REPORT ABOUT ENVISAT GOMOS NRT PRODUCTS (GOM_RR__2P) FOR JULY 2011

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1. Key points for July 2011

- The data volume received in July showed an increase of about 15% in the amount of ozone observations compared with that of June 2011. The water vapour data volume was comparable with that of the previous month.
- The mean ozone first guess and analysis departures were typically between $\pm$15% between 0.4 and 40 hPa in the tropics and at midlatitudes in the SH, as well as in the lower stratosphere in the SH extra-tropics. Slightly larger departures (within $\pm$20%) were found in the middle and upper stratosphere at high latitudes. The standard deviations of the departures were larger than 10% at all levels and latitudinal bands; values larger than 50% were found in places.
- The comparisons between the GOMOS water vapour retrievals and the ECMWF water vapour first guess and analyses showed a generally poor level of agreement as discussed in the last few months. GOMOS water vapour observations were from one to four orders of magnitude larger than their model equivalent at most vertical levels and latitudes.
- The monitoring statistics for July were produced with the operational ECMWF model, CY37R2.

2. Quality and amount of received data

Data coverage and amount of received data during July 2011 are shown in figures 1 and 2 in the ozone and water vapour reports. Overall, up to 1669 data were available for ozone and up to 423 (good) observations were delivered for water vapour. These values represent a 15% increase in the ozone amount compared with that received in June, while no change was found in the water vapour volume compared with that of the previous month. The largest number of observations were sampled in the mid stratosphere (see figure 3 in the attached water vapour and ozone reports). There were no observations at mid and high latitudes in the northern hemisphere. Only a small amount of water vapour data was available at some levels, so that here the results might not be statistically significant. Nonetheless they are summarized below for completeness.

3. GOMOS ozone data

The profile plots (ozone report: Figures 3-6) show that both the ozone first guess and analyses were within the observation one-standard deviation range at all levels and latitudinal bands.

In the global mean, the first-guess departures were within -10 and +15% at most vertical levels in the stratosphere and lower mesosphere (0.4 hPa $<$p$<$ 80 hPa). Larger departures ($>$50% in places) were found in the lower stratosphere (typically p$>$ 80 hPa).

In the tropics, the ozone residuals were within -15 and +10% in the mesosphere and stratosphere for pressure levels smaller than 40hPa. Larger departures ($>$50% in places) were found at pressure levels larger than 40 hPa. At midlatitudes in the southern hemisphere, departures typically within $\pm$15% were found in most of the stratosphere (2 hPa$<$p$<$ 80 hPa), but larger residuals ($>$50% in places) were found elsewhere. At high latitudes in the SH, the first guess and analysis departures were typically within $\pm$20% at most vertical levels in the stratosphere and mesosphere.

The standard deviations of the analysis and first guess departures were larger than 10% at all levels and latitudinal bands, exceeding 50% in places.

The scatter plots (ozone report: Figures 7-14) generally confirm the above analysis. Large scatter was still found in the GOMOS ozone observations at mesospheric levels that led to a large scatter in the first-guess departures.

The timeseries of GOMOS ozone and departures (ozone report: Figure 15-18) and the Hovmoeller plots (ozone report: Figure 19-20) also confirm the level of agreement between NRT GOMOS ozone retrievals and the ECMWF ozone analyses discussed above.

4. Water vapour data

The level of agreement between the GOMOS water vapour profiles and the corresponding ECMWF water vapour first guess and analyses is generally comparable with that discussed in the last few months. The profile plots (Water Vapour report: Figures 3-4) show that the GOMOS water vapour values were from one to four orders of magnitude larger than those given by the model at most vertical levels and all available latitudinal bands, with the model being drier than the GOMOS observations.

The scatter plots (water vapour report: Figures 5-10) confirm the above analysis. Where data were available, they showed large scatter at all vertical levels and available latitudes that led to large scatter in the first guess departures. The Hovmoeller plots and the timeseries (not presented) of GOMOS water vapour and departures show almost no signal as a consequence of the combination of low number of data and their poor level of agreement with their model equivalent.

5. Remarks

This monitoring report was produced with the operational ECMWF model (CY37R2). Ozone layers from SBUV/2 on NOAA-17, NOAA-18, and NOAA-19 were actively assimilated. In addition, SCIAMACHY total column ozone (produced by KNMI), and OMI total column ozone were also used. MERIS total column water vapour (TCWV) was assimilated since September 2009.

A variational bias correction for retrieved products became operational in September 2009 in the ECMWF model CY35R3. All the assimilated ozone products (with the only exception of the SBUV/2 data) and the MERIS TCWV were bias corrected.

The results presented in this report made use of only the observations acquired in dark-limb conditions as implemented in the PDS2BUFR converter in May 2007.

All ozone values are in Dobson Units (DU), and water vapour partial columns are in mg/m^2.

REPORT ABOUT ENVISAT GOMOS NRT OZONE DATA (GOM_RR__2P) FOR JULY 2011

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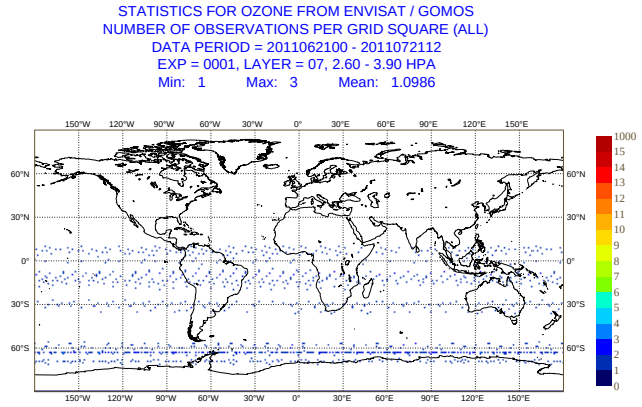


Fig. 1. Geographical distribution of mean number of ENVISAT GOMOS NRT ozone data for layer 7 (2.60-3.90 hPa) for July 2011.

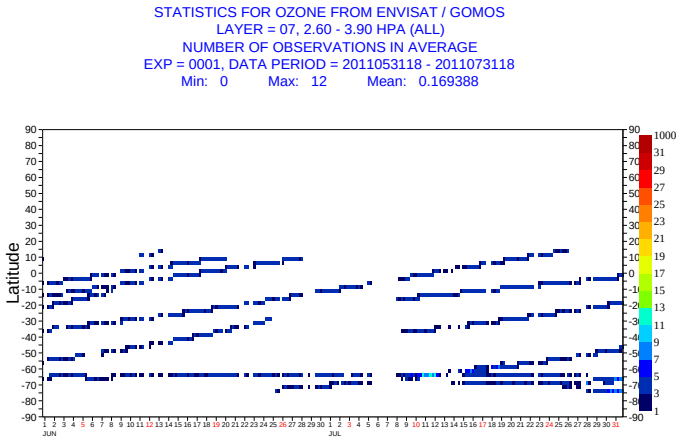


Fig. 2. Hovmoeller diagram of zonal mean number of data of ENVISAT GOMOS NRT ozone data per 6-hour cycle for layer 7 (2.60-3.90 hPa) for June-July 2011.

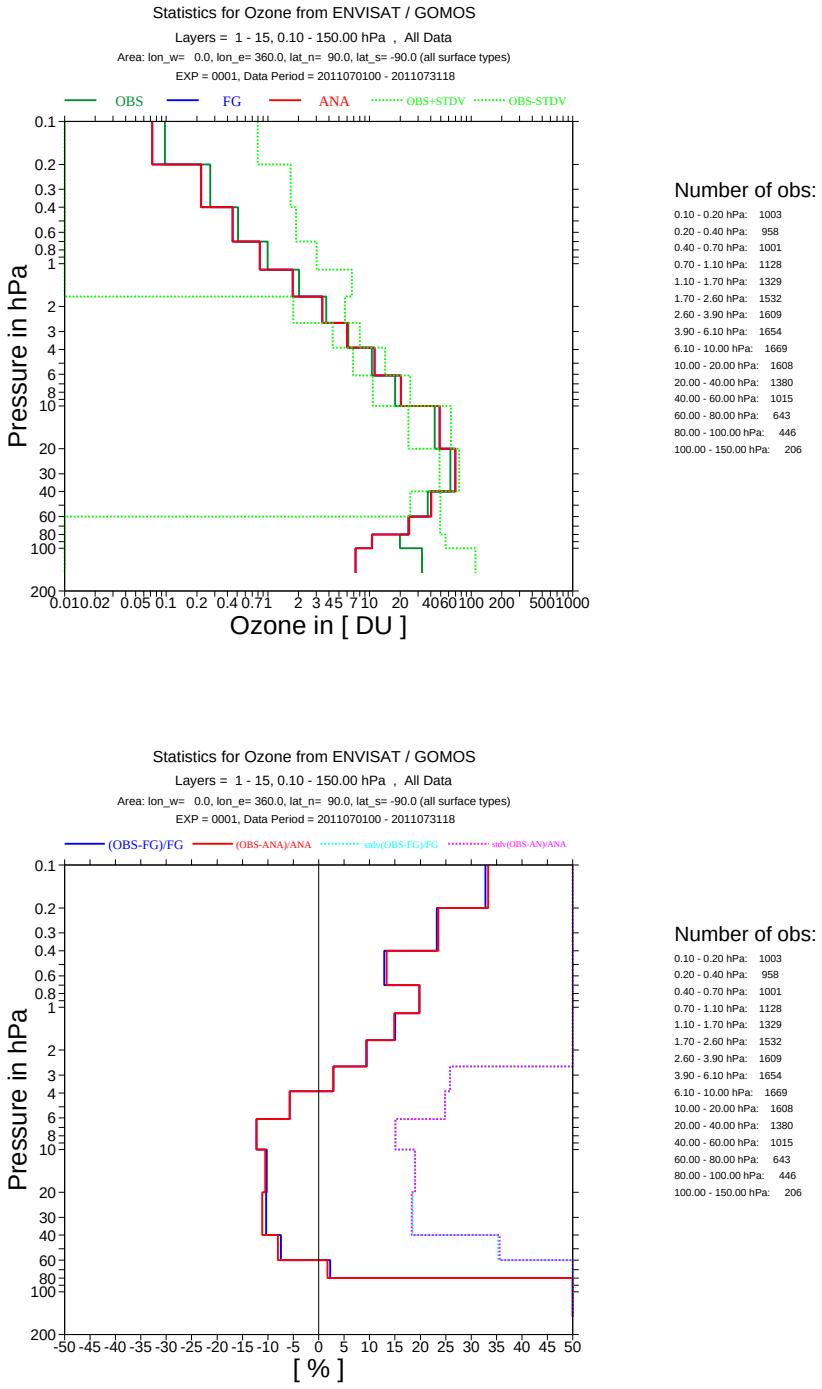


Fig. 3. Time mean vertical distribution of ENVISAT GOMOS NRT ozone data in DU for July 2011 (global mean). The top plot shows the mean analysis values (red), the mean first-guess (blue), the mean observation (red), and the mean observation (green) +/- 1 standard deviation (green dotted lines). The bottom plot shows the departures and the standard deviation of the departures in %. Plotted are the partial columns for the 15 layers listed to the right of the diagrams.

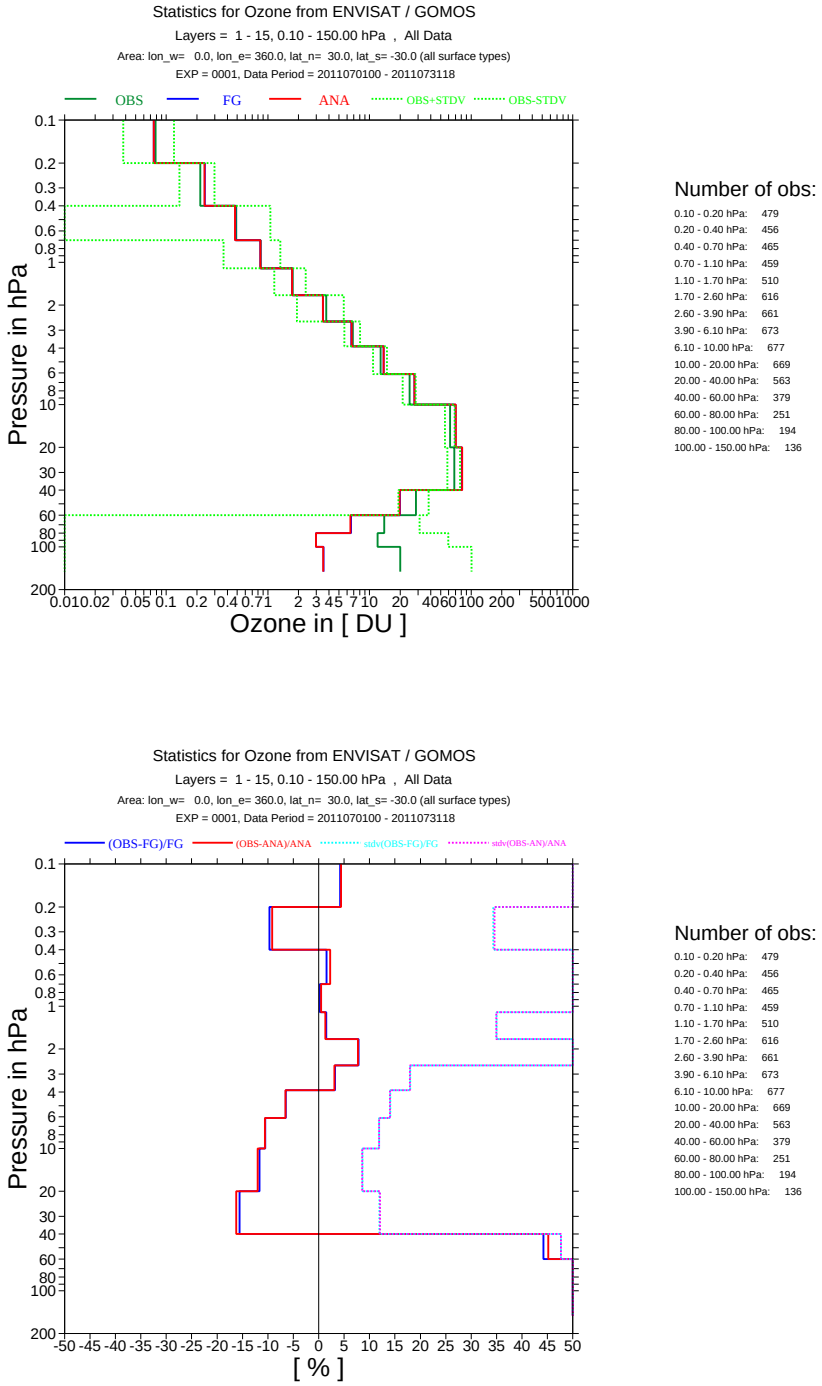


Fig. 4. As Fig. 3 but for 30N-30S.

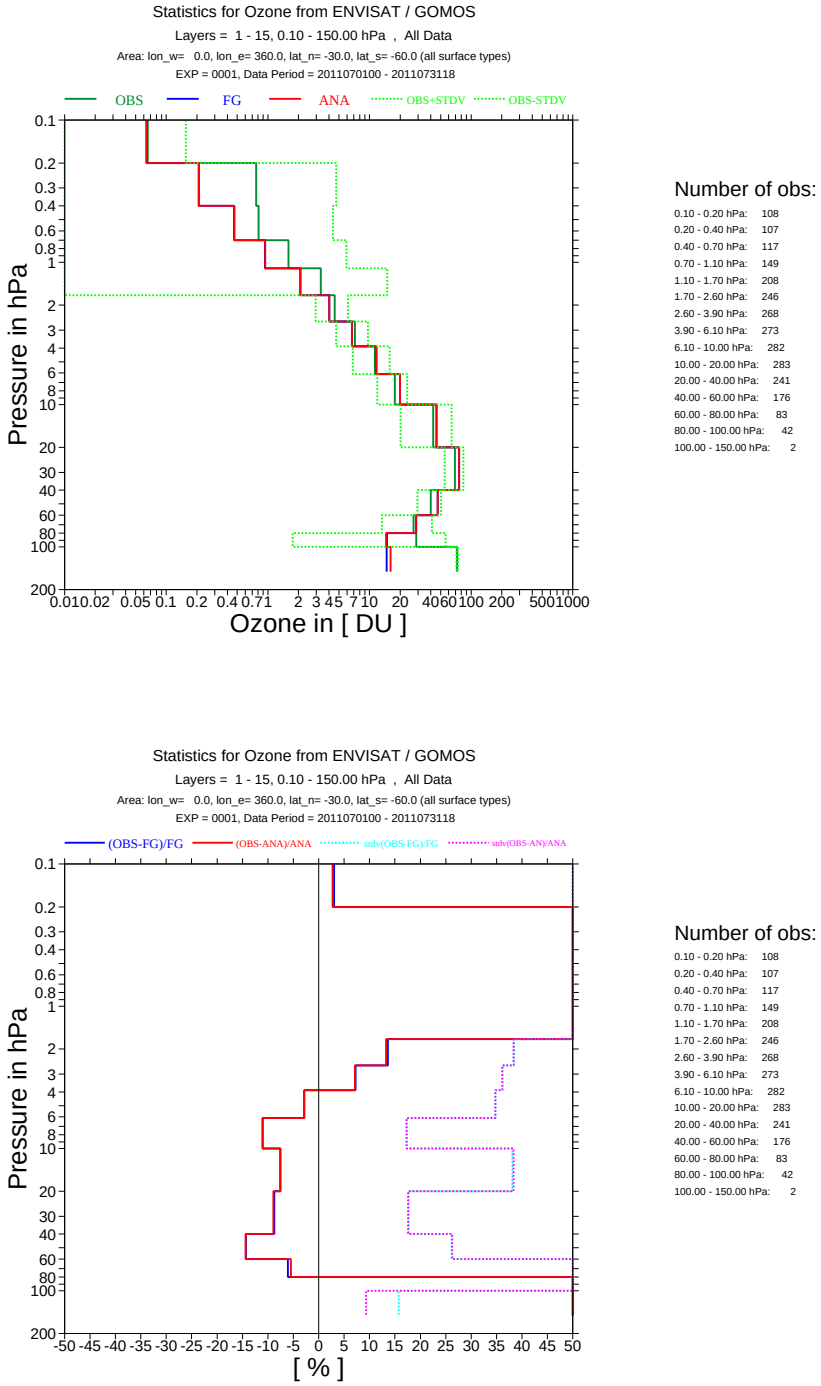
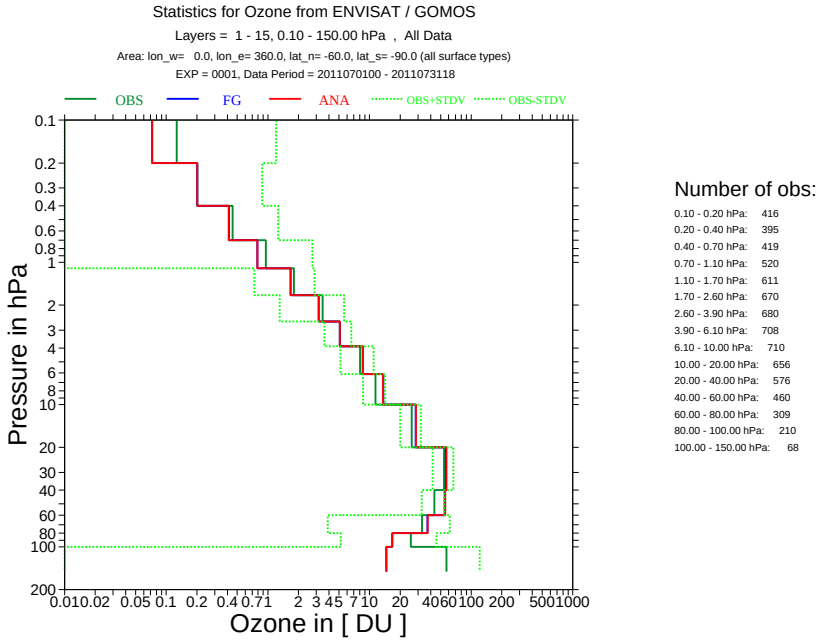


Fig. 5. As Fig. 3 but for 30S-60S.



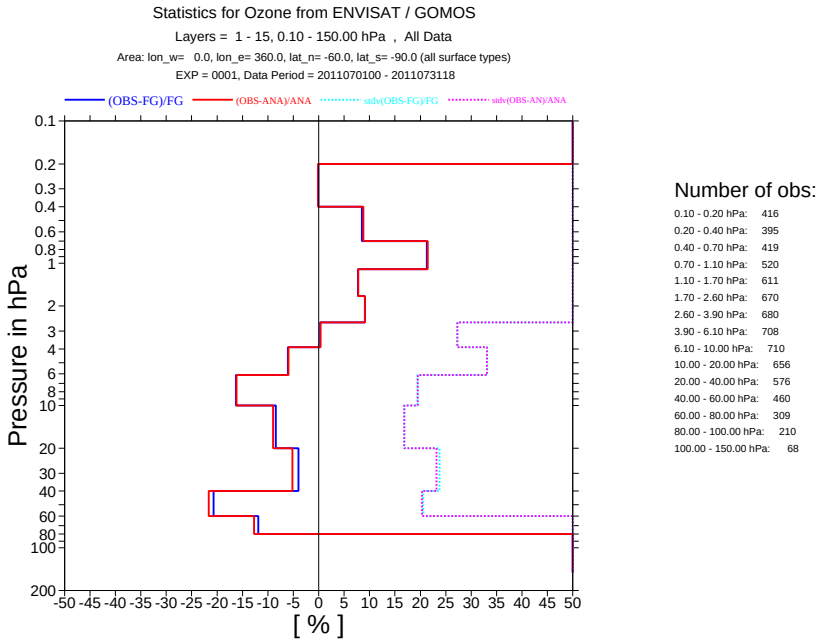


Fig. 6. As Fig. 3 but for 60-90S.

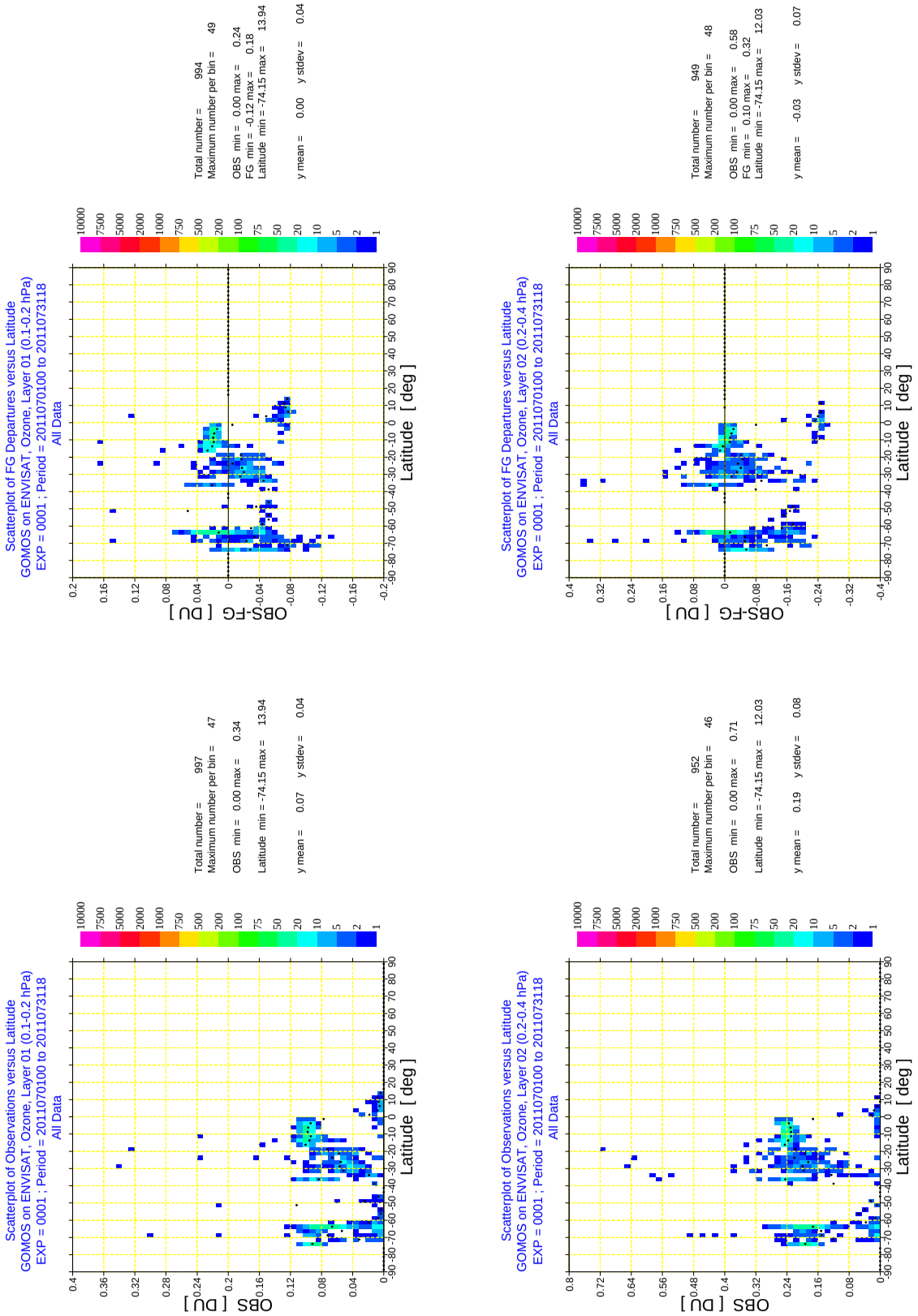


Fig. 7. Scatter plot of ENVISAT GOMOS NRT ozone data against latitude (left) and scatter plot of first-guess departures of ENVISAT GOMOS NRT ozone data against latitude (right) for July 2011 for layer 1 (0.1-0.2 hPa) and layer 2 (0.2-0.4 hPa). The colours show the number of data per bin, the black dots the mean value per bin.

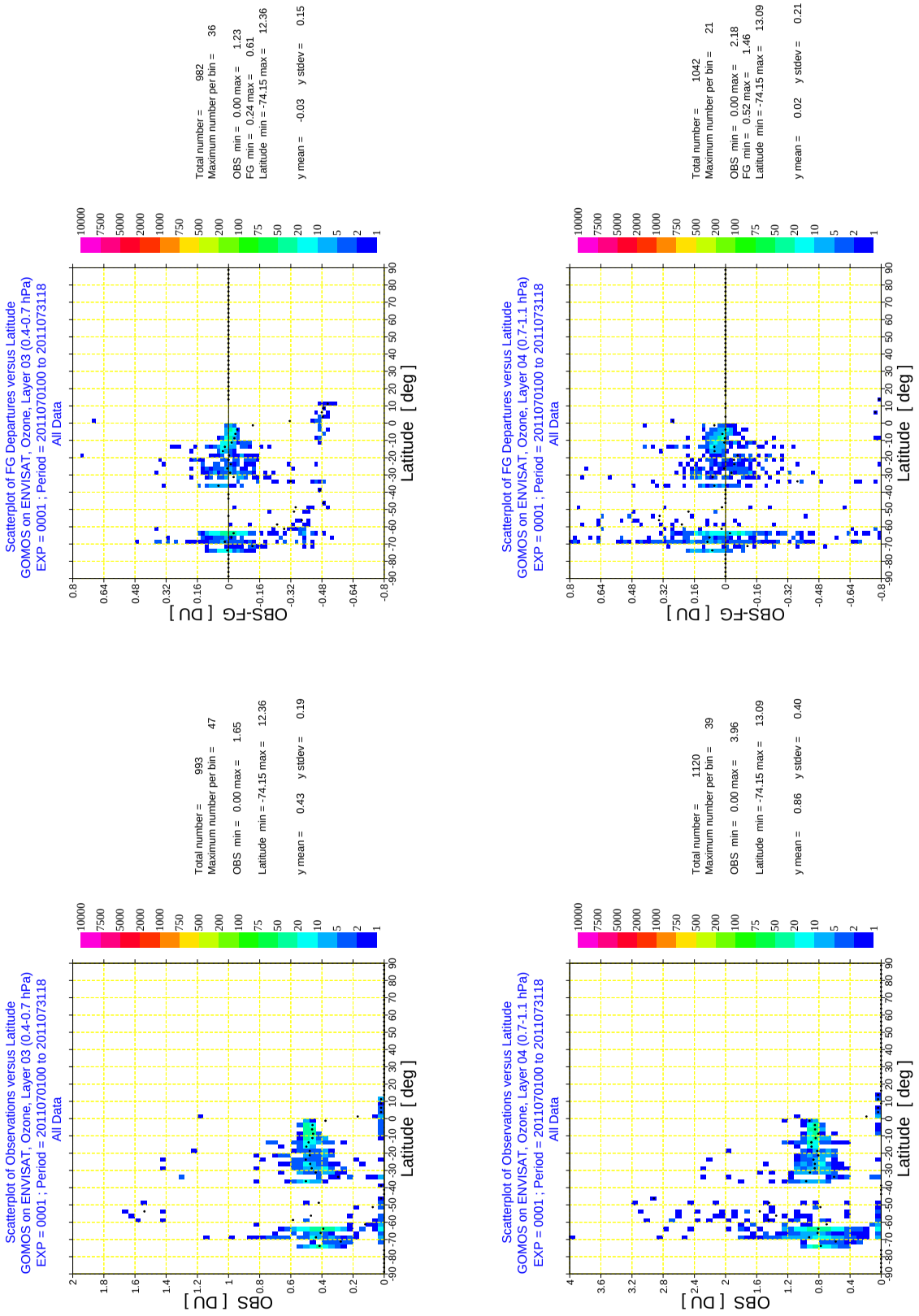


Fig. 8. As Fig. 7 but for layer 3 (0.4-0.7 hPa) and layer 4 (0.7-1.1 hPa).

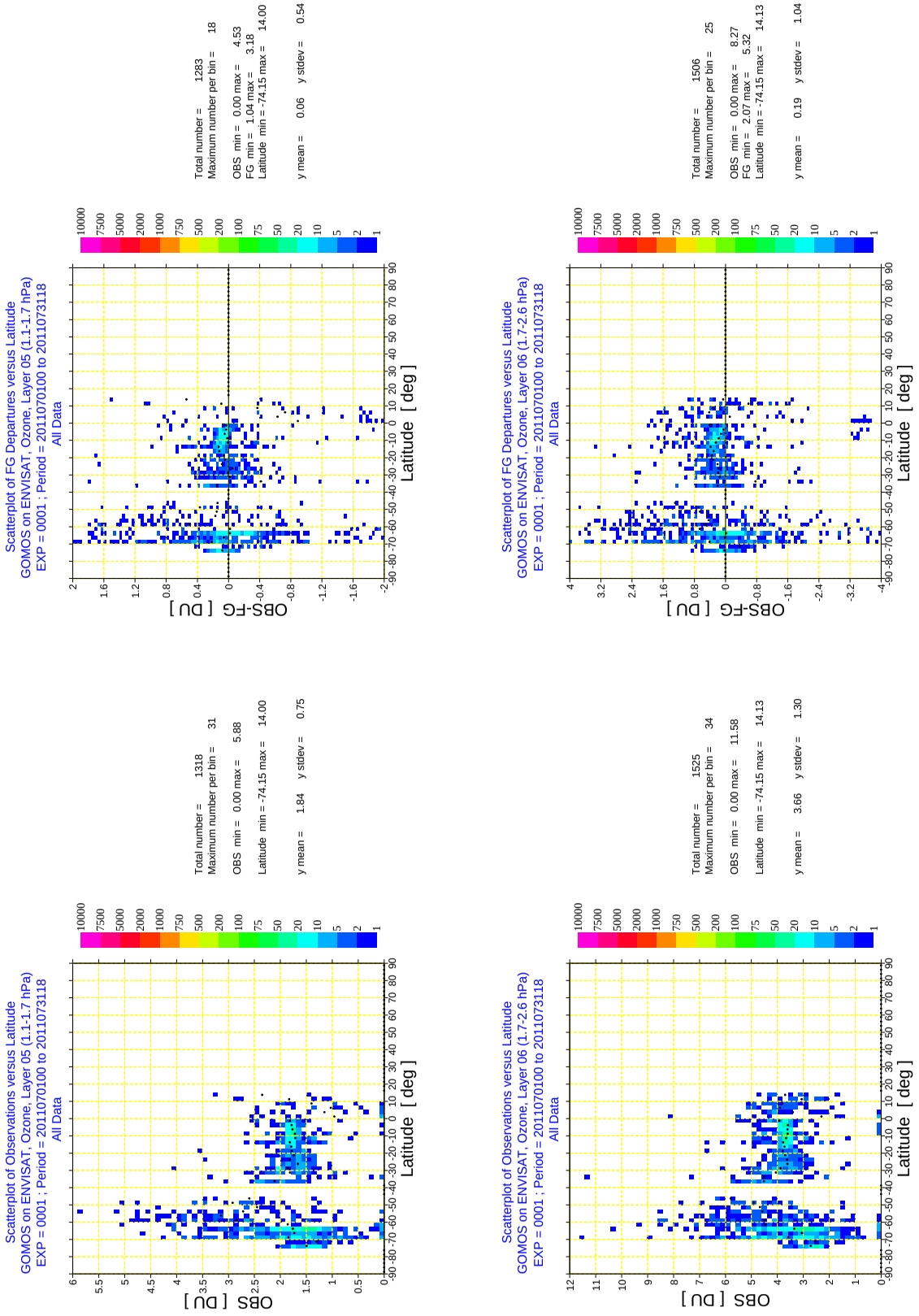


Fig. 9. As Fig. 7 but for layer 5 (1.1-1.7 hPa) and layer 6 (1.7-2.6 hPa).

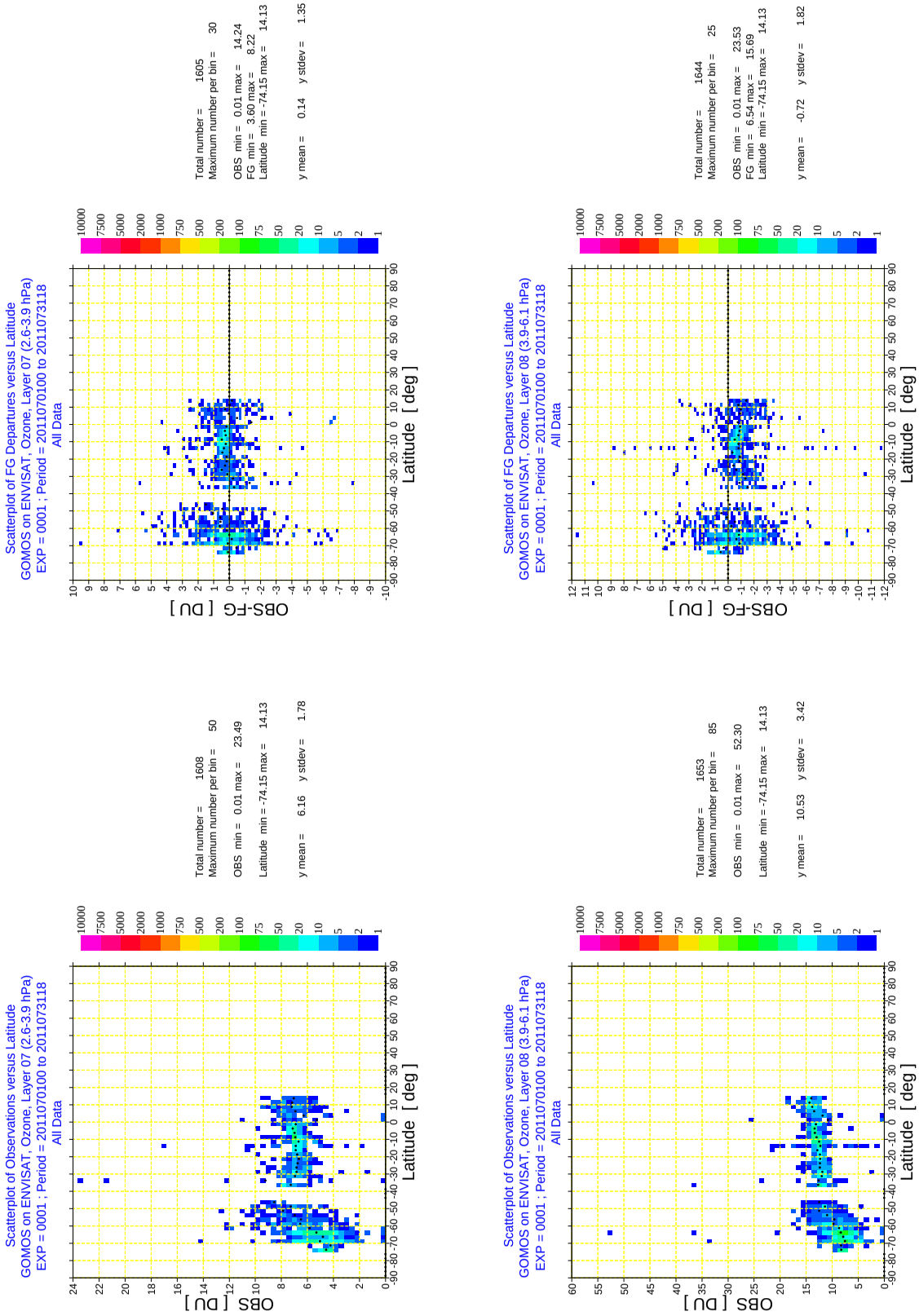


Fig. 10. As Fig. 7 but for layer 7 (2.6-3.9 hPa) and layer 8 (3.9-6.1 hPa).

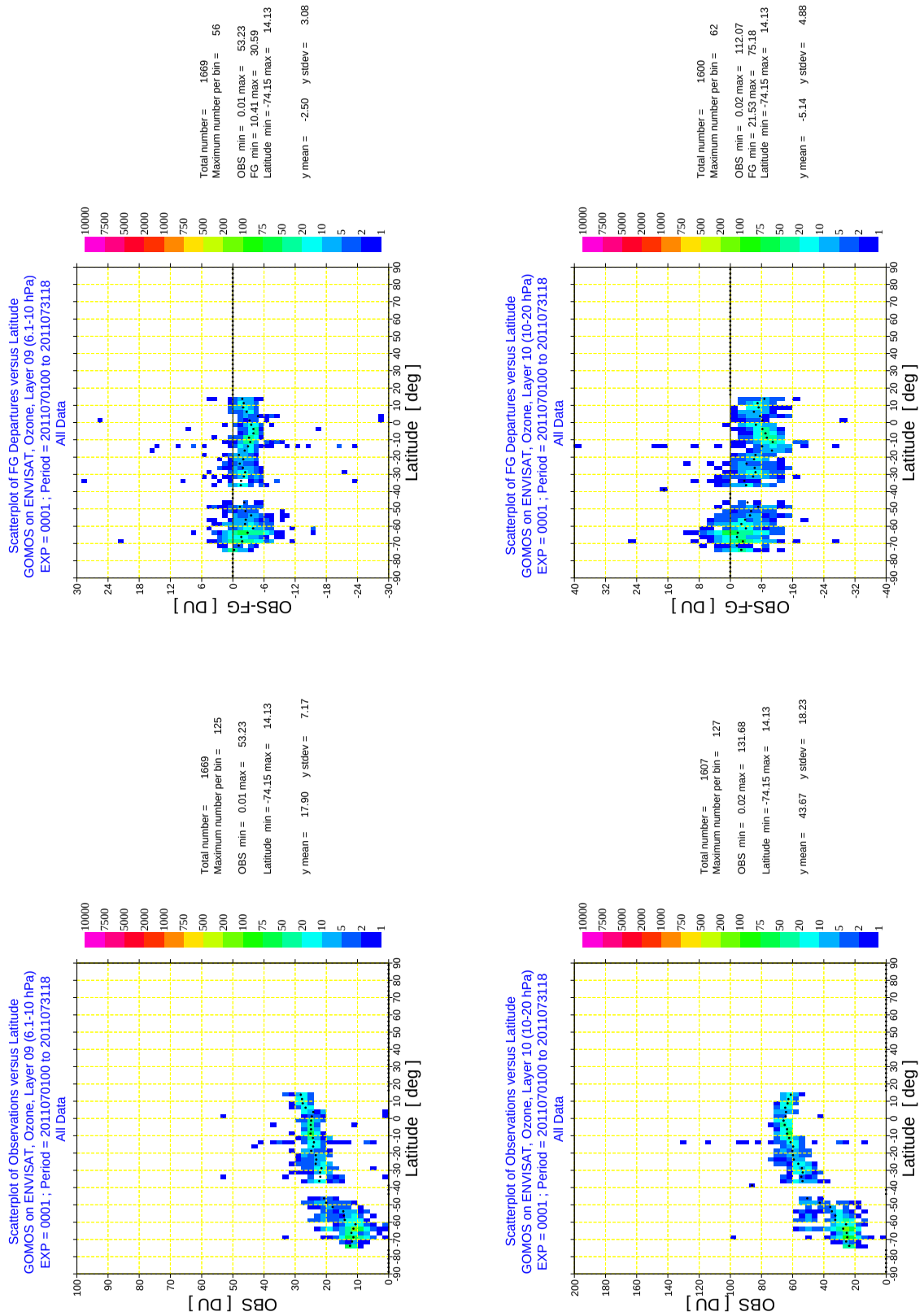


Fig. 11. As Fig. 7 but for layer 9 (6.1-10 hPa) and layer 10 (10-20 hPa).

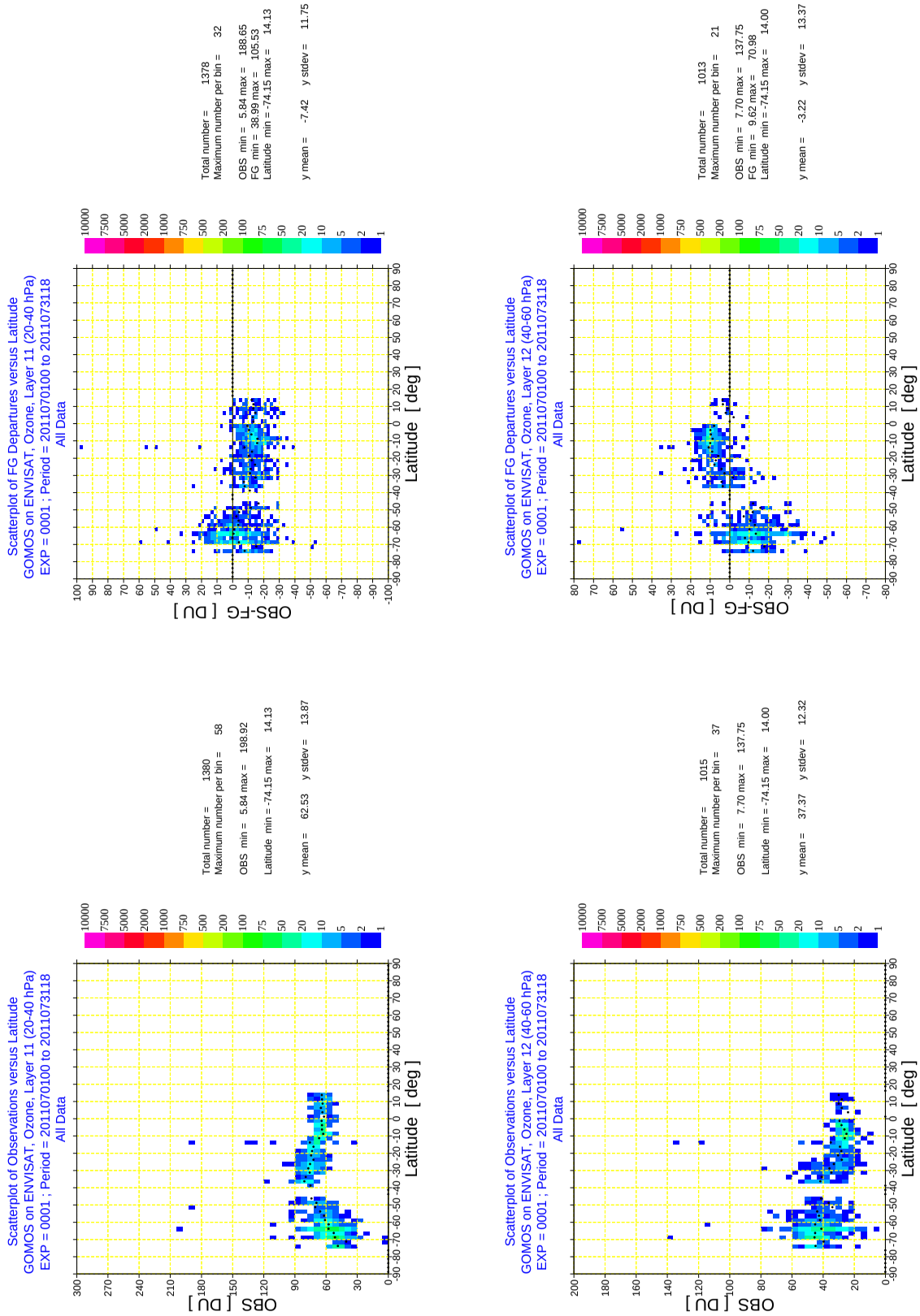


Fig. 12. As Fig. 7 but for layer 11 (20-40 hPa) and layer 12 (40-60 hPa).

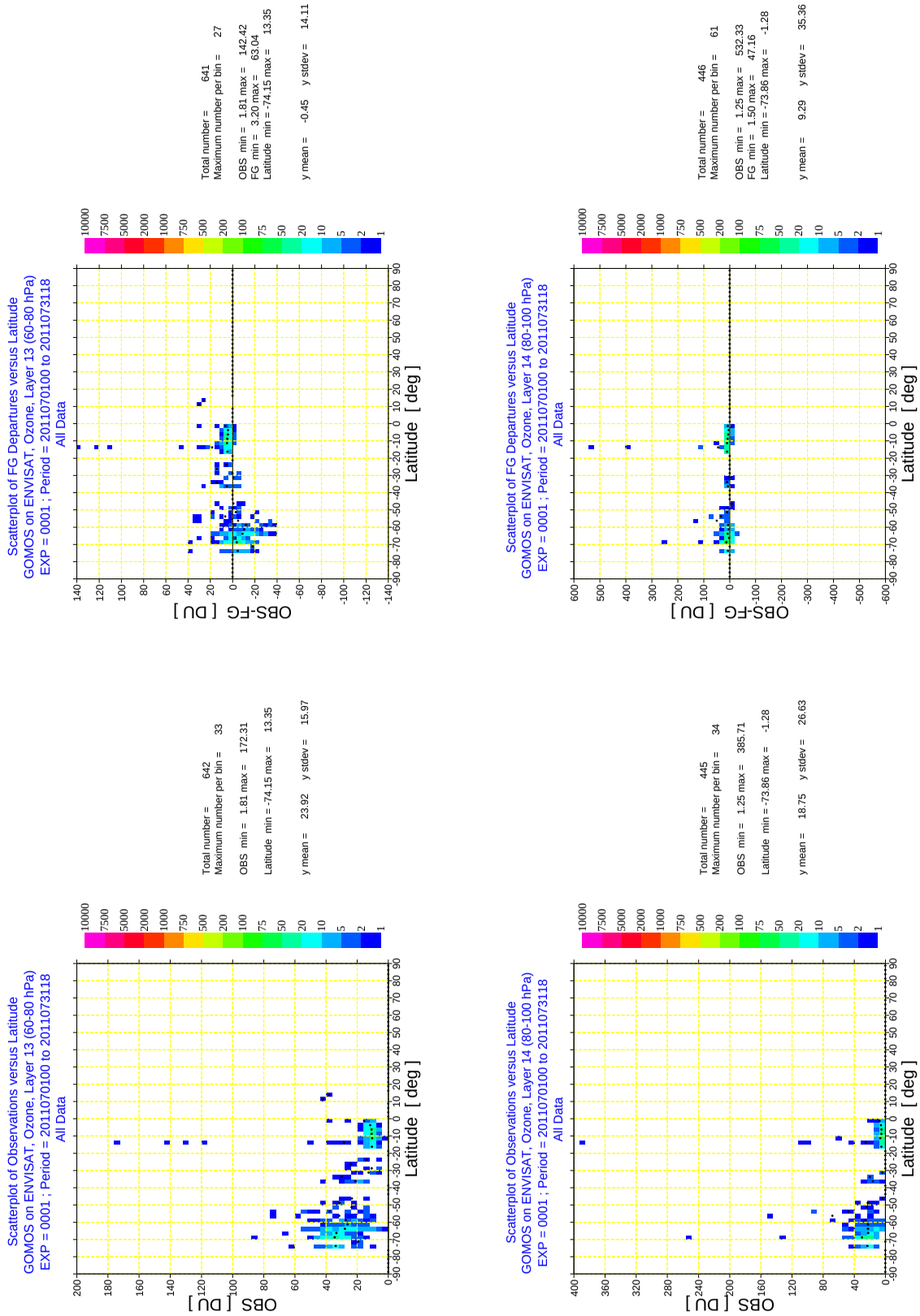


Fig. 13. As Fig. 7 but for layer 13 (60-80 hPa) and layer 14 (80-100 hPa).

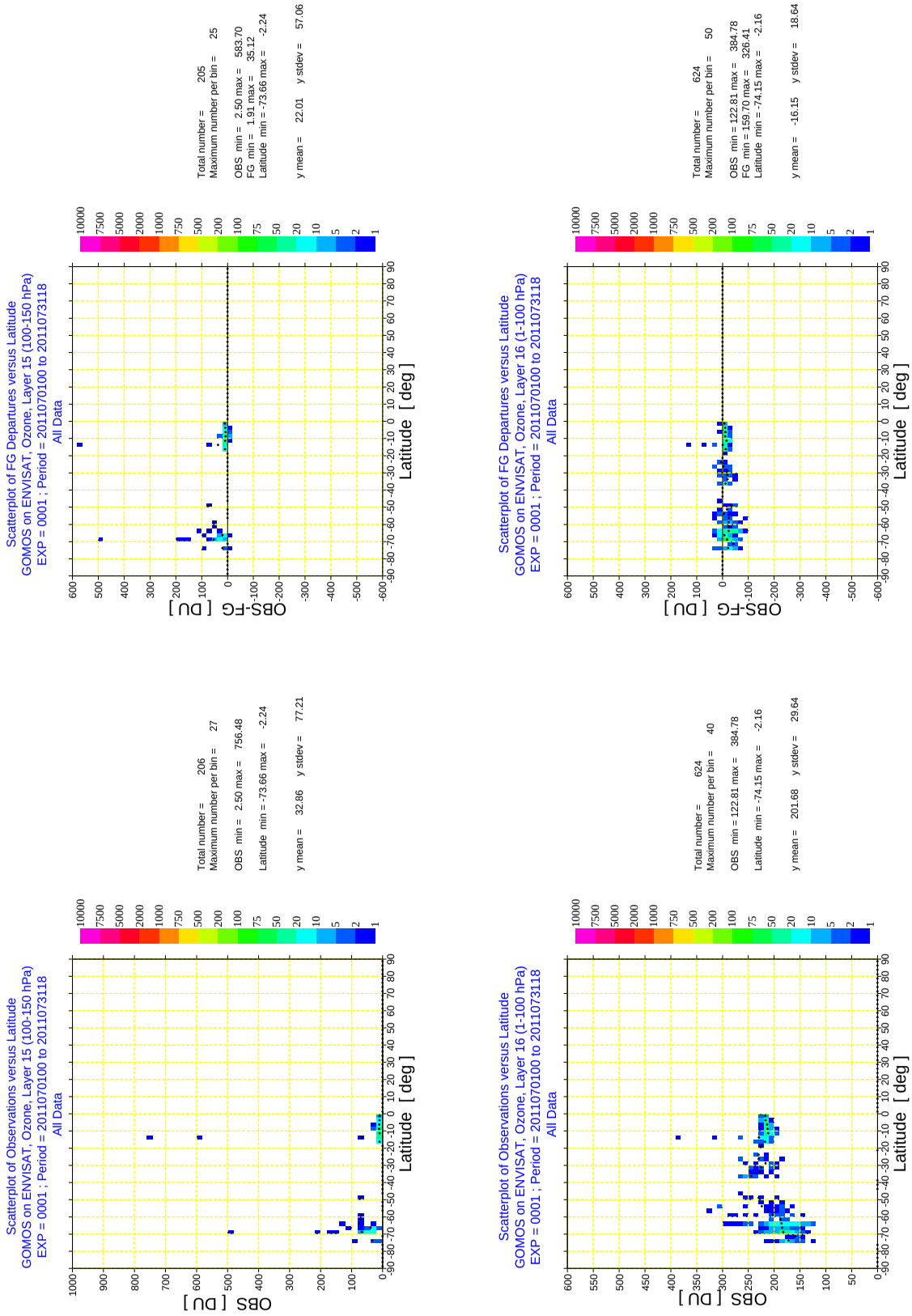


Fig. 14. As Fig. 7 but for layer 15 (100-150 hPa) and layer 16 (1-100 hPa).

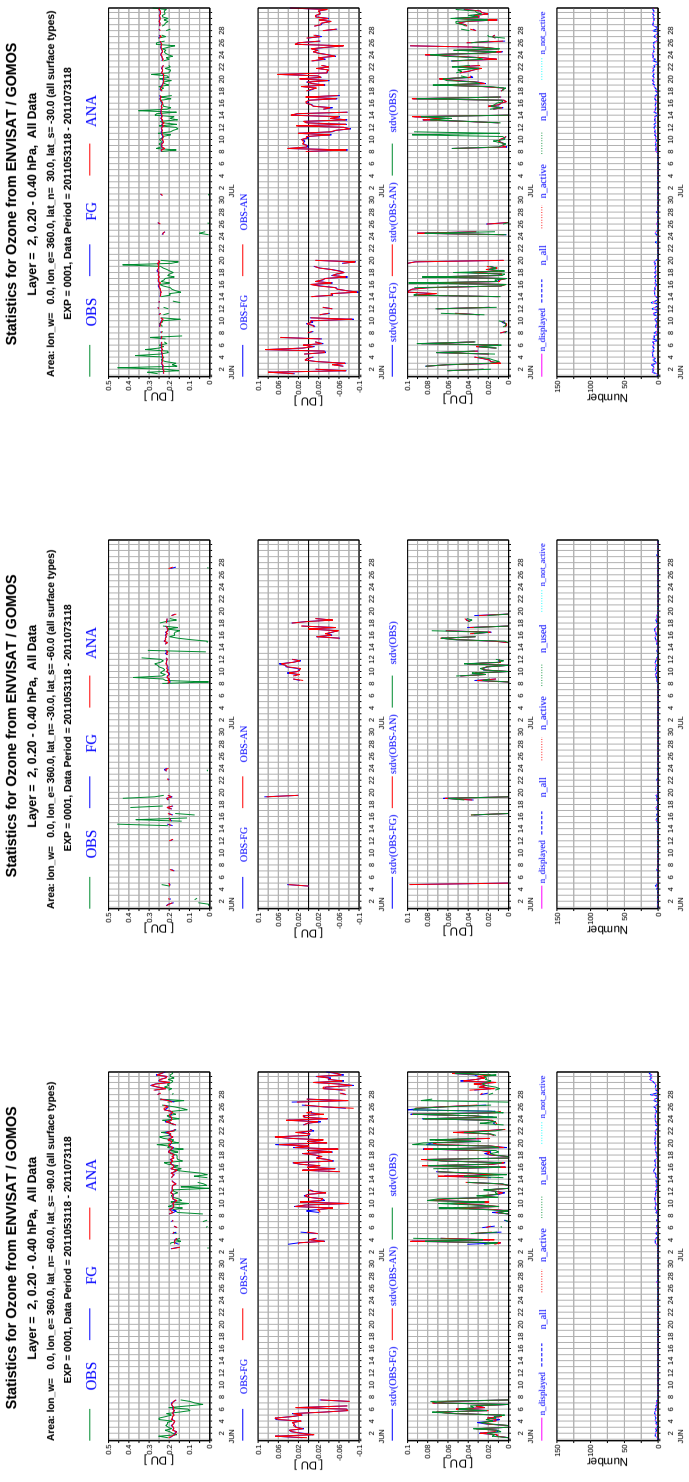


Fig. 15. Timeseries of mean ENVISAT GOMOS NRT ozone data, first guess and analysis values (top panels), first-guess and analysis departures (second panels), standard deviations (third panels) and number of data (bottom panels) per 6-hour cycle for layer 2 (0.2-0.4 hPa) 30N-30S, 30-60S, and 60-90S for the period June-July 2011.

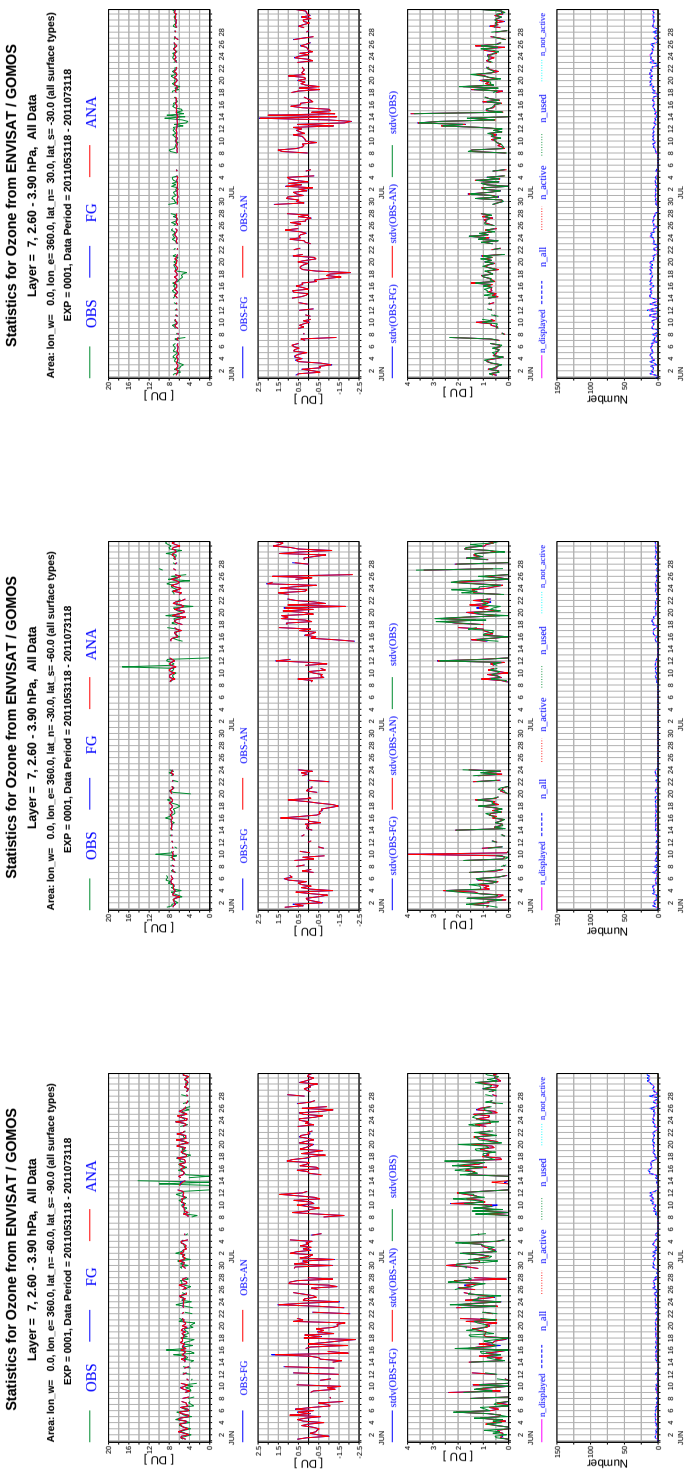


Fig. 16. As Figure 15, but for layer 7 (2.6-3.9 hPa).

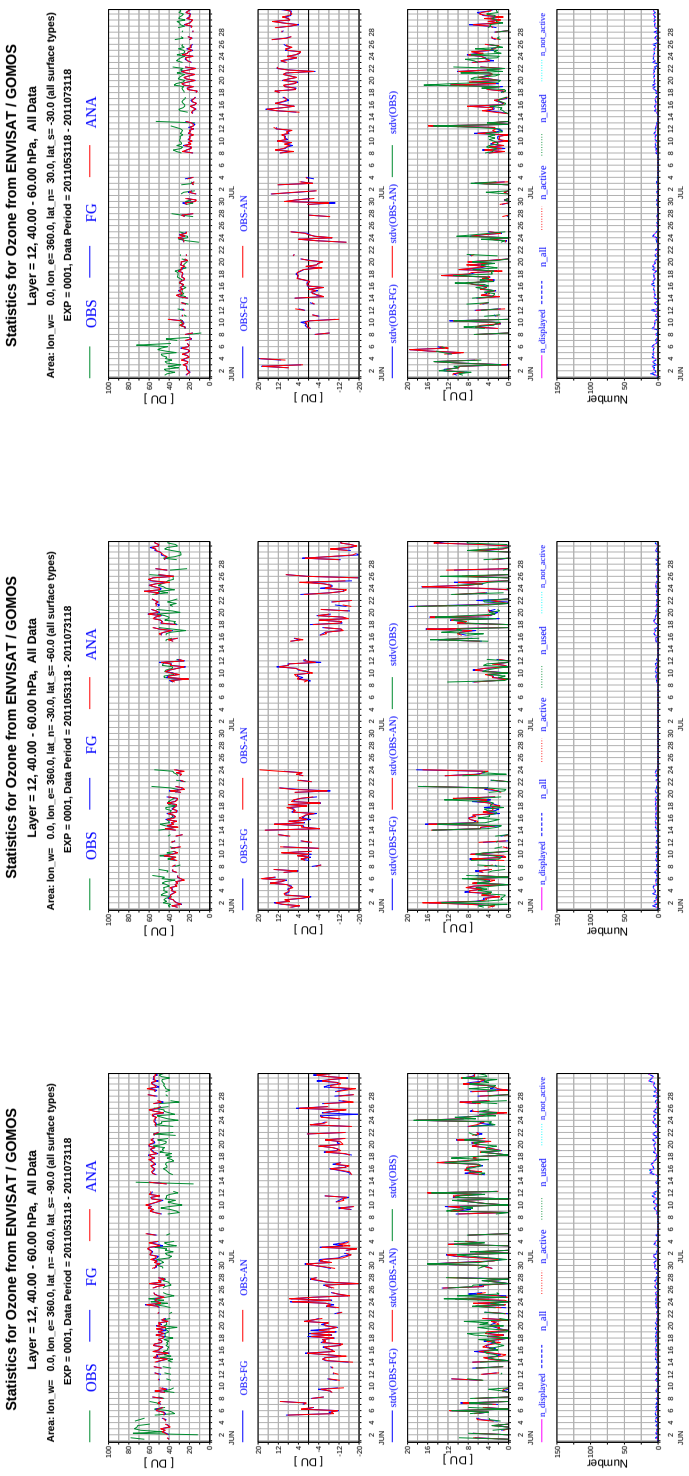


Fig. 17. As Figure 15, but for layer 12 (40-80 hPa).

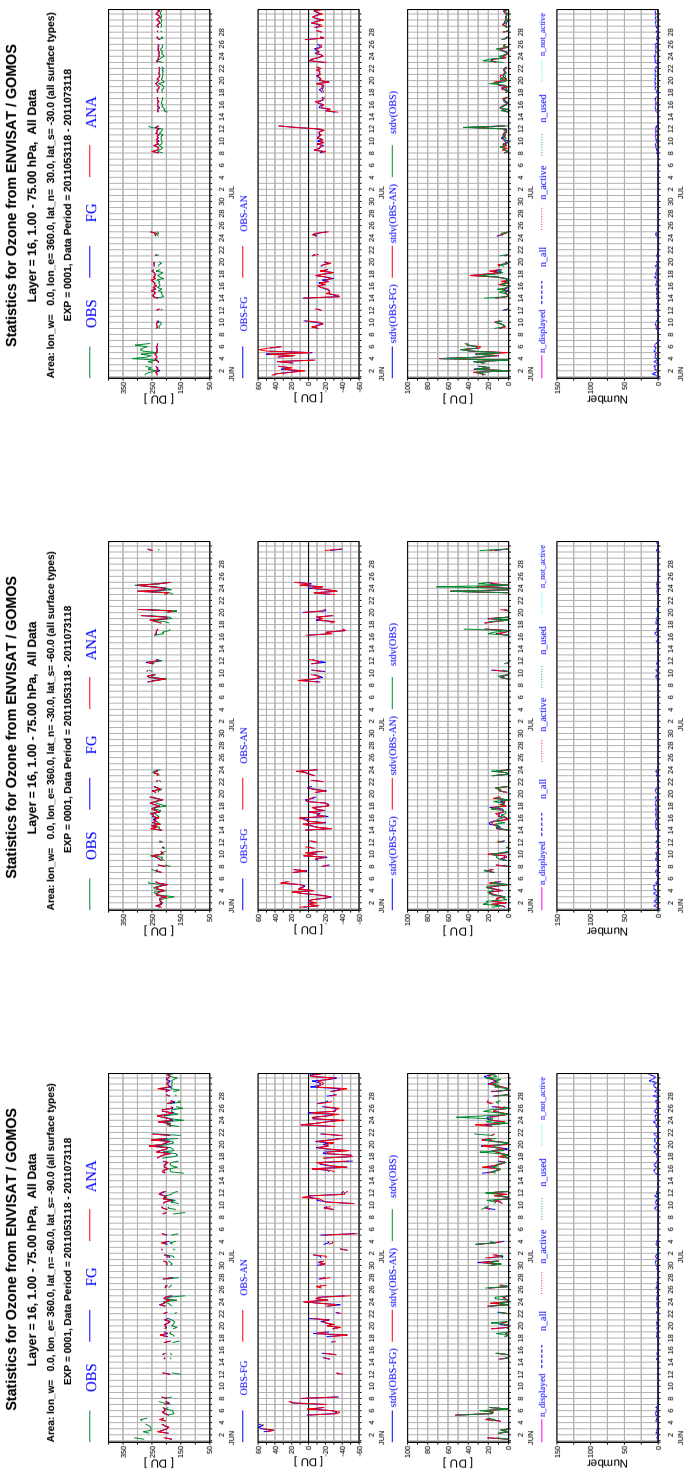


Fig. 18. As Figure 15, but for layer 16 (1-100 hPa).

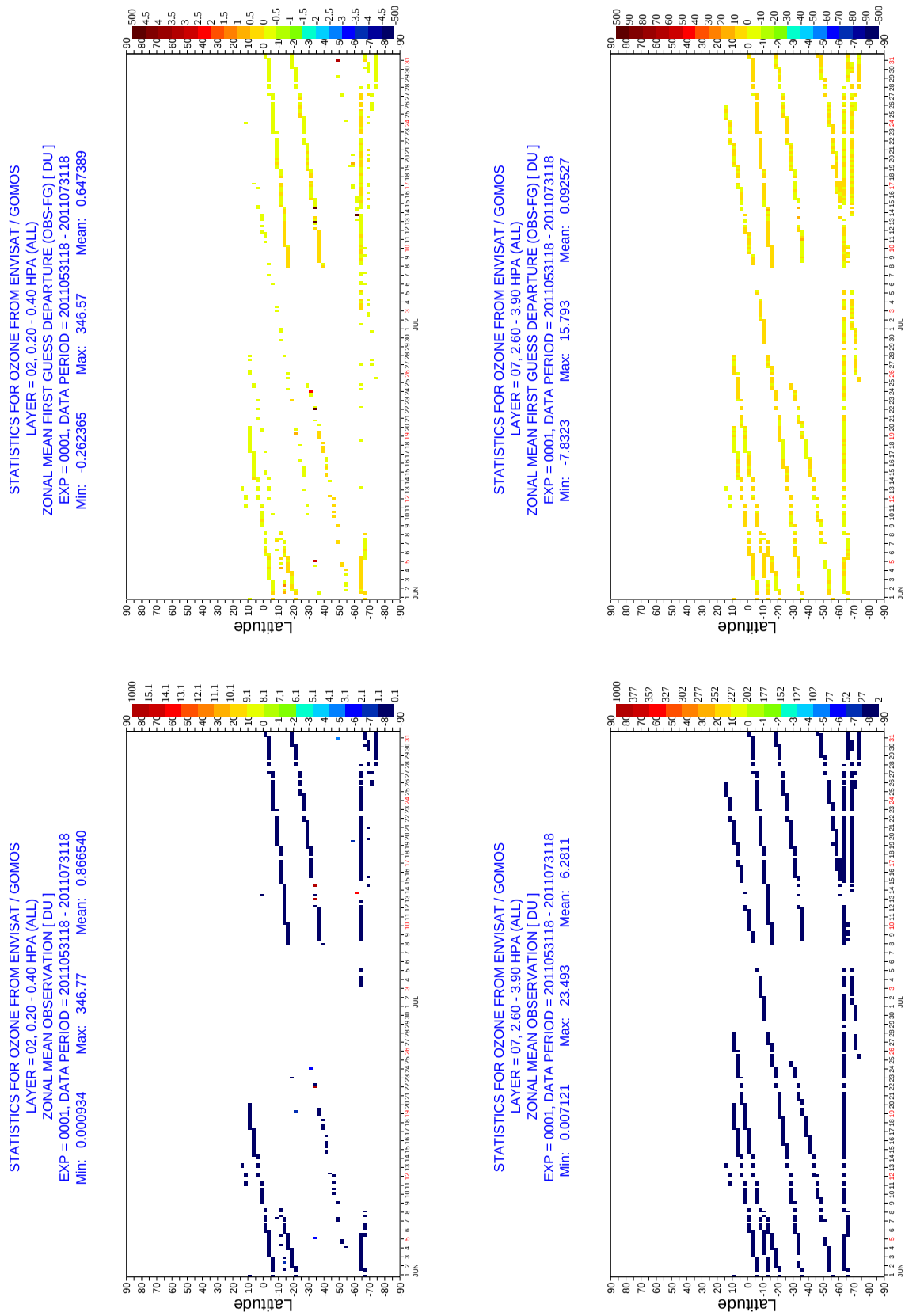


Fig. 19. Hovmoeller diagram of zonal mean ENVISAT GOMOS NRT ozone data per 6-hour cycle for June-July 2011 and of the zonal mean first-guess departures for layer 2 (0.2-0.4 hPa) and layer 7 (2.6-3.9 hPa).

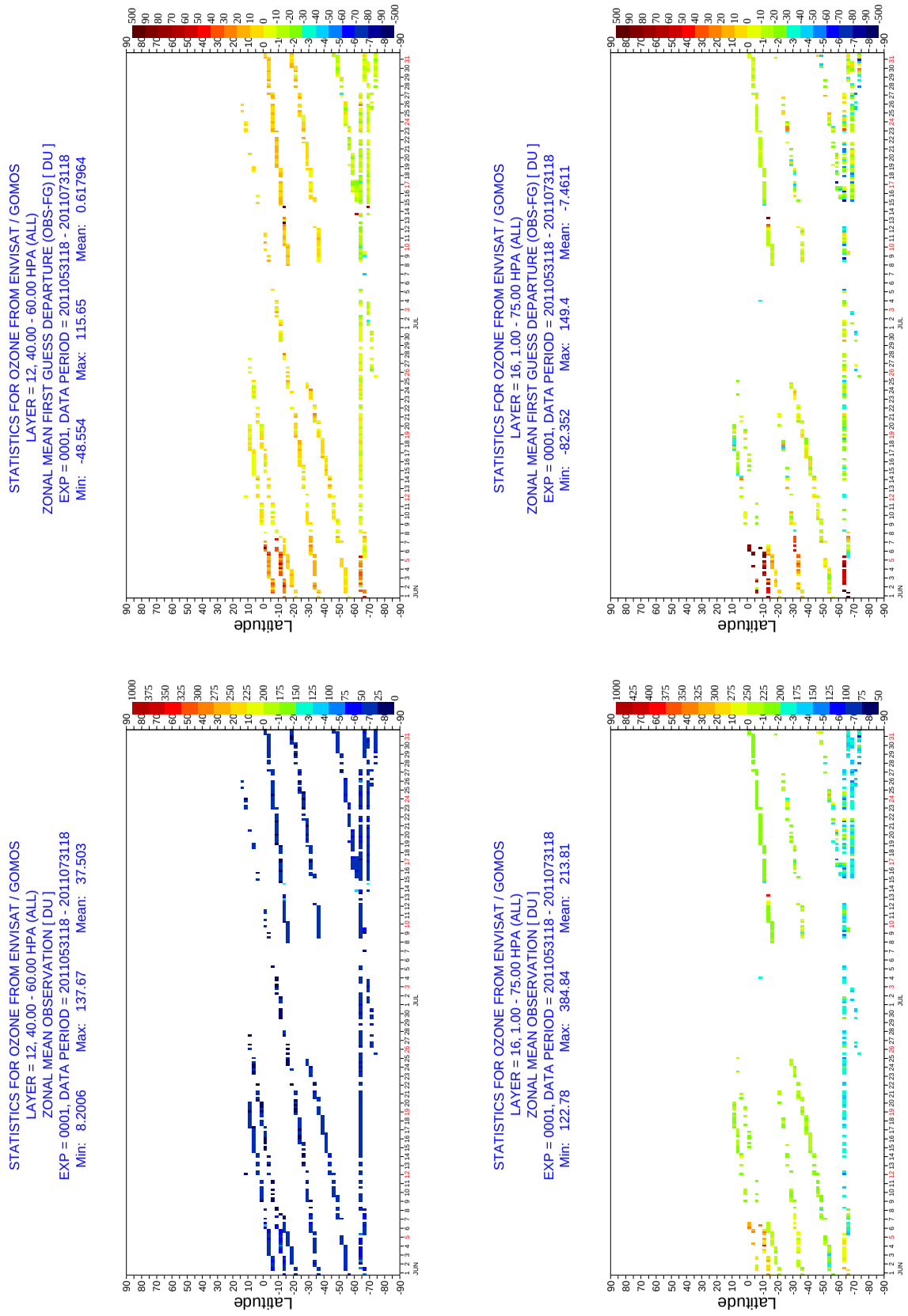


Fig. 20. As Fig. 19 but for layer 12 (40-60 hPa) and layer 16 (1-100 hPa).

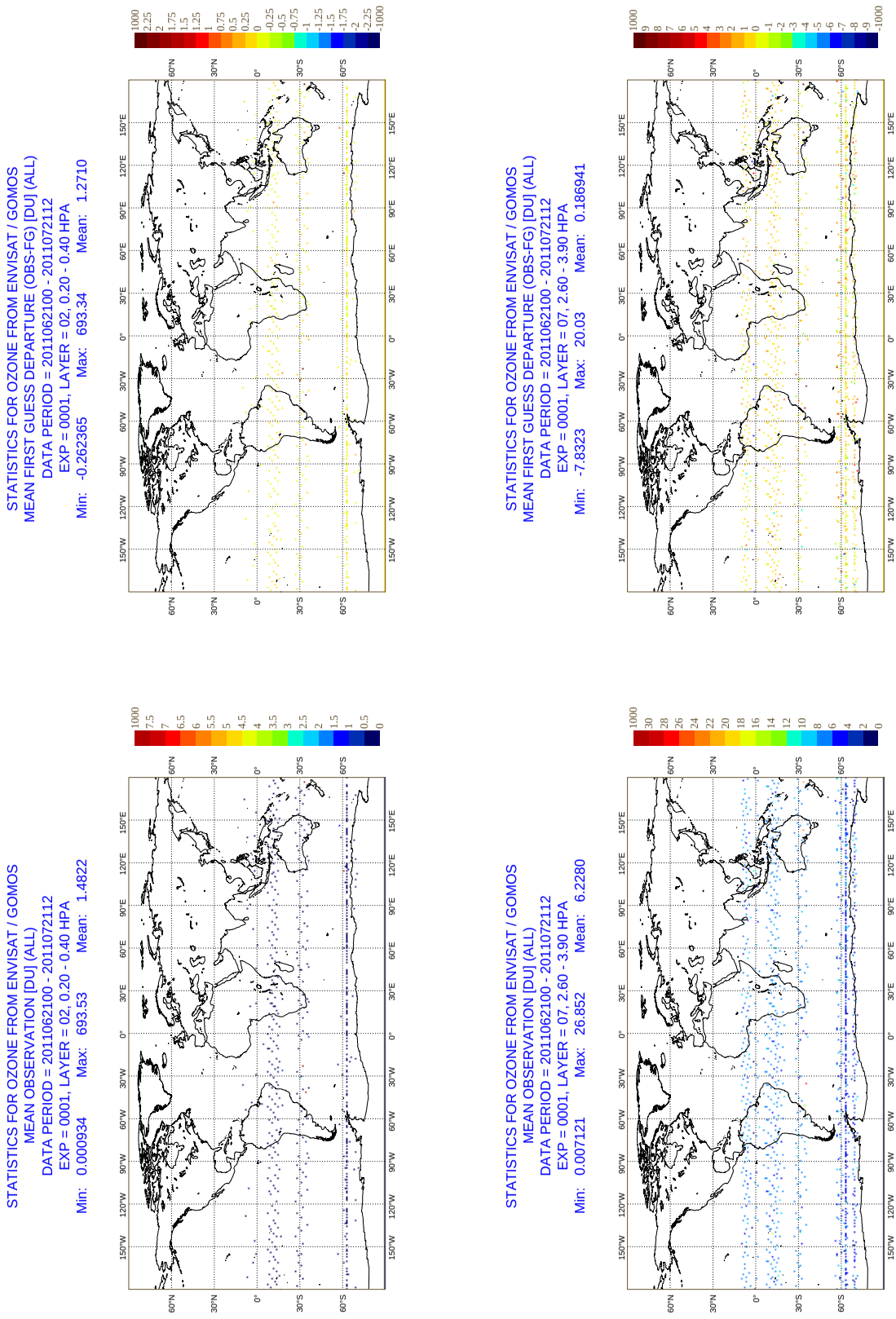


Fig. 21. Geographical distribution of mean ENVISAT GOMOS NRT ozone data and mean first-guess departures for July 2011 for layer 2 (0.2-0.4 hPa) and layer 7 (2.6-3.9 hPa).

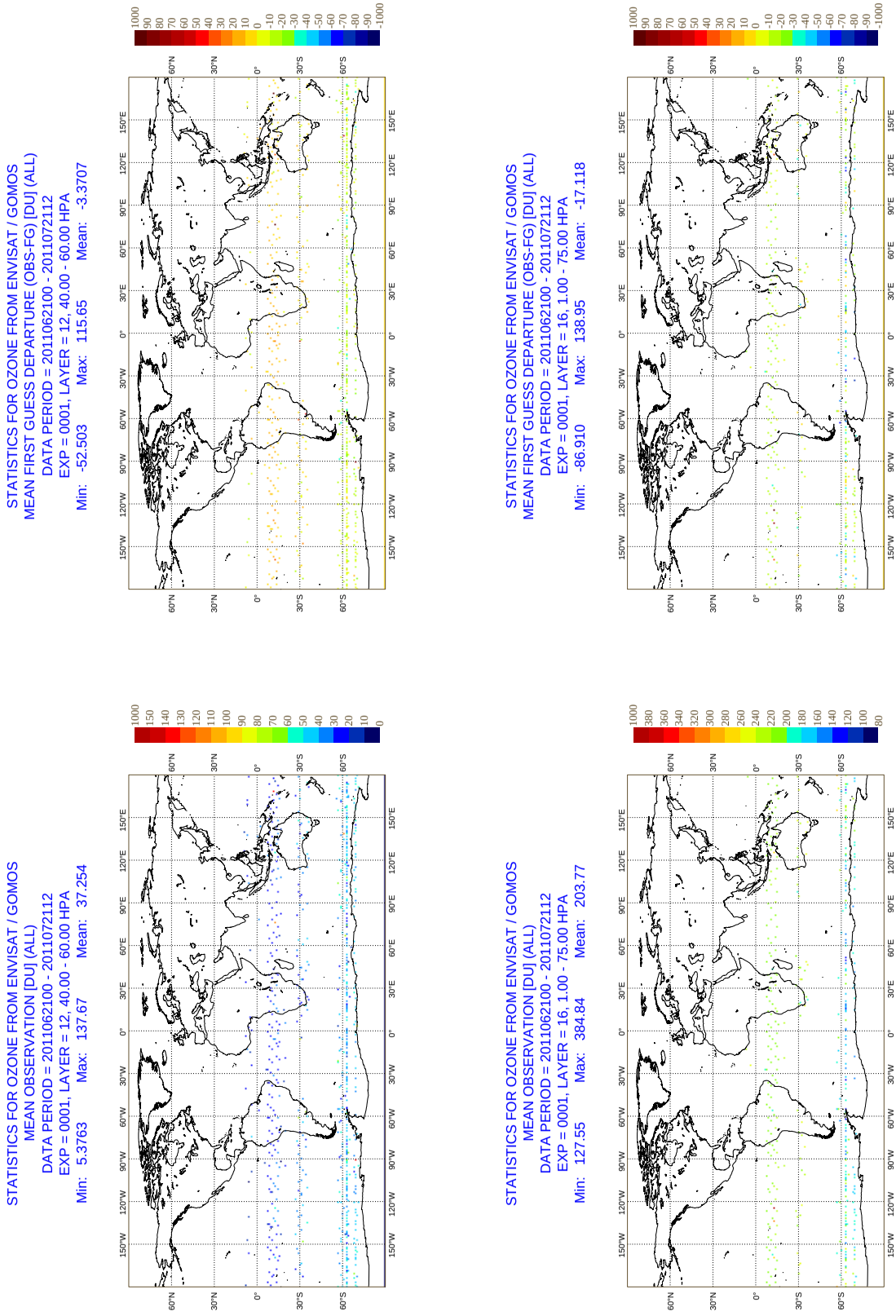


Fig. 22. As Fig. 21 but for layer 12 (40-60 hPa) and layer 16 (1-100 hPa).

REPORT ABOUT ENVISAT GOMOS NRT WATER VAPOUR DATA (GOM_RR_2P) FOR JULY 2011

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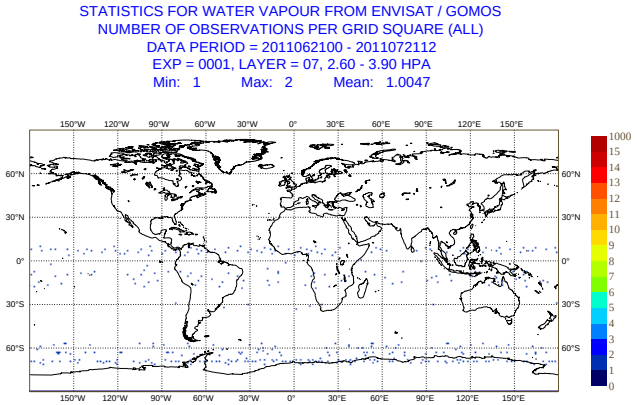

Fig. 1. Geographical distribution of mean number of ENVISAT GOMOS NRT water vapour data for level 7 (2.6-3.9 hPa) for July 2011.

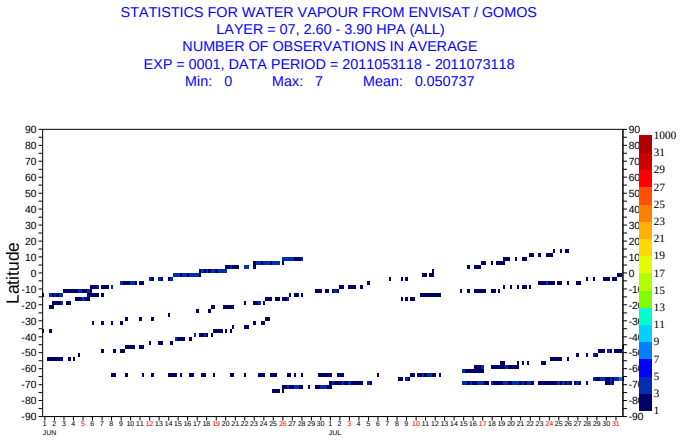

Fig. 2. Hovmoeller diagram of zonal mean number of data of ENVISAT GOMOS NRT water vapour data per 6-hour cycle for level 7 (2.6-3.9 hPa) for June-July 2011.

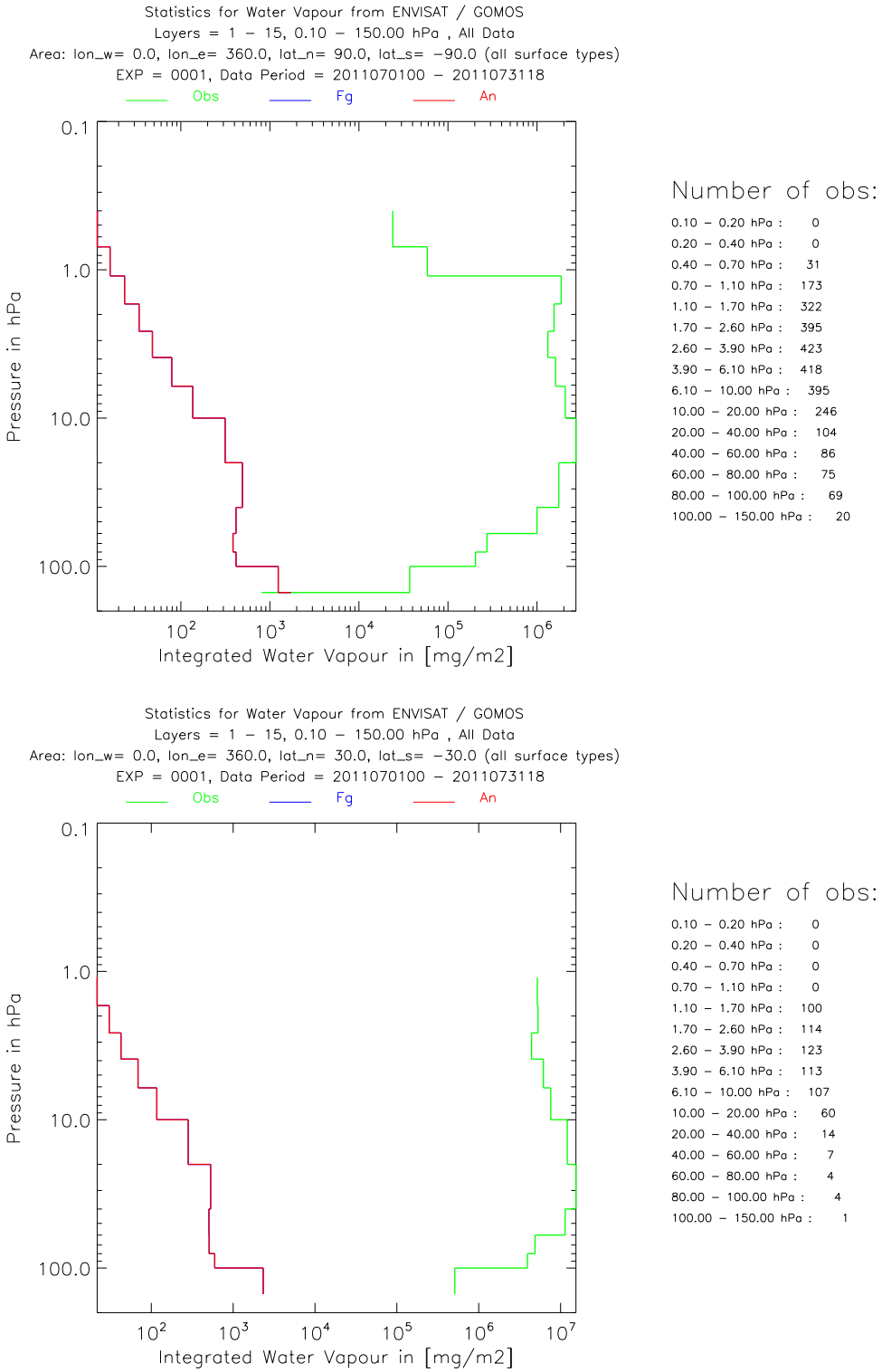

Fig. 3. Time mean vertical distribution of ENVISAT GOMOS NRT water vapour data in mg/m^2 for July 2011. The top plot shows the mean analysis values (red), the mean first-guess (blue), the mean observation (green) globally averaged. The bottom plot shows a similar plot for the tropics (30N-30S). Plotted are the partial columns for the 16 levels listed to the right of the diagrams.

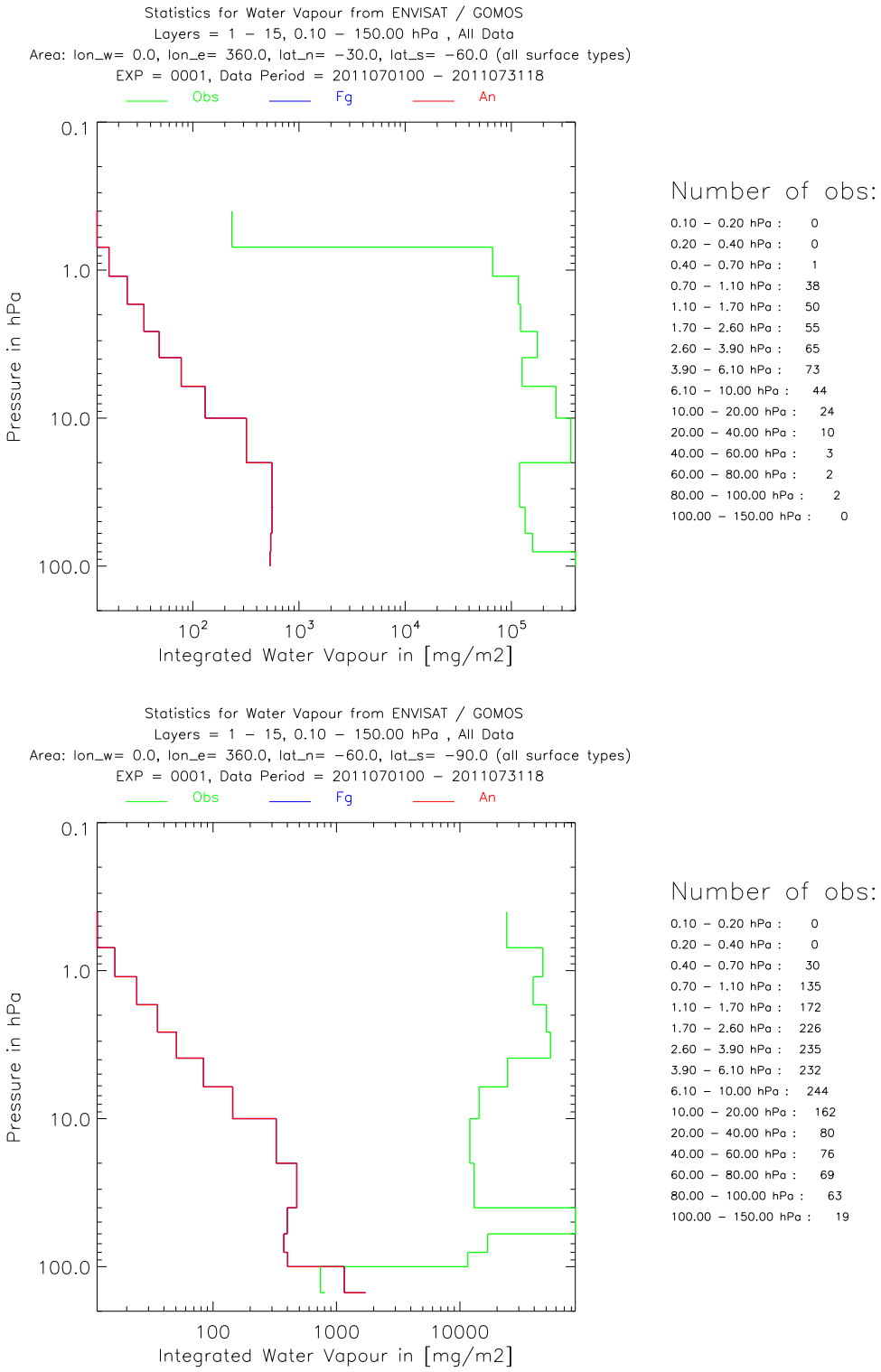

Fig. 4. As Fig. 3 but for the latitudinal band 30-60S (top panel) and 60-90S (bottom panel).

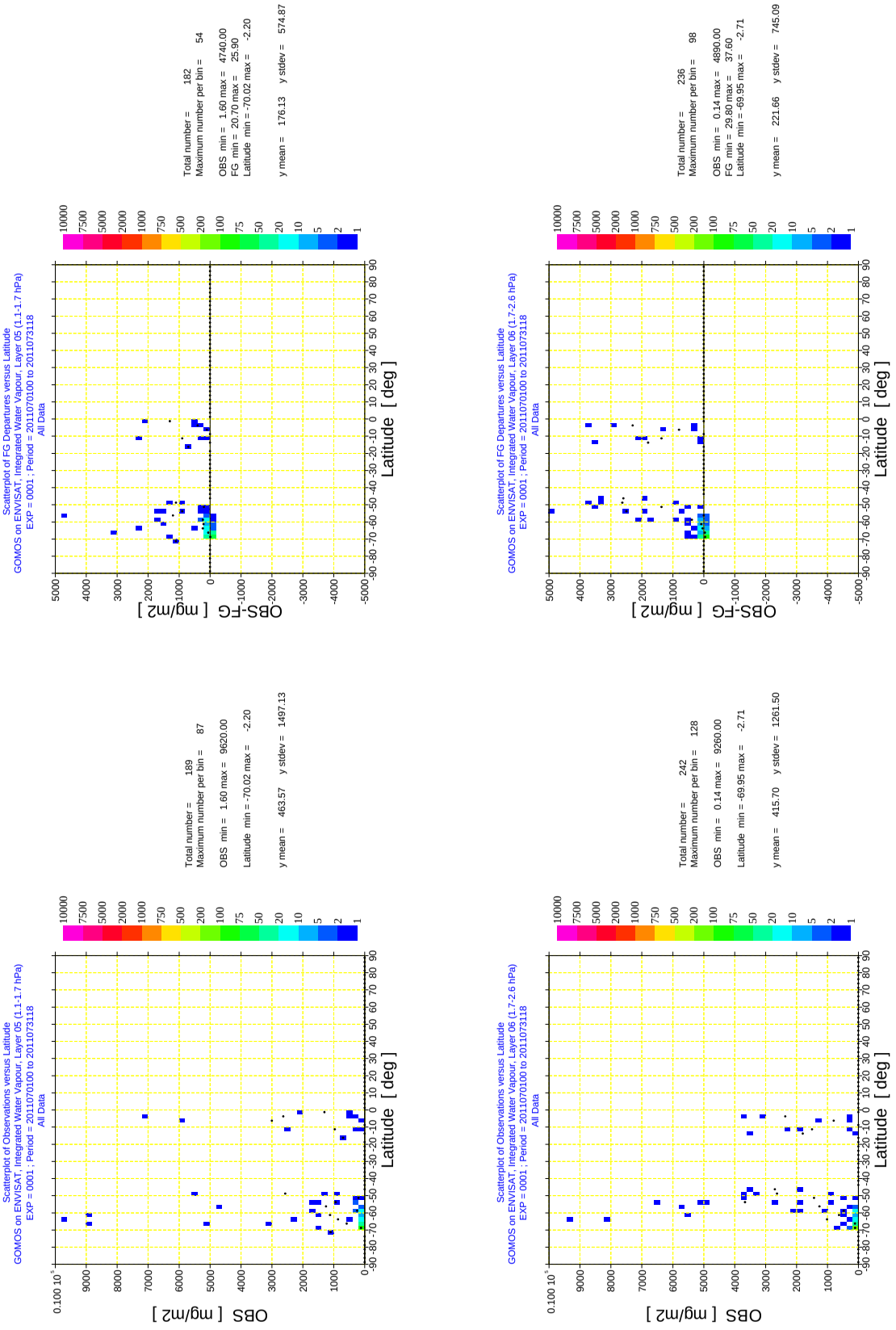

Fig. 5. Scatter plot of ENVISAT GOMOS NRT water vapour data against latitude (left) and scatter plot of first-guess departures of ENVISAT GOMOS NRT water vapour data against latitude (right) for July 2011 for level 5 (1.1 hPa) and level 6 (1.7 hPa). The colours show the number of data per bin, and the black dots the mean value per bin.

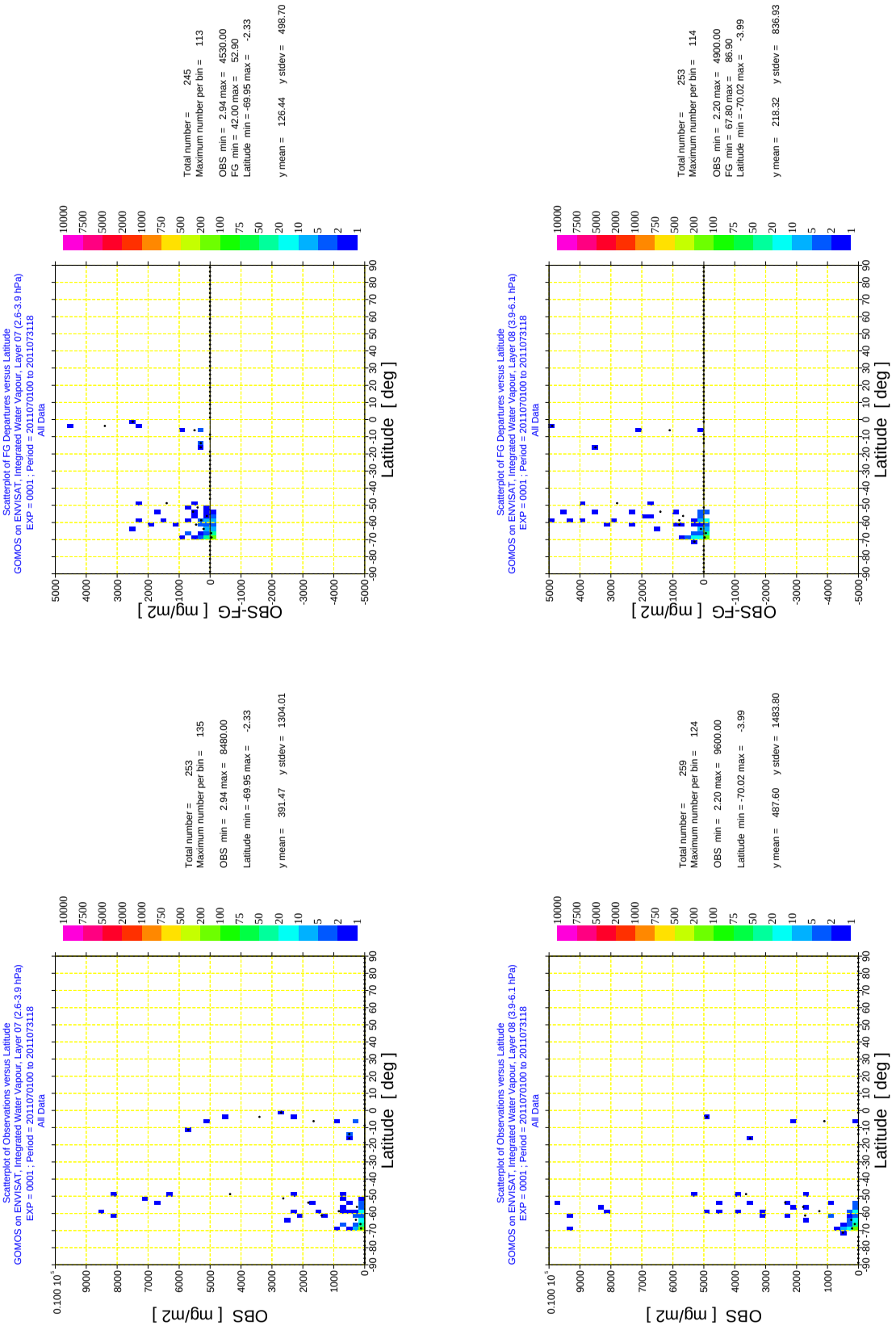

Fig. 6. As Fig. 5 but for level 7 (2.6 hPa) and level 8 (3.9 hPa).

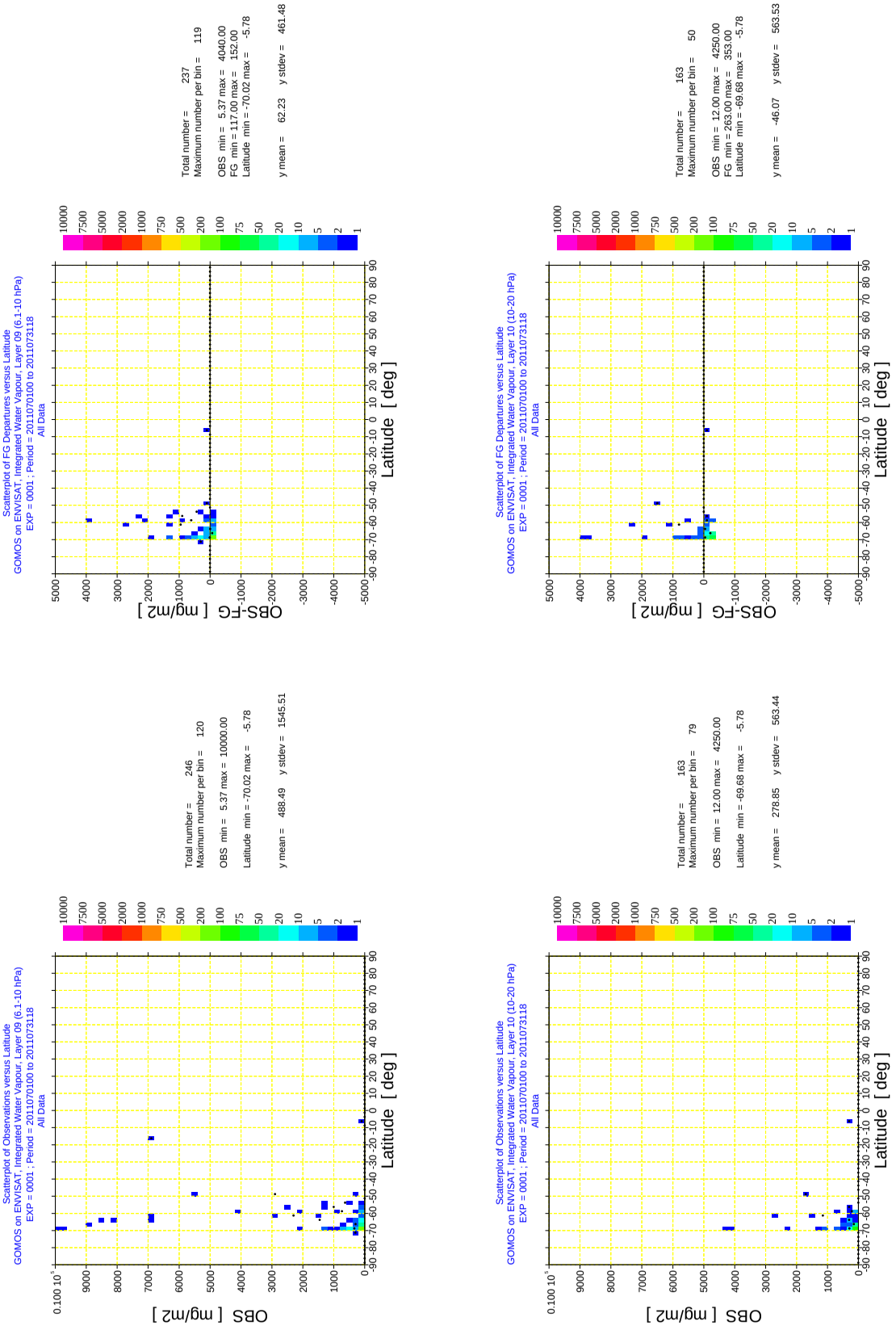

Fig. 7. As Fig. 5 but for level 9 (6.1 hPa) and level 10 (10 hPa).

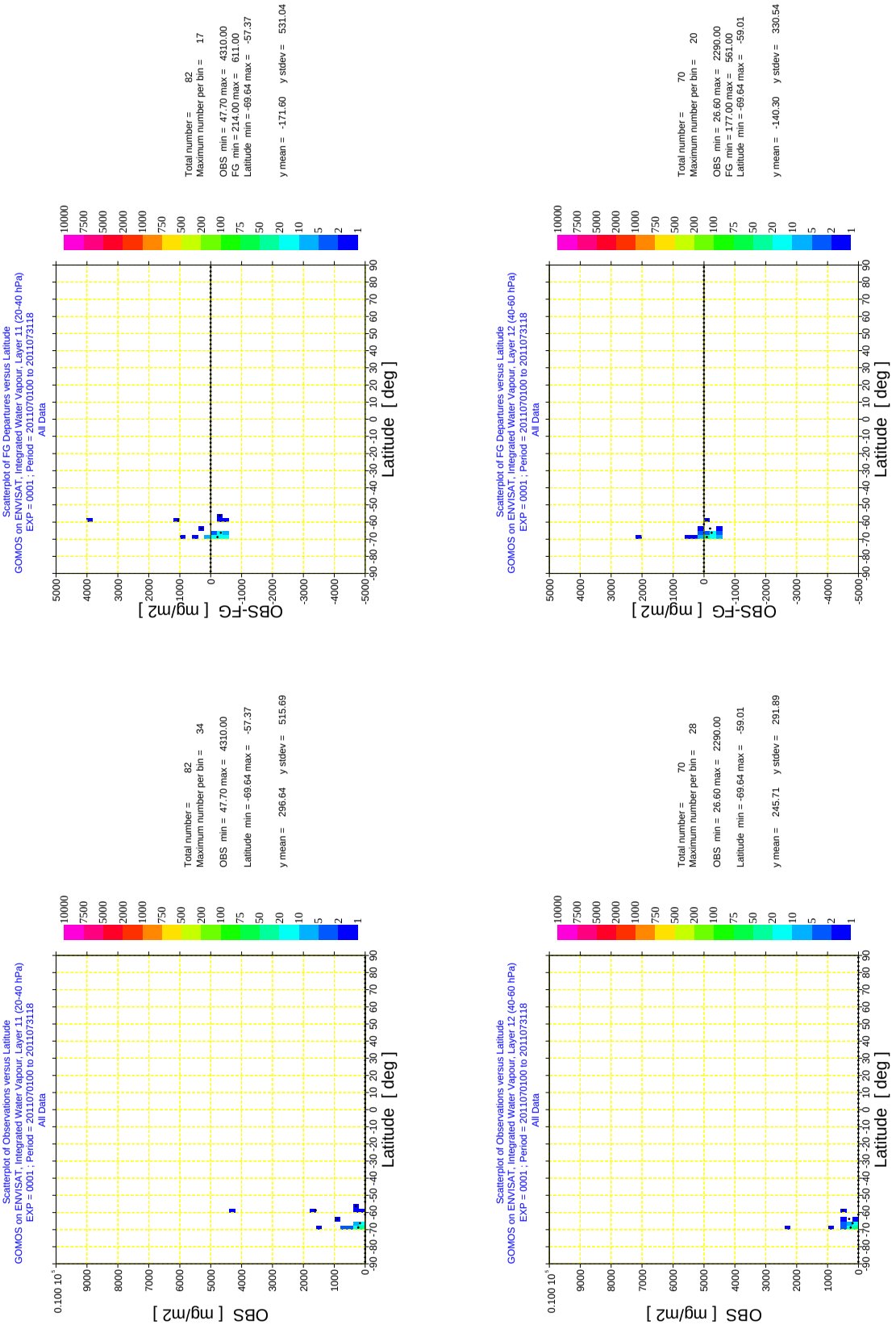

Fig. 8. As Fig. 5 but for level 11 (20-40 hPa) and level 12 (40-60 hPa).

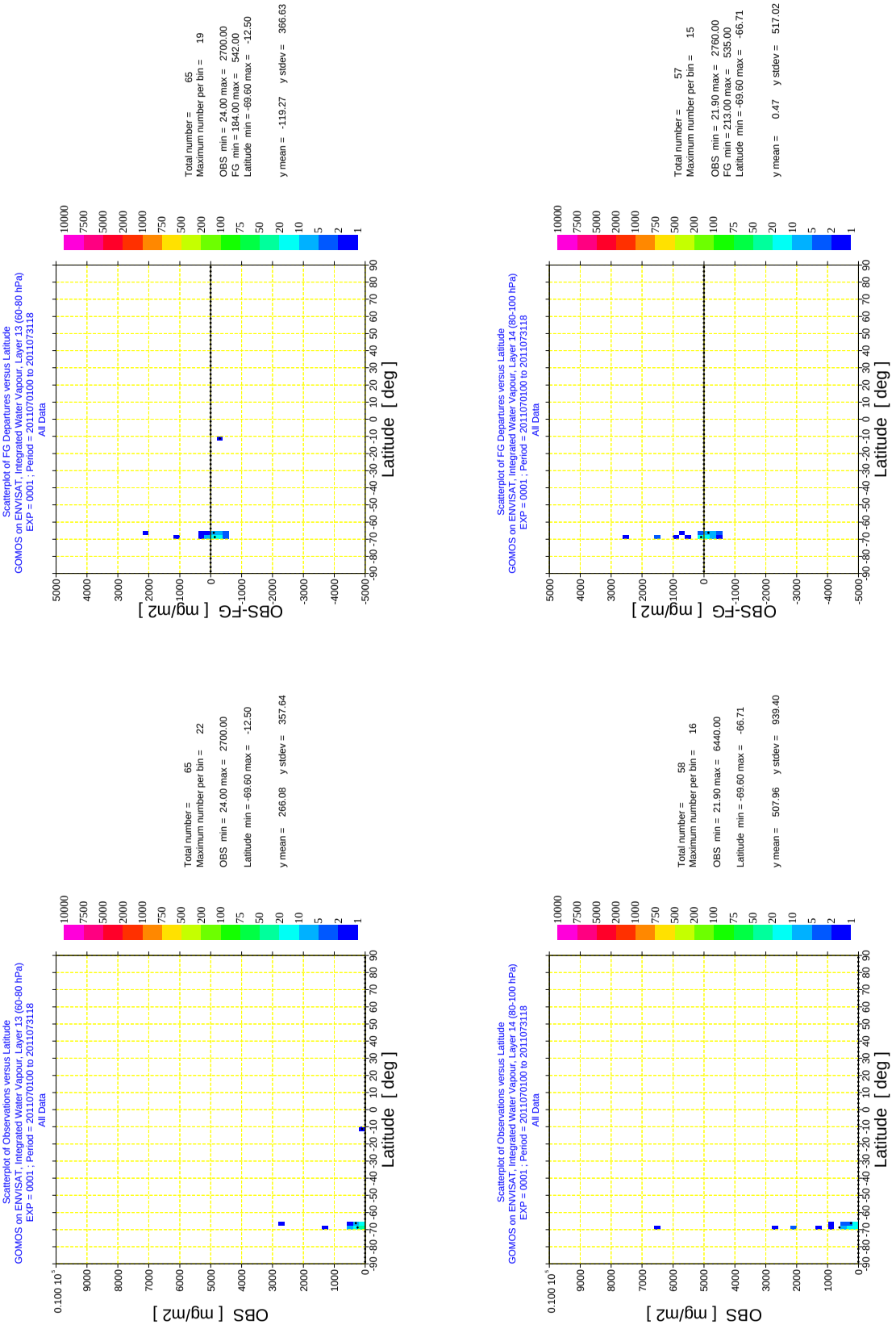

Fig. 9. As Fig. 5 but for level 13 (60-80 hPa) and level 14 (80-100 hPa).