

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

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1. Key points for January 2005

- SCIAMACHY data quality stable from 10 January onwards.
- Improvement on the agreement between SCIAMACHY and ECMWF ozone values.
- Decrease of the (negative) mean departures in the global means as compared to December 2004 in particular after 10 January.
- SCIAMACHY data about 10 DU lower in the global means than ECMWF ozone values after 10 January.
- Unrealistically large SCIAMACHY ozone values in the high latitudes have disappeared after the end of the decontamination activities.
- This monitoring report was produced with the operational ECMWF model, CY28R4.

2. Quality and amount of received data

This report covers SCIAMACHY NRT total column ozone data for January 2005. Amount of received data and their quality are shown in Figures 1-6 for various latitude bands. Geographical distributions of mean number of data, mean observation values and mean first-guess departures are shown in Figures 7-9. Timeseries of zonal mean number of data, zonal mean observation values and zonal mean first-guess departures are shown in Figures 10-12. Figures 13-15 present the scatter plots of SCIAMACHY ozone values against first-guess ozone values and latitude as well as the scatter plot of first-guess departures of SCIAMACHY ozone values against latitude.

As expected SCIAMACHY data quality was not stable during the non-nominal and post-non-nominal decontamination period which ended on 4 January. Its quality only became stable from 10 January onwards, roughly 5 days after the end of the decontamination activities and 3 days after the orbital control manoeuvre which took place on 7 January.

In the global means, the agreement between the SCIAMACHY and ECMWF ozone values improved this month as compared to December 2004. The global mean departures (SCIAMACHY-ECMWF) decreased from -25 DU, in the previous month, to -10 DU after 10 January (Figure 1). This improvement is particularly noticeable in the northern hemisphere (Figures 2-3).

The standard deviations of the mean departures have also decreased from values above 30 DU in December to values around 15 DU, in the global means. This decrease is particularly pronounced in the northern

mid-latitudes and in the southern high latitudes (Figures 3 and 6). However the standard deviation of the SCIAMACHY ozone values in the global means has slightly increased. This increase is mainly due to the larger variability of the ozone values in the mid-latitudes winter compared to the previous month (Figures 3 and 11).

The zonal mean first-guess departures presented in Figure 12 show that the largest departures are concentrated at the northern high latitudes which are likely to occur at high solar zenith angles (SZA). This issue can not be further investigated because NRT SCI_RV__2P data do not include any geolocation information like SZA.

The unrealistically high ozone values (up to 929.3 DU) between 67.5-62.5S and 70-65N seen in Figure 14 (top) disappeared after the end of the decontamination activities (Figure 14, middle right and bottom). However some unrealistic ozone values are still observed between 9 and 21 January (Figure 14, bottom left). During this period there is also a scatter between 0-30S with some relatively low and high ozone values (Figure 14, bottom left). This scatter is also observed in the SCIAMACHY total column ozone from KNMI (not shown). As pointed out in previous reports, this might be a sign of cloud contamination but as before, there is no information about cloud cover or cloud top height in the NRT SCIA_RV__2P data, hence this issue can not be investigated further.

3. Remarks

As ozone layers from SBUV/2 on NOAA-16 and SCIAMACHY total column ozone data produced by KNMI are actively assimilated in the operational ECMWF model, the comparison of SCI_RV__2P data against the ECMWF ozone field does not give an independent validation.

All ozone values are in Dobson Units (DU).

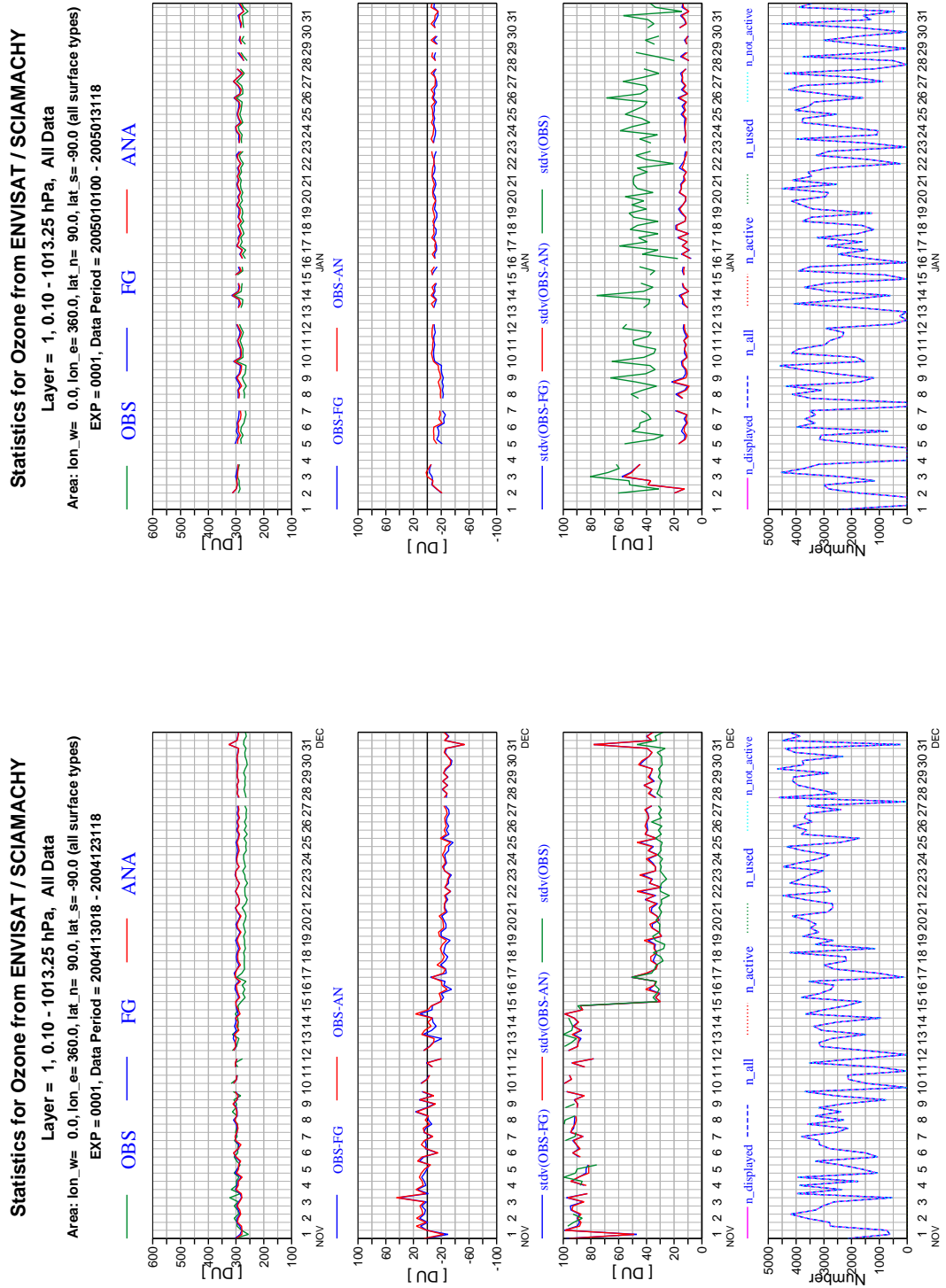


Fig. 1. Time series of mean observations, first guess and analysis values (top panels), first-guess and analysis departures (second panels), standard deviations (third panels) and number of data (bottom panels) per 6-hour cycle for ENVISAT SCIAMACHY NRT ozone data for December 2004 and January 2005 (Global means).

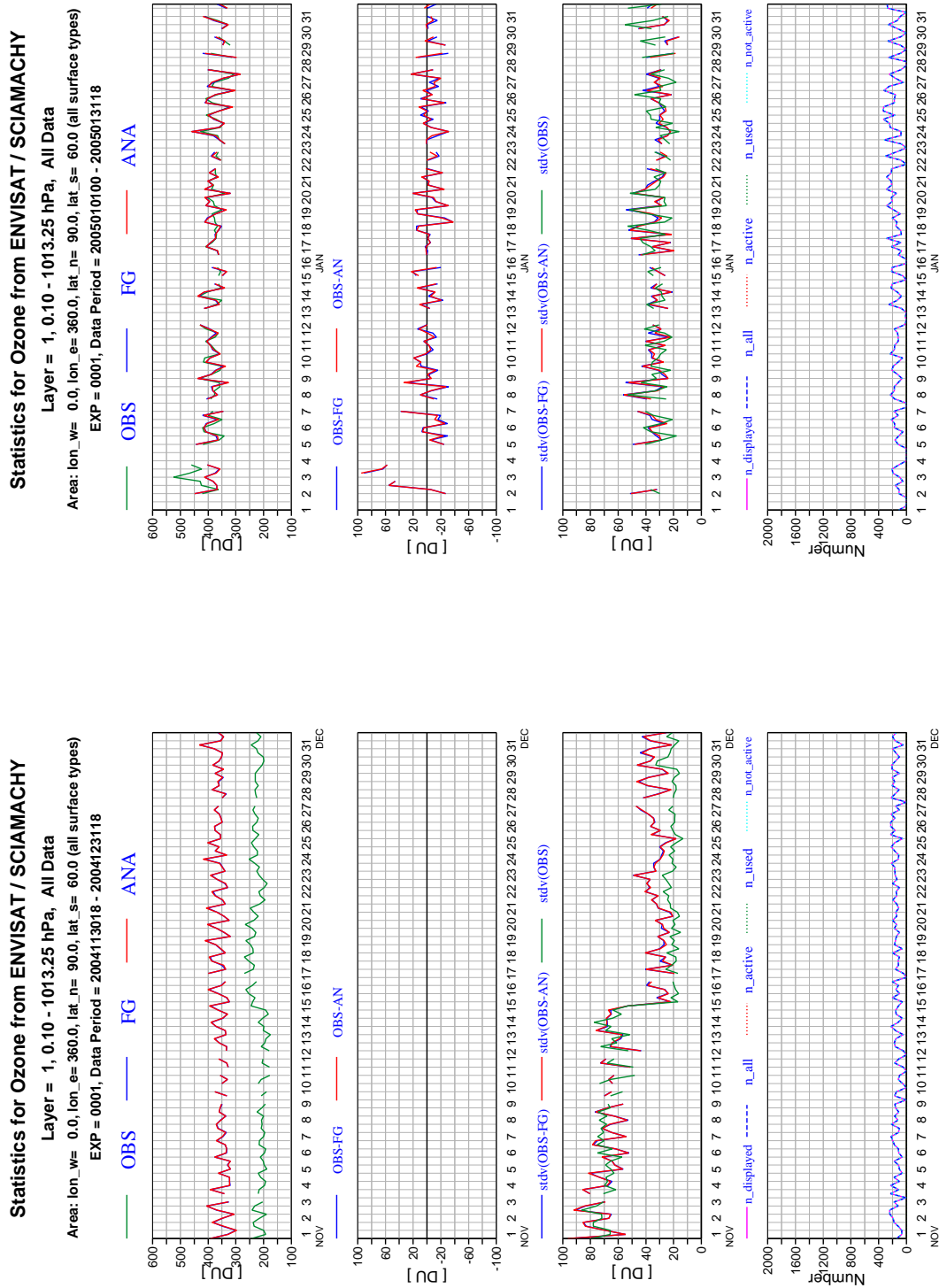


Fig. 2. As Fig.1 but for 90-60N. NB: Mean departures for December 2004 are not shown because their values (between -120 and -180 DU) are out of the scale of the plot.

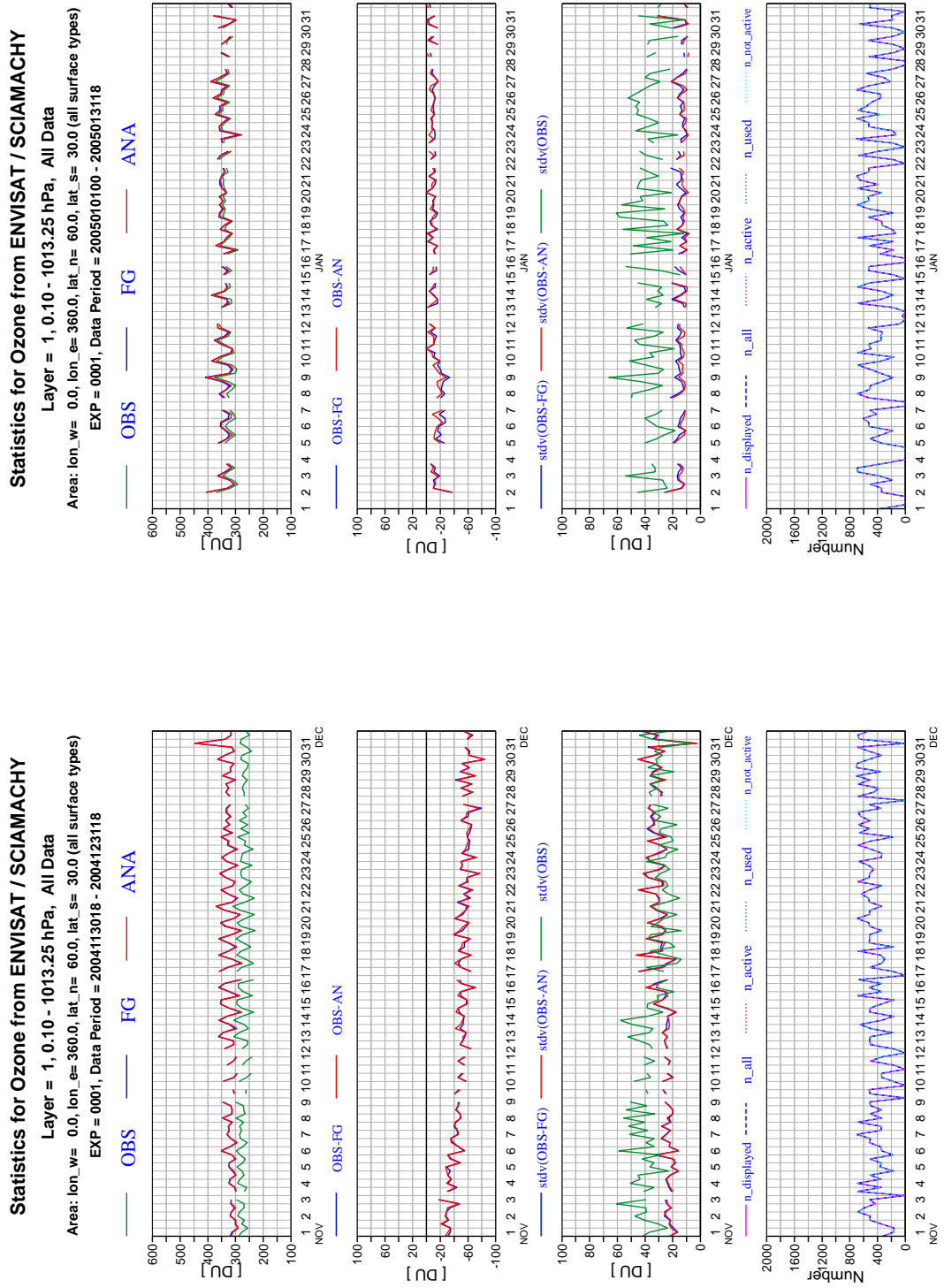


Fig. 3. As Fig. 1 but for 60-30N.

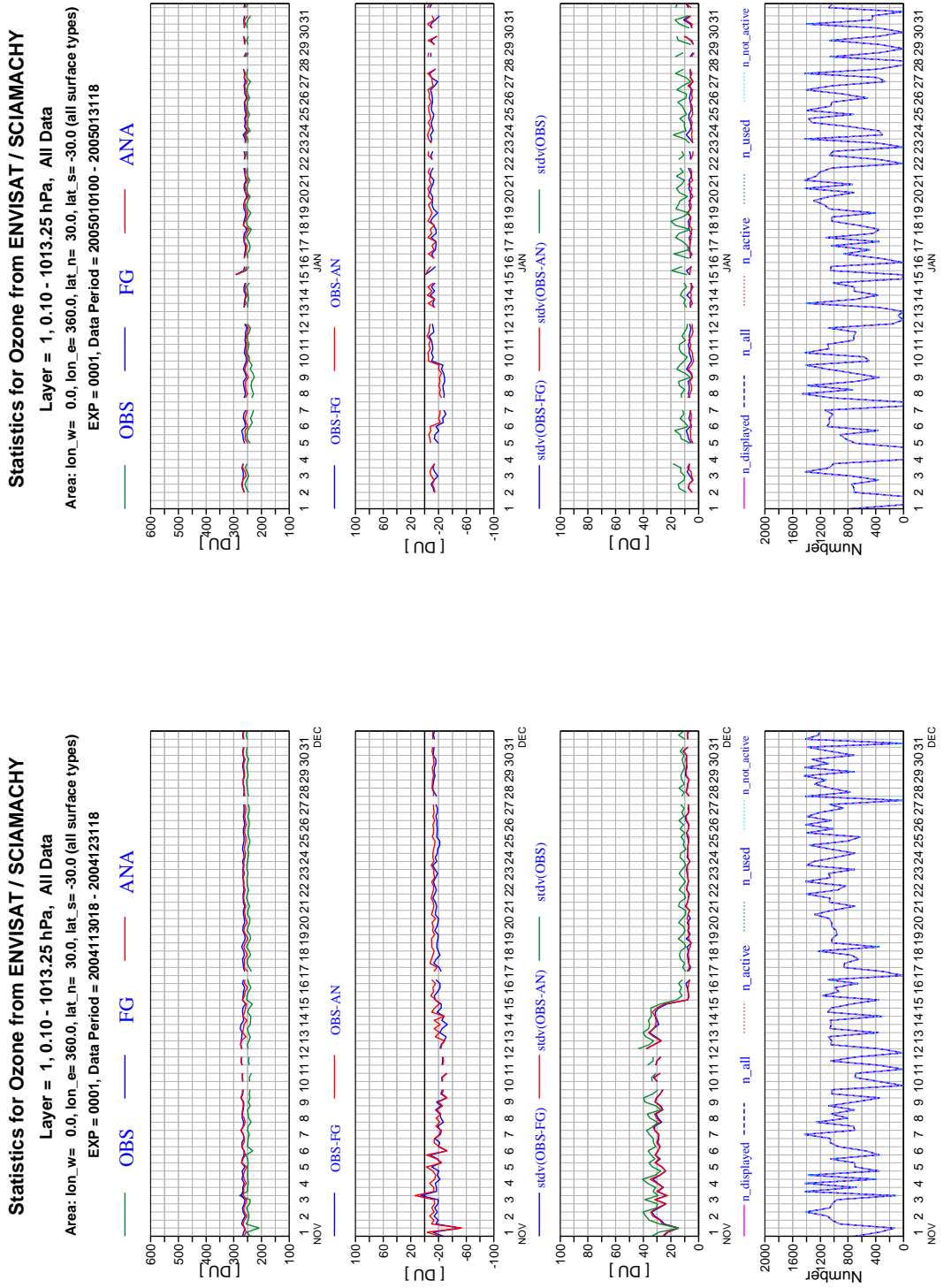


Fig. 4. As Fig. 1 but for 30N-30S.

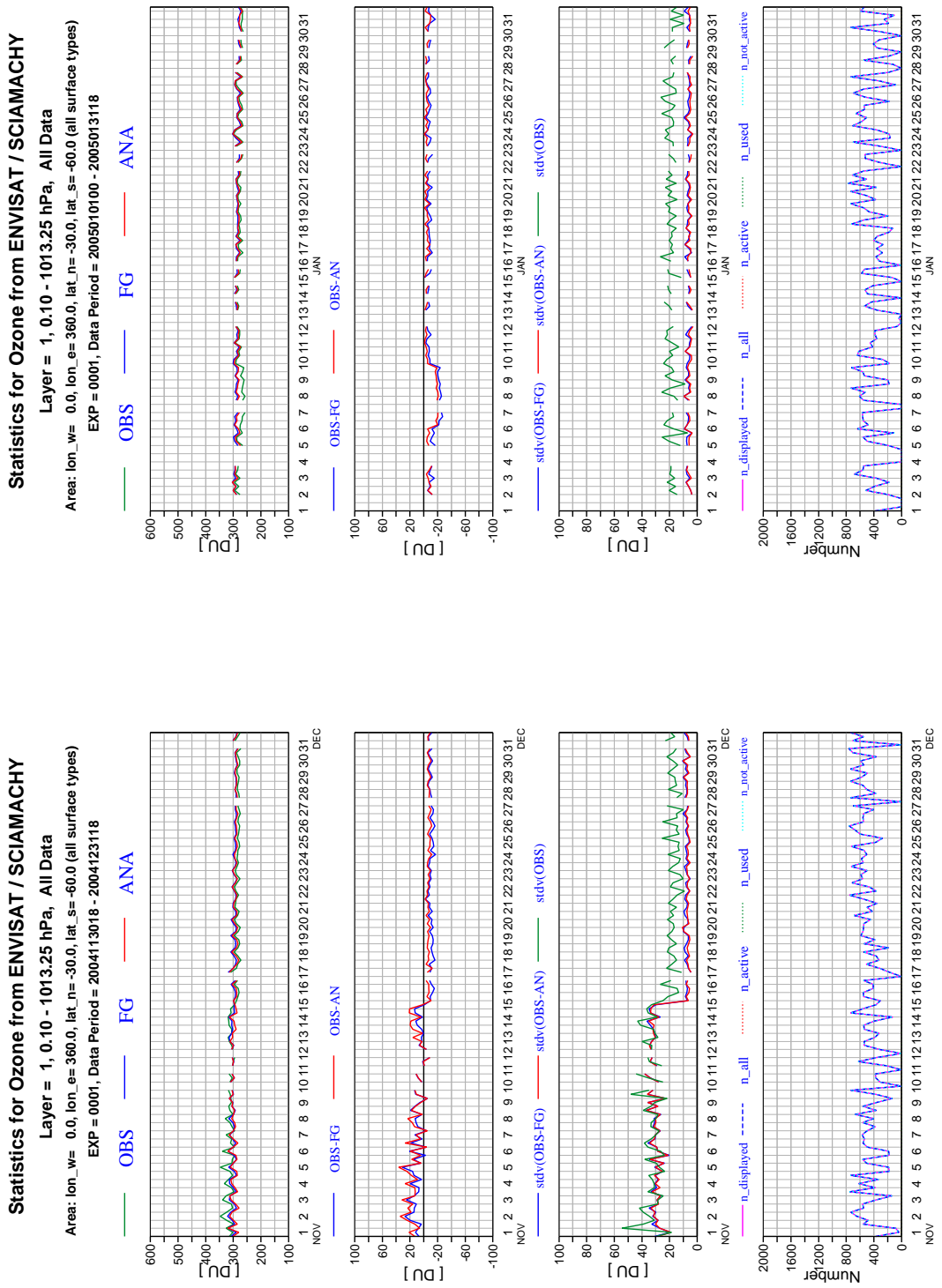


Fig. 5. As Fig. 1 but for 30-60S.

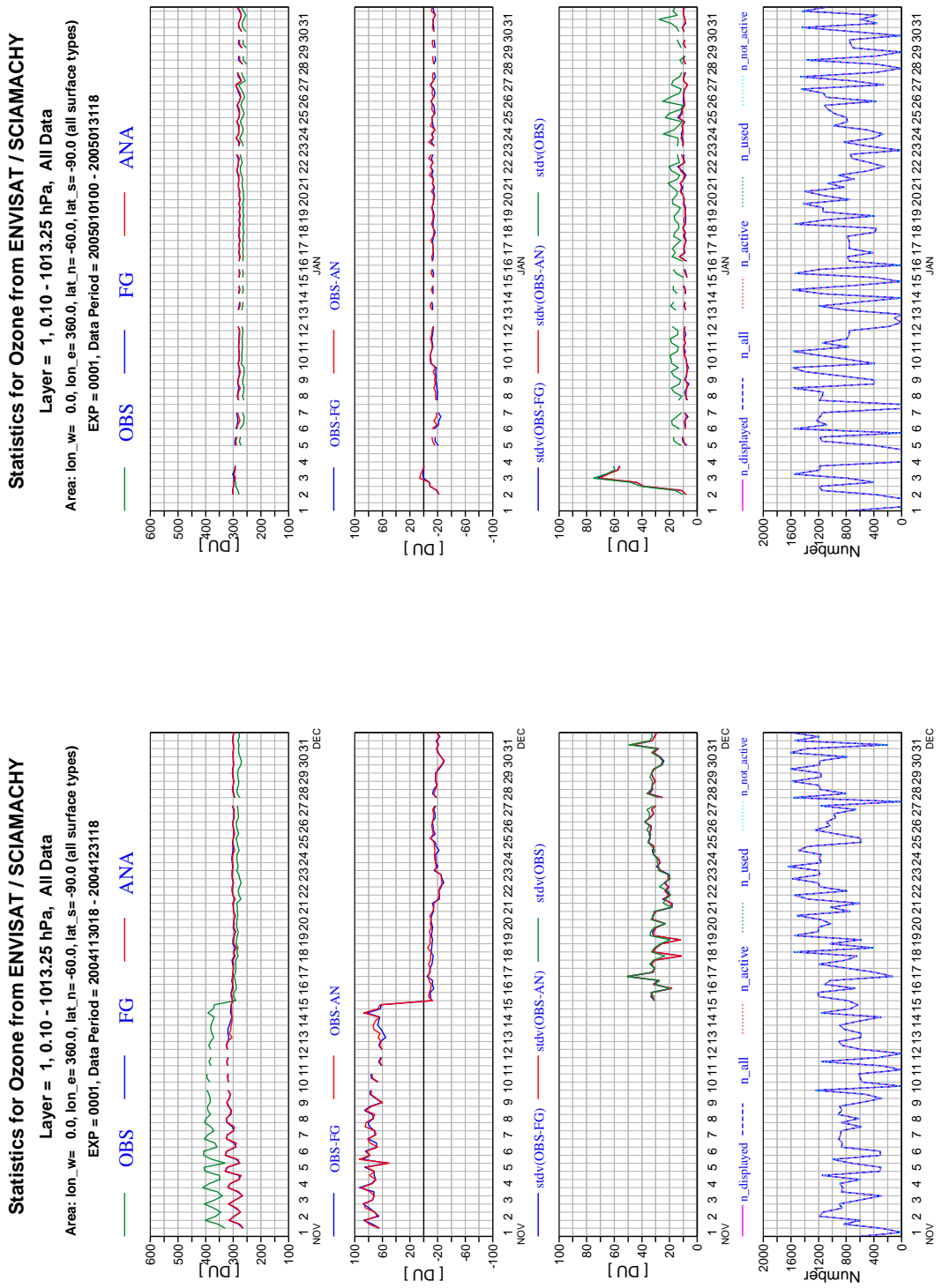


Fig. 6. As Fig. 1 but for 60-90S.

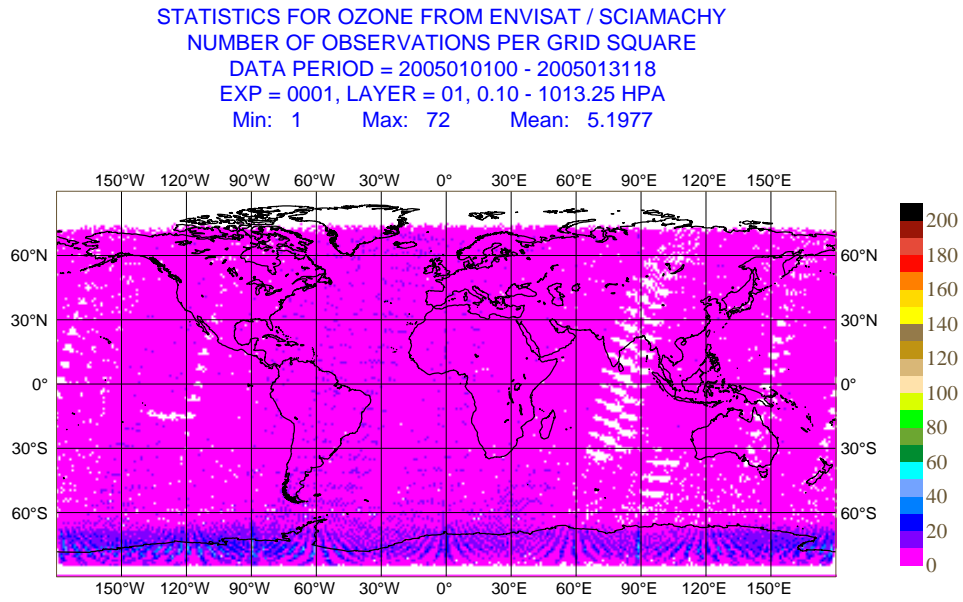


Fig. 7. Geographical distribution of mean number of data for ENVISAT SCIAMACHY NRT ozone data for January 2005.

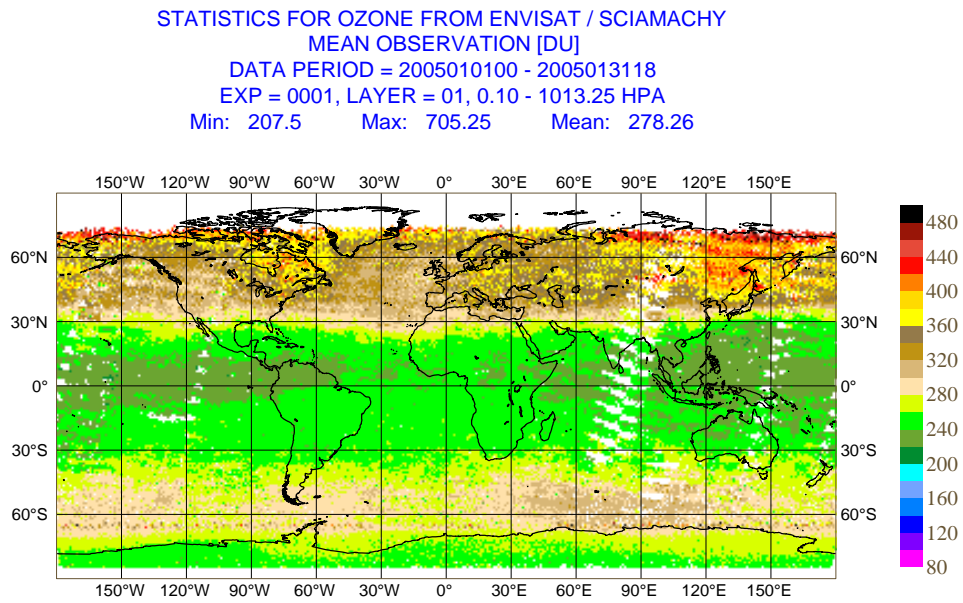


Fig. 8. Geographical distribution of mean observation values for ENVISAT SCIAMACHY NRT ozone data for January 2005.

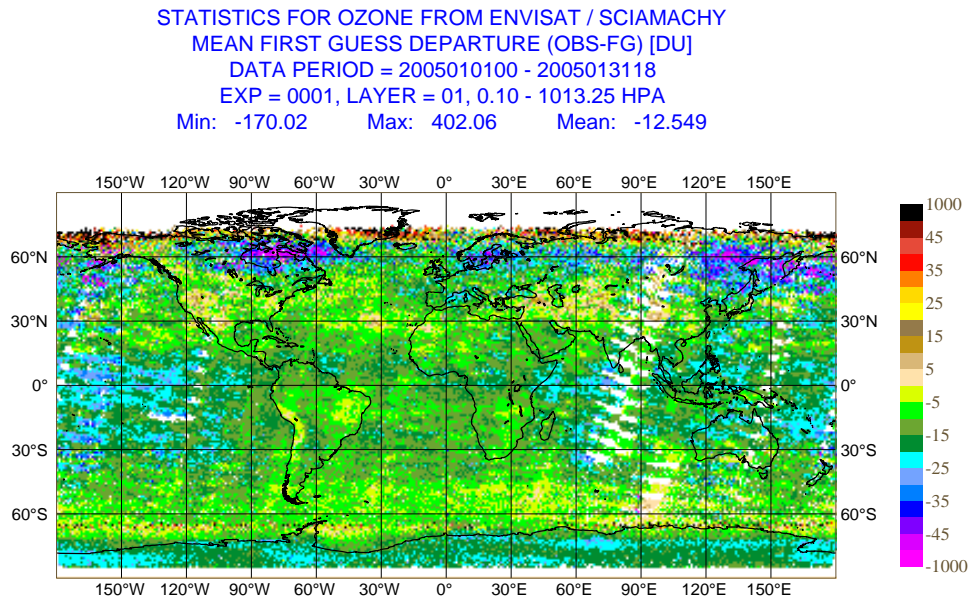


Fig. 9. Geographical distribution of mean first-guess departures for ENVISAT SCIAMACHY NRT ozone data for January 2005.

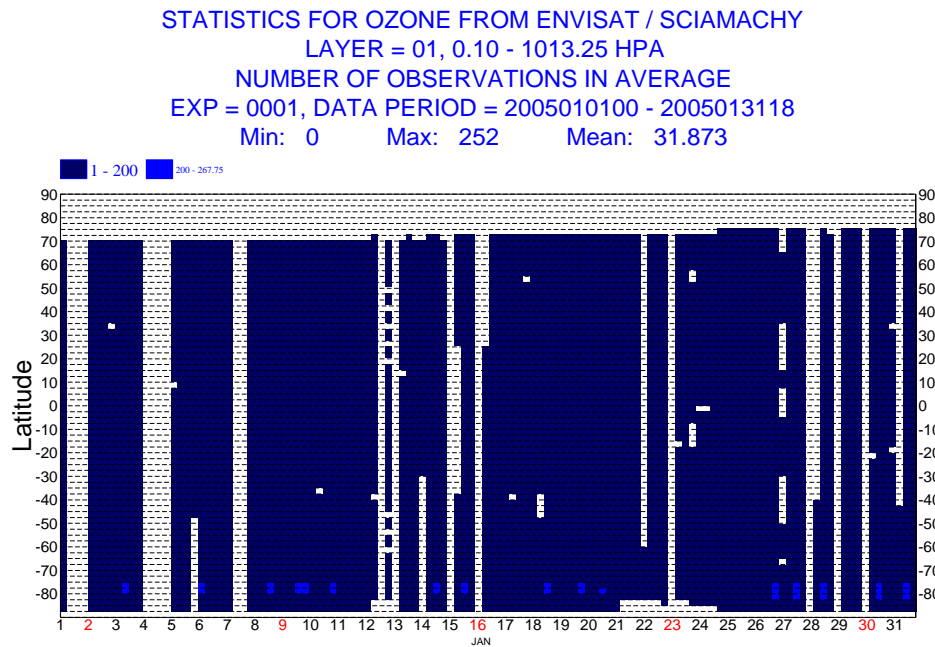


Fig. 10. Hovmoeller diagram of zonal mean number of data for ENVISAT SCIAMACHY NRT ozone data per 6-hour cycle for January 2005.

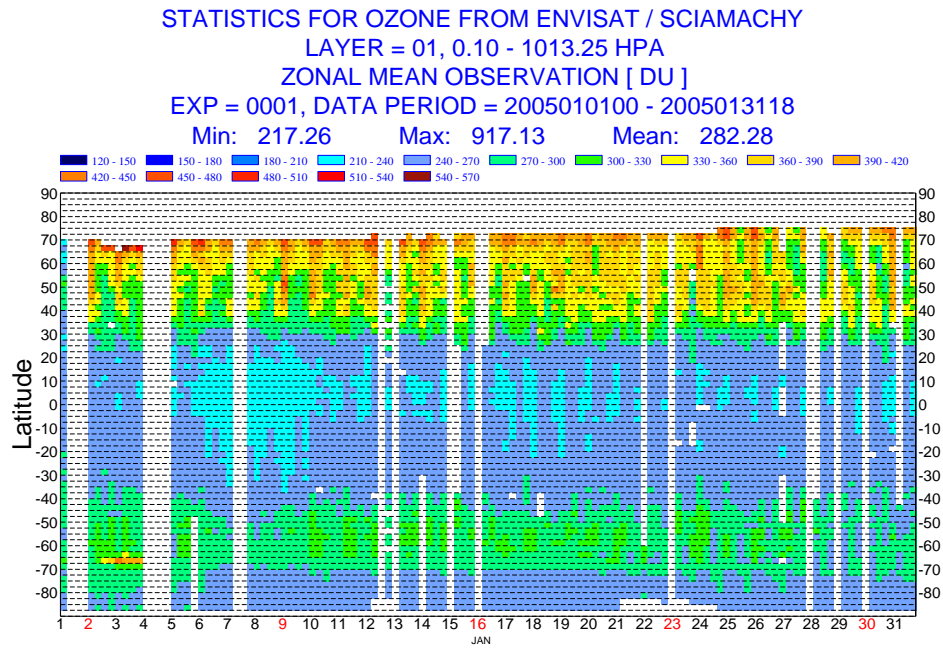


Fig. 11. Hovmoeller diagram of zonal mean observation values for ENVISAT SCIAMACHY NRT ozone data per 6-hour cycle for January 2005.

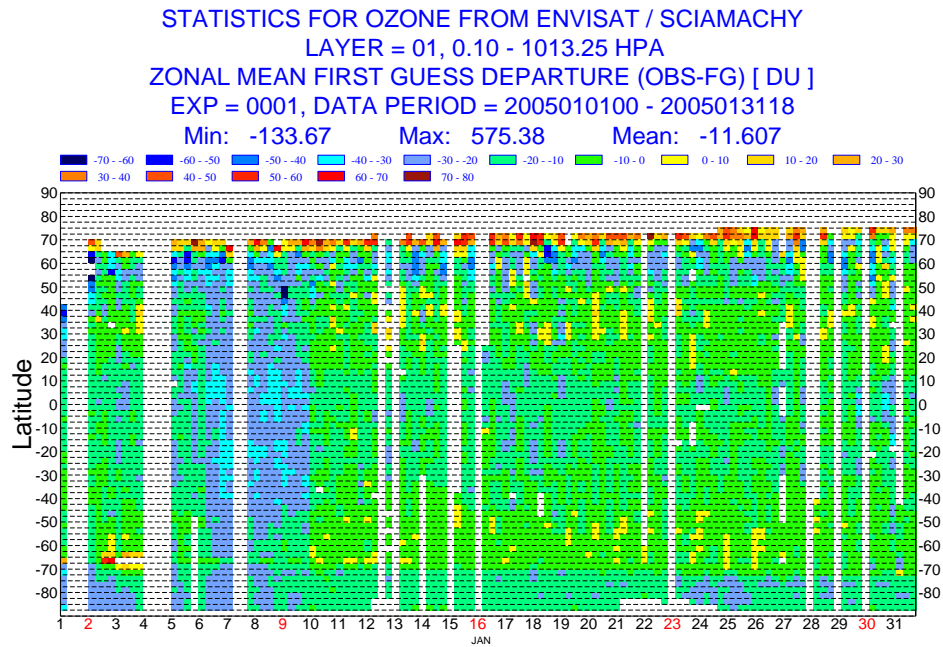


Fig. 12. Hovmoeller diagram of zonal mean first-guess departures for ENVISAT SCIAMACHY NRT ozone data per 6-hour cycle for January 2005.

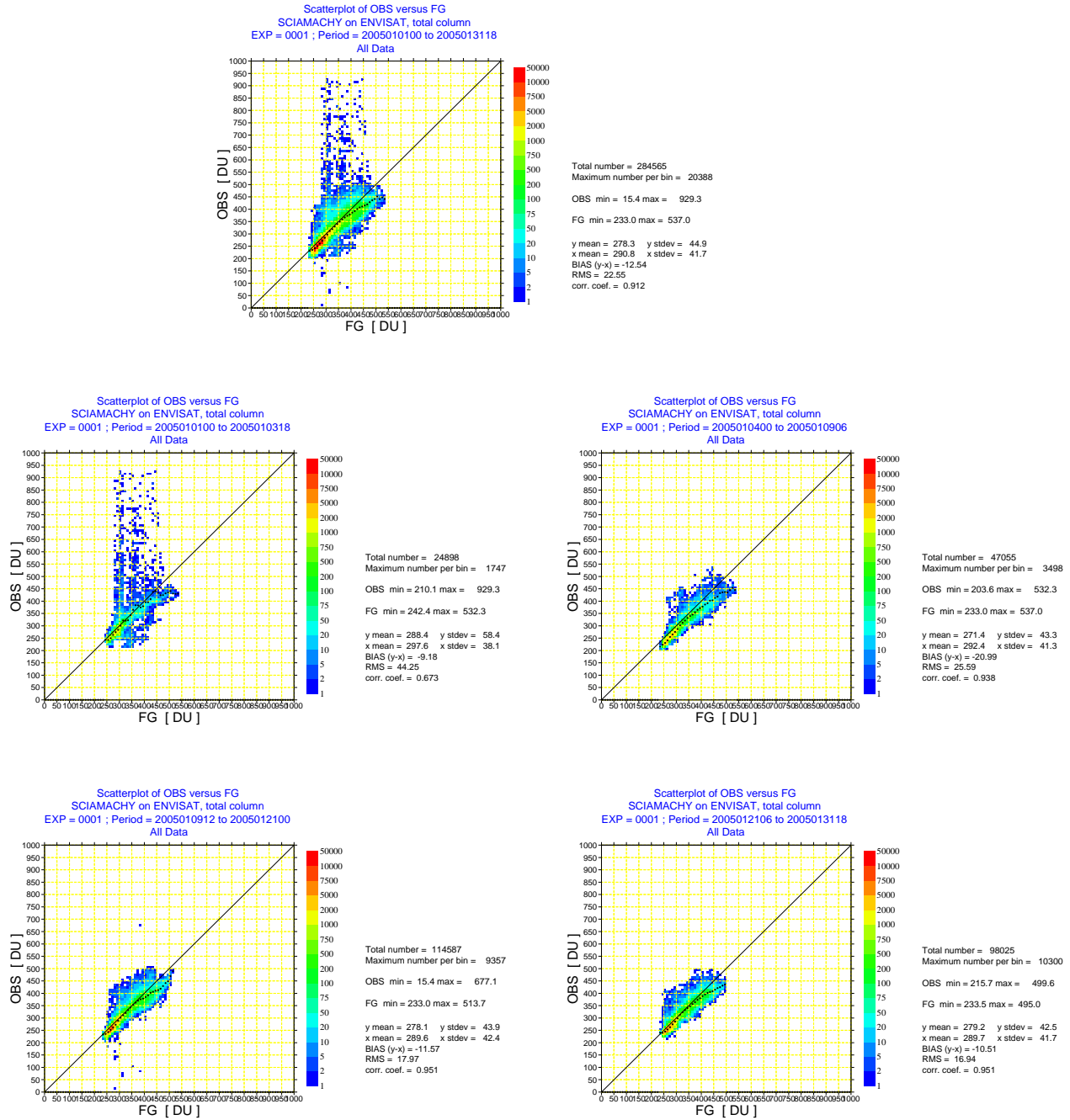


Fig. 13. Scatter plot of ENVISAT SCIAMACHY ozone values against latitude for January 2005 (top plot) and for the periods: 2005010100-2005010318 (left middle plot), 2005010400-2005010906 (right middle plot), 2005010912-2005012100 (left bottom plot) and 2005012106-2005013118 (right bottom panel). The colours show the number per bin, the black dots the mean values per bin.

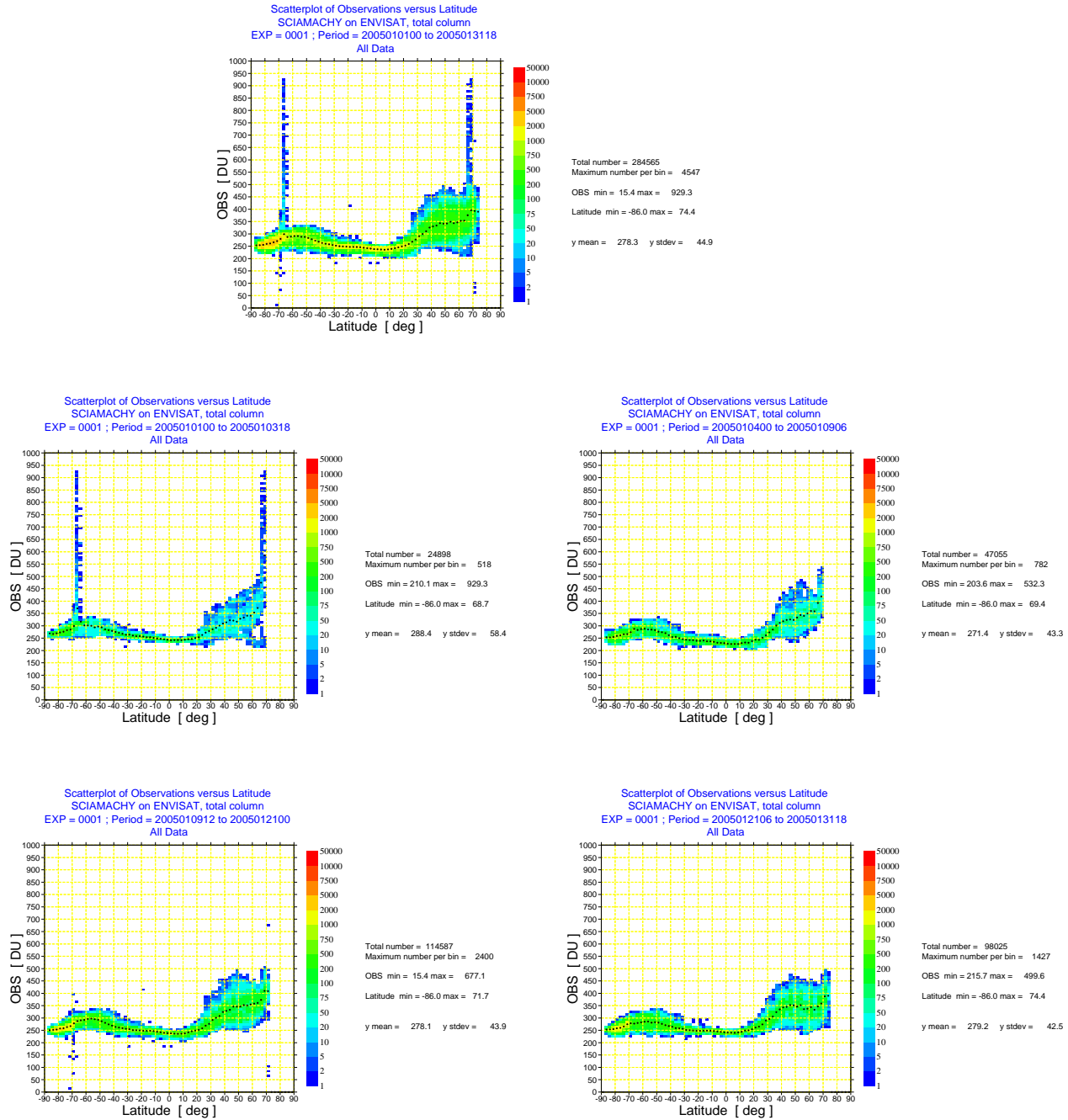


Fig. 14. Scatter plot of ENVISAT SCIAMACHY ozone values against latitude for January 2005 (top plot) and for the periods: 2005010100-2005010318 (left middle plot), 2005010400-2005010906 (right middle plot), 2005010912-2005012100 (left bottom plot) and 2005012106-2005013118 (right bottom panel). The colours show the number per bin, the black dots the mean values per bin.

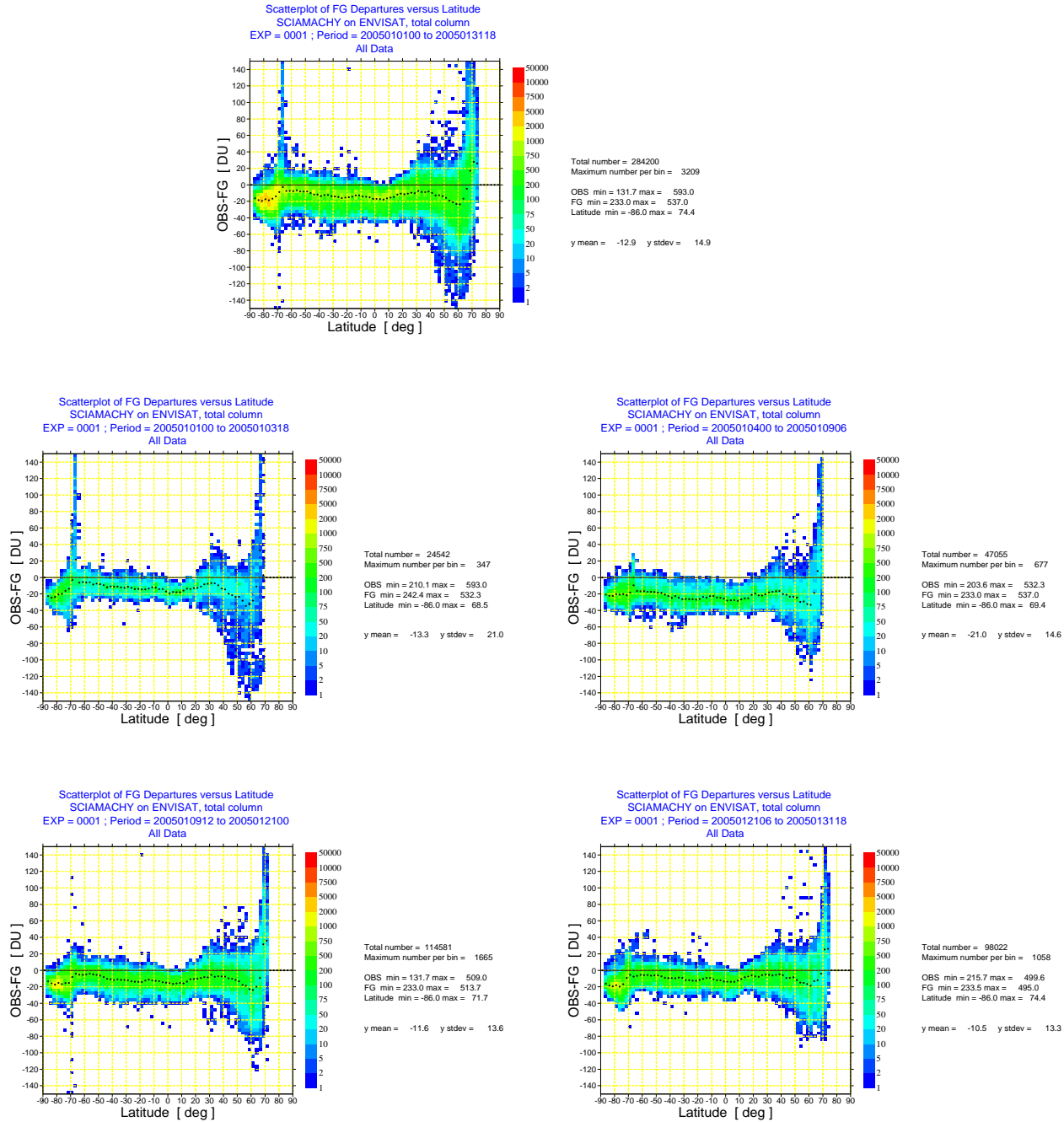


Fig. 15. Scatter plot of first-guess departures of ENVISAT SCIAMACHY ozone against latitude for January 2005 (top panel) and for the periods: 2005010100-2005010318 (left middle plot), 2005010400-2005010906 (right middle plot), 2005010912-2005012100 (left bottom plot) and 2005012106-2005013118 (right bottom panel). The colours show the number per bin, the black dots the mean values per bin.