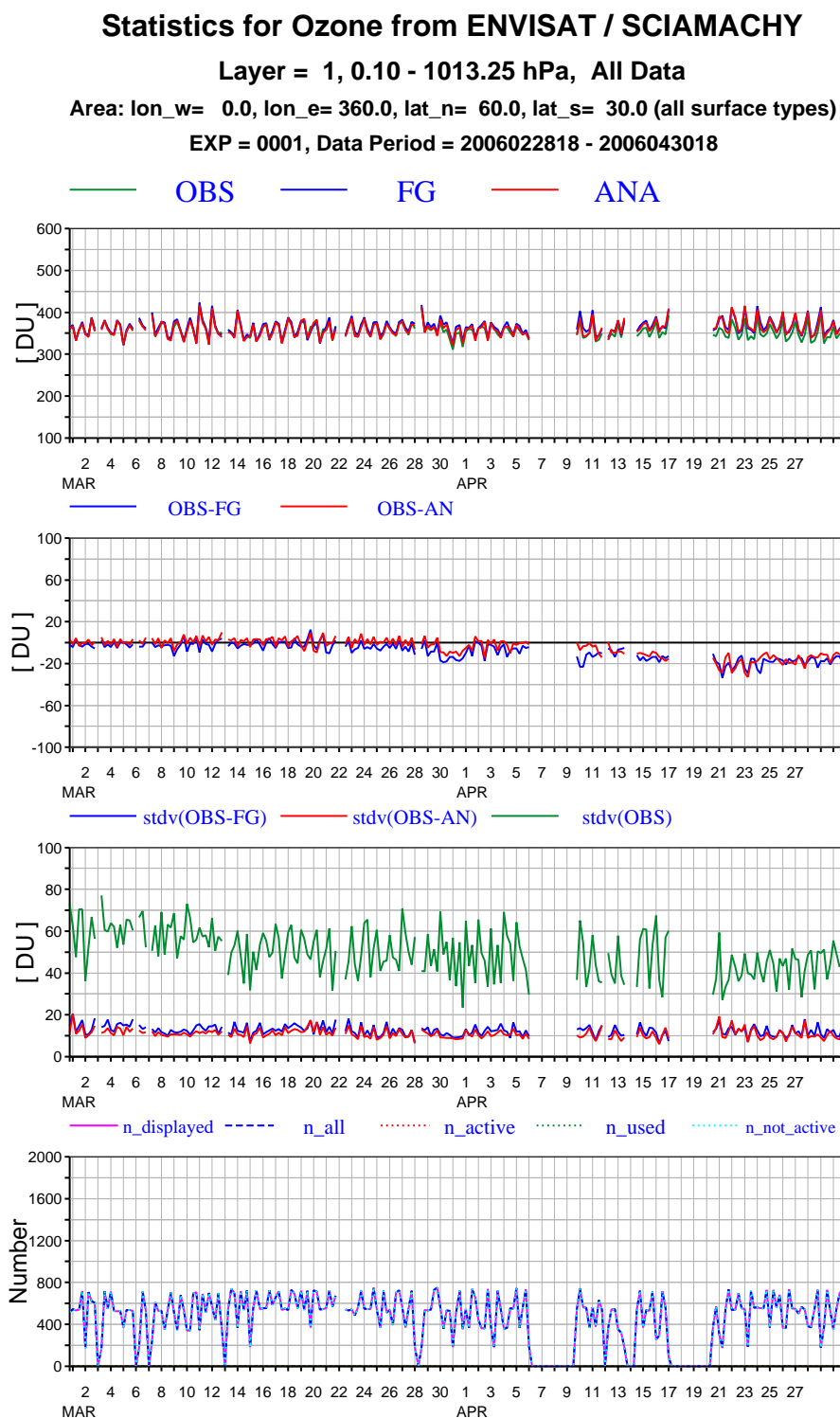


Fig. 3. As Fig. 1 but for 60-30N.

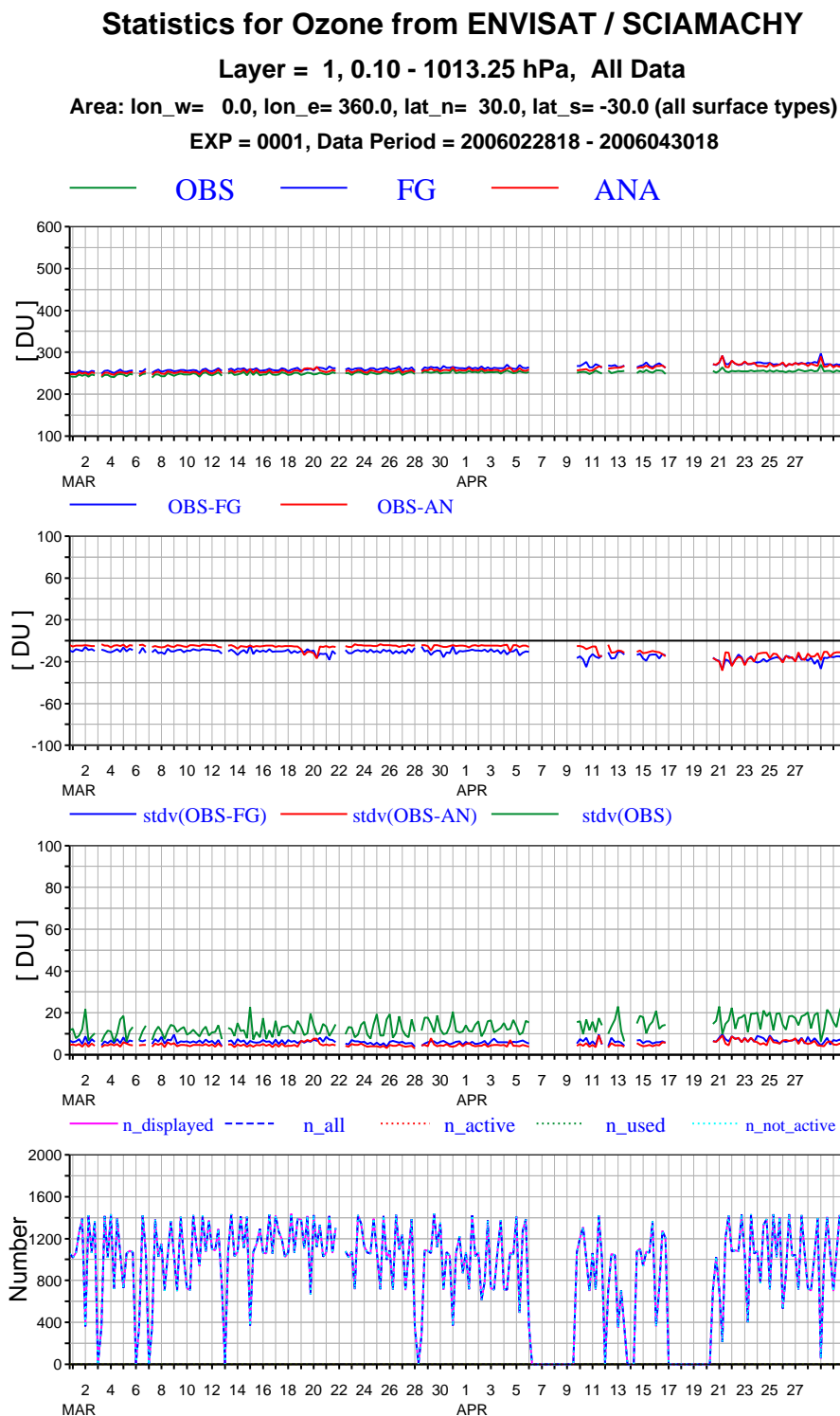


Fig. 4. As Fig. 1 but for 30N-30S.

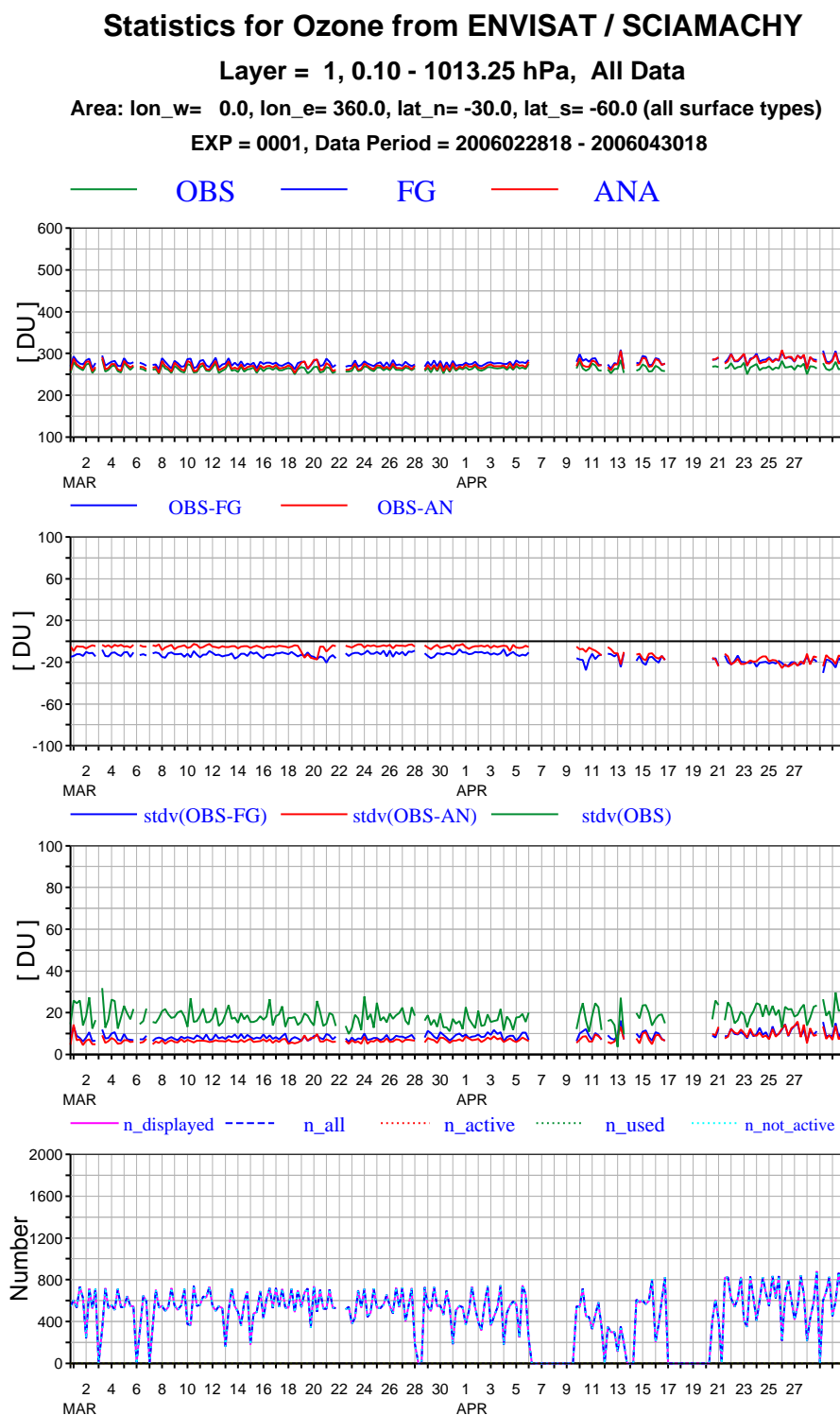


Fig. 5. As Fig. 1 but for 30-60S.

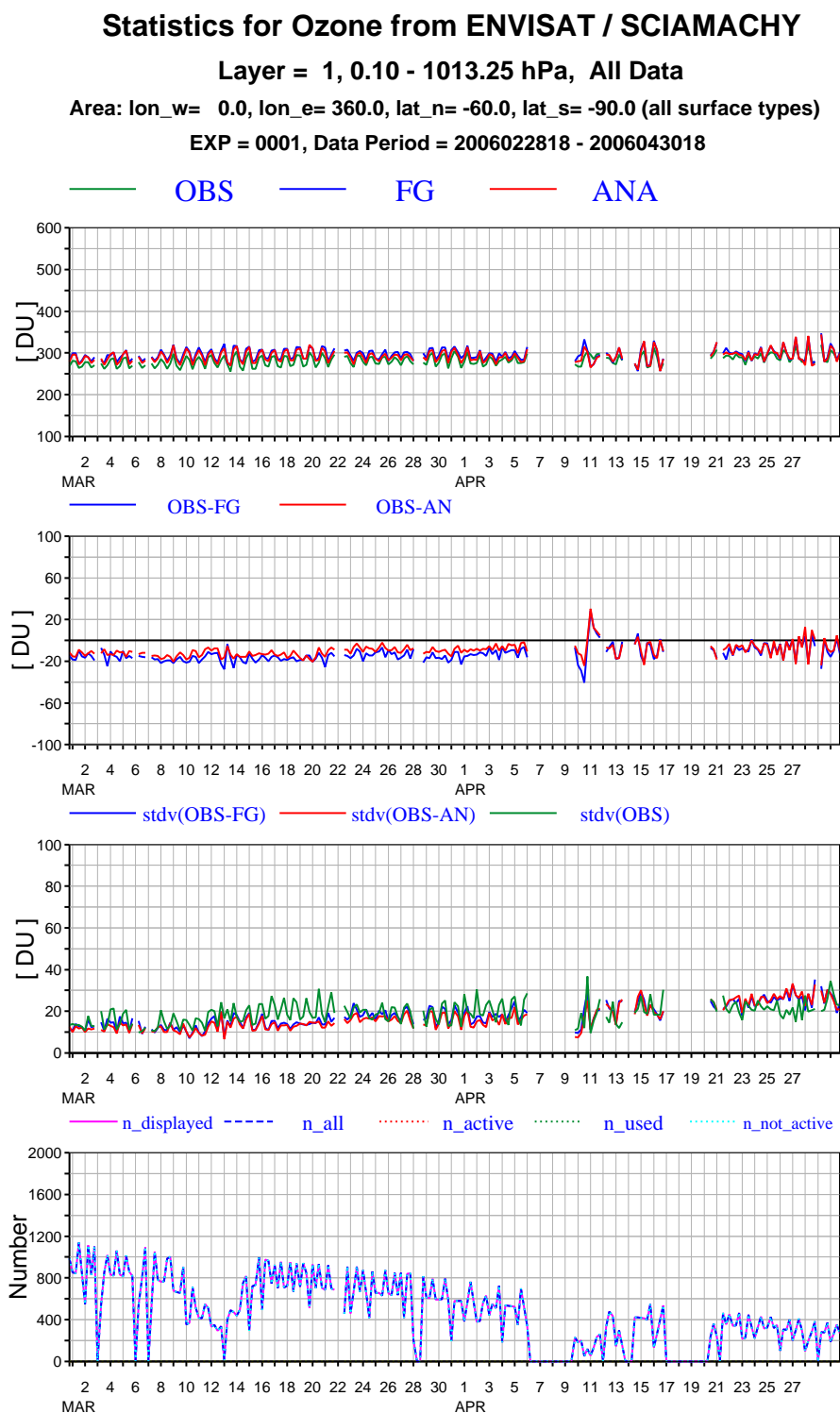


Fig. 6. As Fig. 1 but for 60-90S.

STATISTICS FOR OZONE FROM ENVISAT / SCIAMACHY
NUMBER OF OBSERVATIONS PER GRID SQUARE (ALL)
DATA PERIOD = 2006040100 - 2006043018
EXP = 0001, LAYER = 01, 0.10 - 1013.25 HPA
Min: 1 Max: 38 Mean: 4.8366

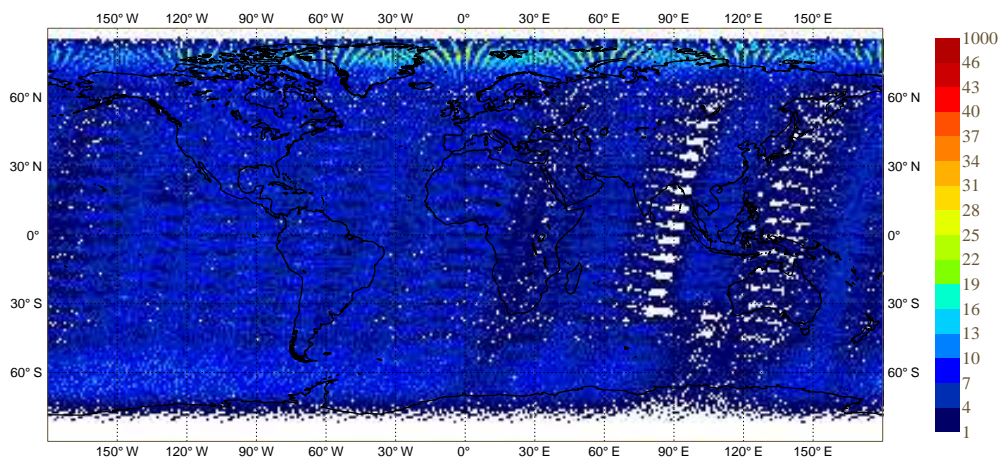


Fig. 7. Geographical distribution of mean number of data for ENVISAT SCIAMACHY NRT ozone data for April 2006.

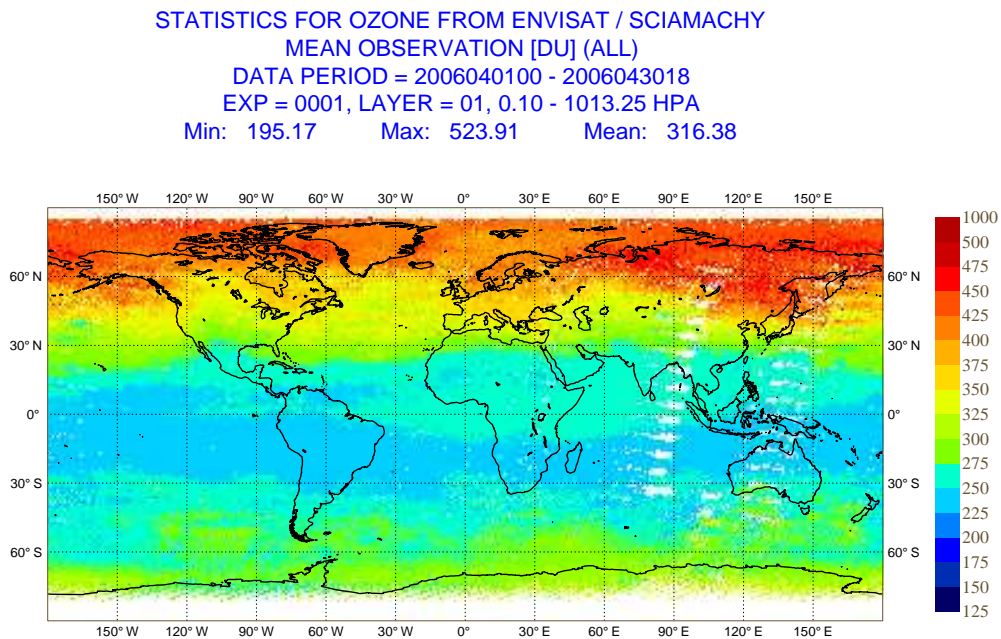


Fig. 8. Geographical distribution of mean observation values for ENVISAT SCIAMACHY NRT ozone data for April 2006.

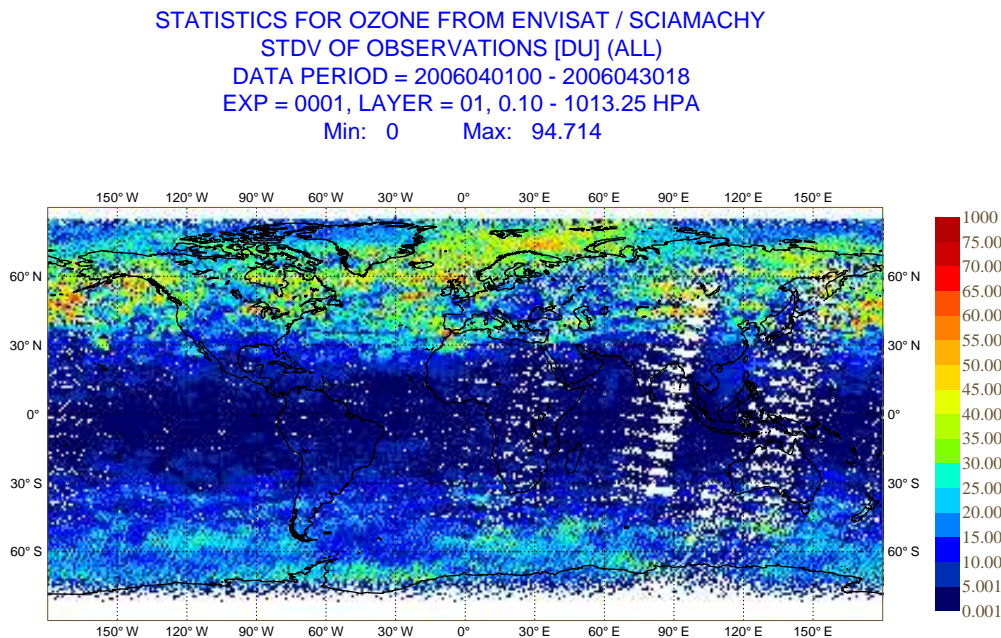


Fig. 9. Geographical distribution of the standard deviation of the mean observation values for ENVISAT SCIAMACHY NRT ozone data for April 2006.

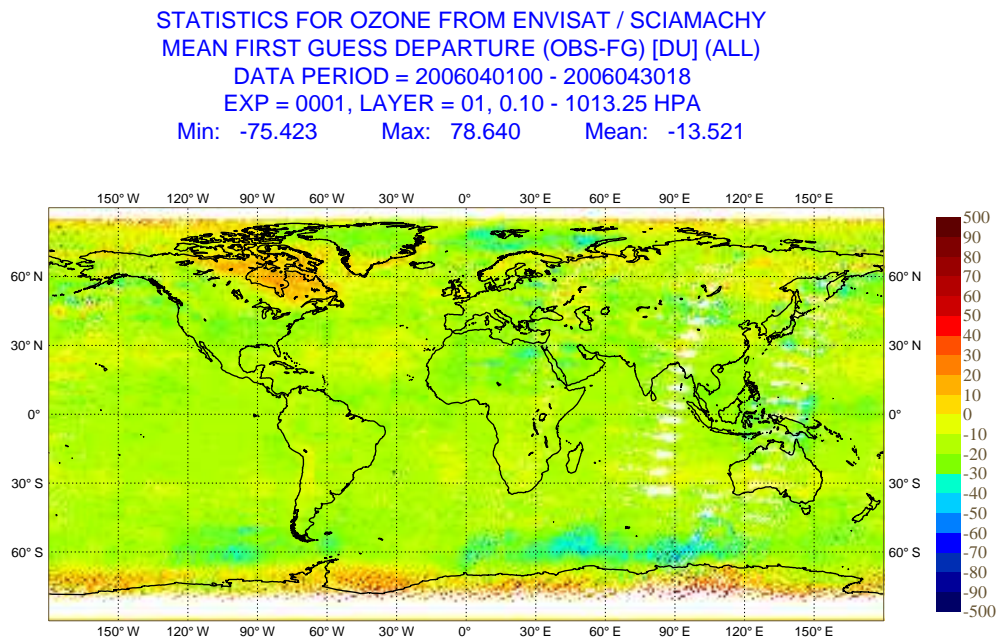


Fig. 10. Geographical distribution of mean first-guess departures for ENVISAT SCIAMACHY NRT ozone data for April 2006.

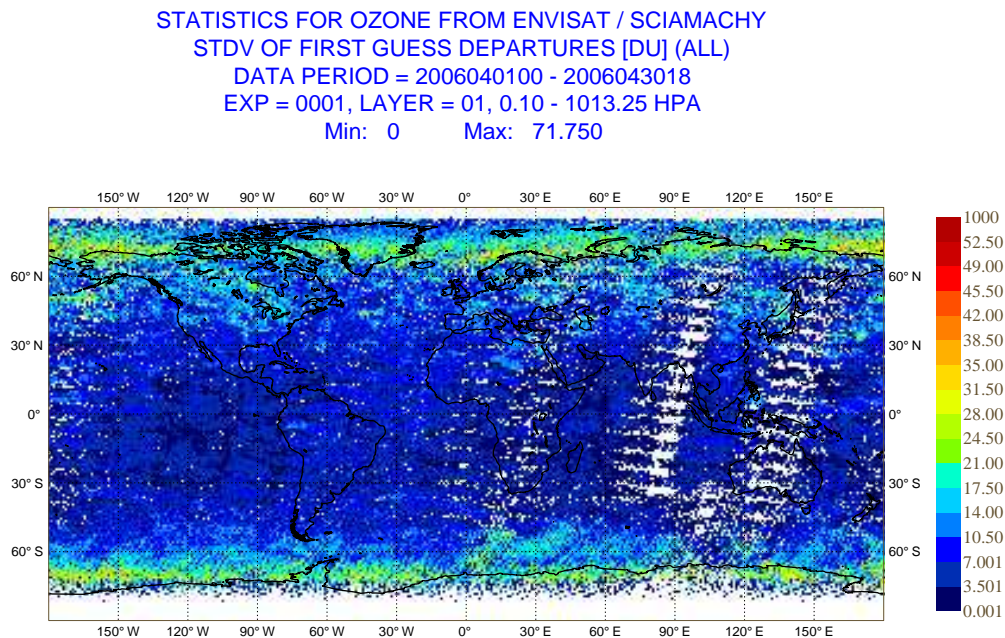


Fig. 11. Geographical distribution of the standard deviation of the mean first-guess departures for ENVISAT SCIAMACHY NRT ozone data for April 2006.

STATISTICS FOR OZONE FROM ENVISAT / SCIAMACHY
LAYER = 01, 0.10 - 1013.25 HPA (ALL)
NUMBER OF OBSERVATIONS IN AVERAGE
EXP = 0001, DATA PERIOD = 2006022818 - 2006043018
Min: 0 Max: 199 Mean: 39.269

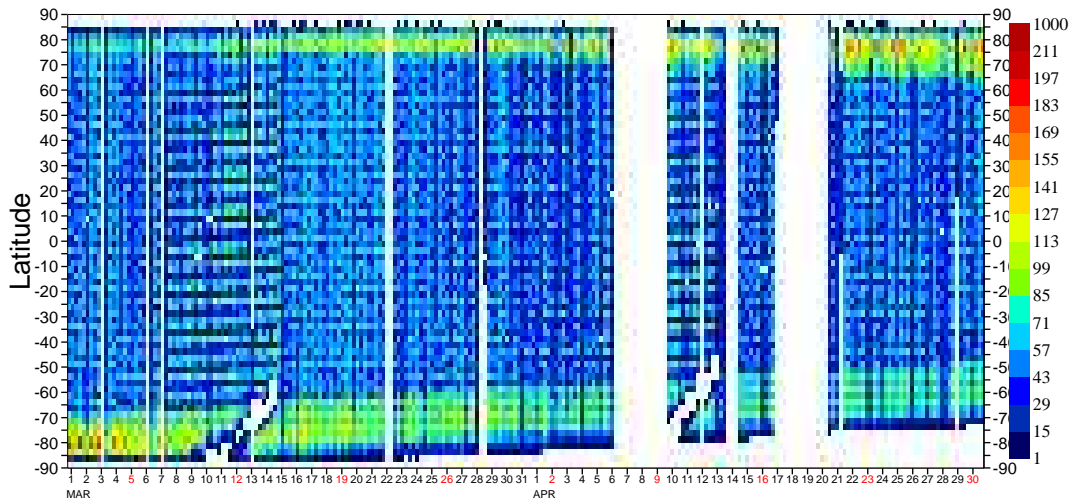


Fig. 12. Hovmoeller diagram of zonal mean number of data for ENVISAT SCIAMACHY NRT ozone data per 6-hour cycle for March and April 2006.

STATISTICS FOR OZONE FROM ENVISAT / SCIAMACHY
LAYER = 01, 0.10 - 1013.25 HPA (ALL)
ZONAL MEAN OBSERVATION [DU]
EXP = 0001, DATA PERIOD = 2006022818 - 2006043018
Min: 228.5 Max: 538.07 Mean: 304.32

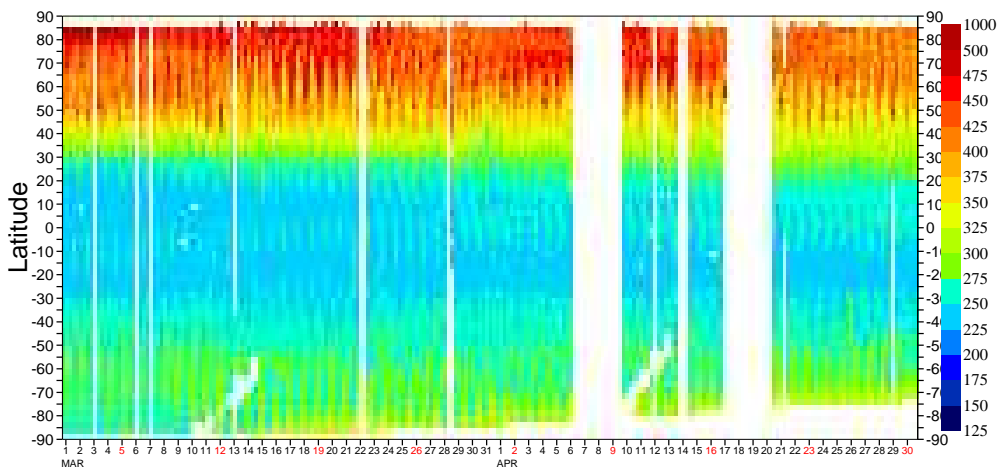


Fig. 13. Hovmoeller diagram of zonal mean observation values for ENVISAT SCIAMACHY NRT ozone data per 6-hour cycle for March and April 2006.

STATISTICS FOR OZONE FROM ENVISAT / SCIAMACHY
LAYER = 01, 0.10 - 1013.25 HPA (ALL)
STDV OF OBSERVATION [DU]
EXP = 0001, DATA PERIOD = 2006022818 - 2006043018
Min: 0 Max: 90.650 Mean: 15.011

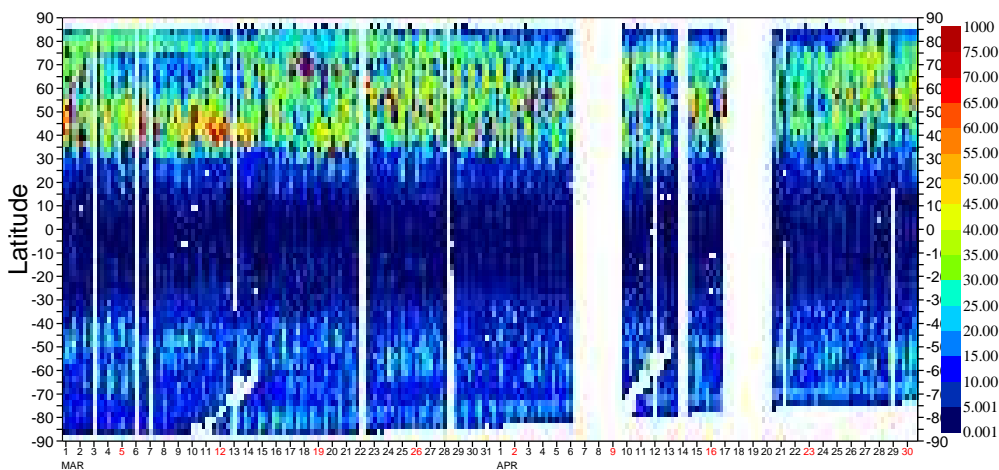


Fig. 14. Hovmoeller diagram of the zonal mean observation standard deviations for ENVISAT SCIAMACHY NRT ozone data per 6-hour cycle for March and April 2006.

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 = 2006022818 - 2006043018
Min: -53.371 Max: 83.158 Mean: -9.9540

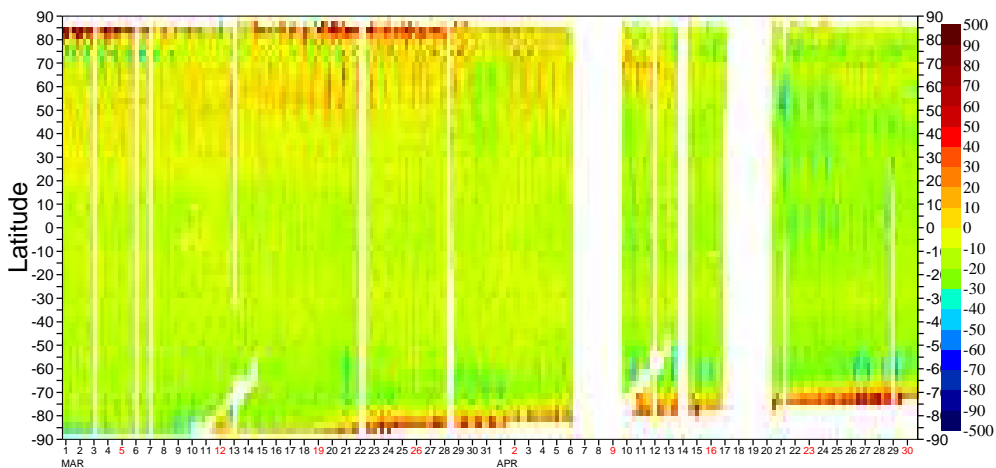


Fig. 15. Hovmoeller diagram of zonal mean first-guess departures for ENVISAT SCIAMACHY NRT ozone data per 6-hour cycle for March and April 2006.

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 = 2006022818 - 2006043018
Min: 0 Max: 62.590 Mean: 9.1391

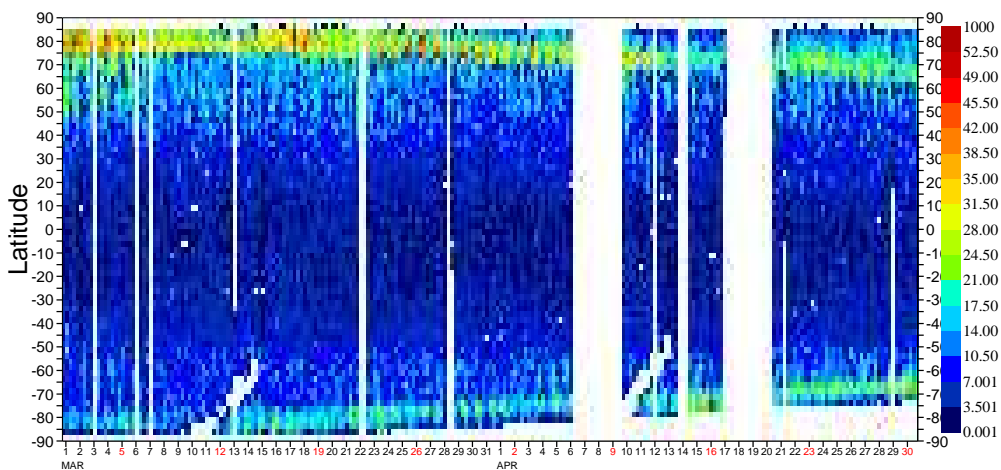


Fig. 16. Hovmoeller diagram of zonal mean first-guess departure standard deviations for ENVISAT SCIAMACHY NRT ozone data per 6-hour cycle for March and April 2006.

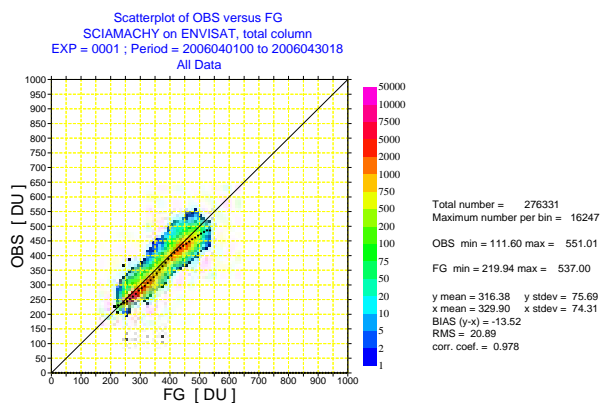


Fig. 17. Scatter plot of ENVISAT SCIAMACHY ozone values against first-guess for April 2006. The colours show the number per bin, the black dots the mean values per bin.

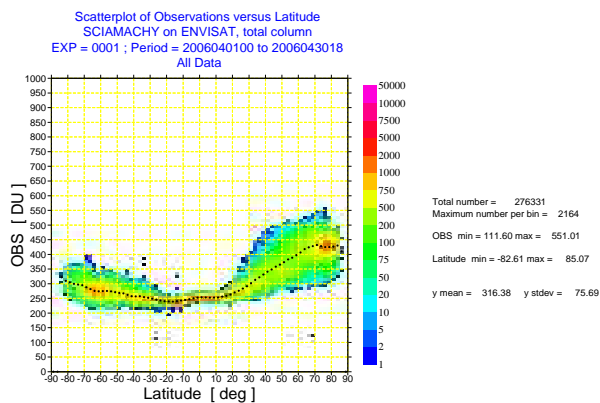


Fig. 18. Scatter plot of ENVISAT SCIAMACHY ozone values against latitude for April 2006. The colours show the number per bin, the black dots the mean values per bin.

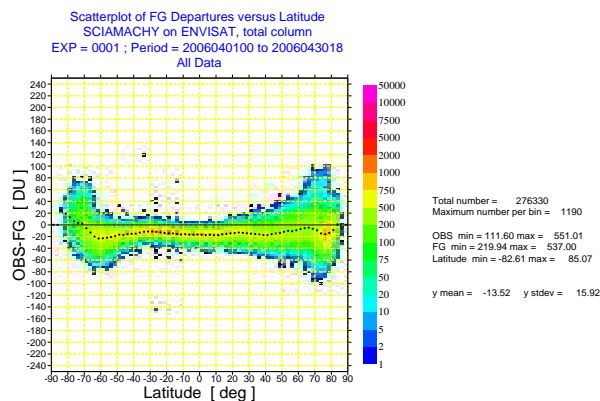


Fig. 19. Scatter plot of first-guess departures of ENVISAT SCIAMACHY ozone against latitude for April 2006. The colours show the number per bin, the black dots the mean values per bin.