

REPORT ABOUT ENVISAT GOMOS NRT PRODUCTS (GOM_RR_2P) FOR JUNE 2006

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July 7, 2006

1. Key points for June 2006

- The quality of GOMOS temperature and ozone data was found generally stable during June 2006, and comparable with that of May.
- Good agreement was found between GOMOS and ECMWF temperatures.
- GOMOS temperatures were lower than ECMWF temperatures in most of the stratosphere and mesosphere.
- The mean departures between GOMOS temperatures and ECMWF temperatures were less than -1% (about -2K) in all the stratosphere, up to 1hPa. Negative departures down to -2% (about -4K) were found, on global average, in the mesosphere.
- The global mean departures between GOMOS and ECMWF ozone profiles were still found very large, with +50% differences in places, especially in the upper stratosphere and mesosphere.
- Large scatter of GOMOS ozone data was found at all latitudes.
- Scatter plots showed unrealistically low GOMOS ozone values (0 DU) at most vertical levels.
- No water vapour data were available in NRT GOMOS BUFR files.
- The monitoring statistics for June were produced with the operational ECMWF model, CY30R1.

2. Quality and amount of received data

This report covers GOMOS NRT temperature and ozone data for June 2006. Data coverage and amount of received data are shown in figures 1 and 2. Overall, 5667 observations were available (see figure 3 in the attached temperature report), with the largest number of observations available in the mesosphere and upper stratosphere, and only a fraction of them were, instead, available in the lower stratosphere (see figure 3 in the attached temperature report).

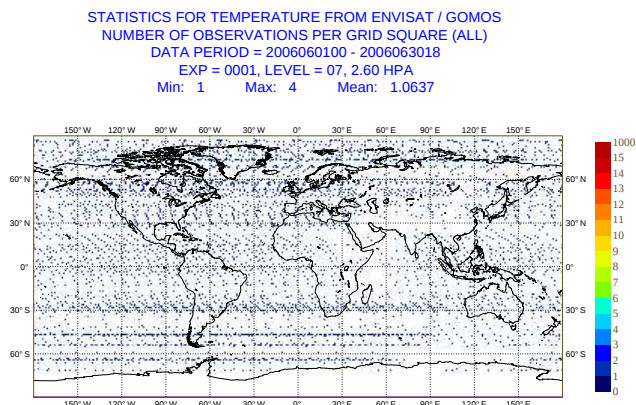


Fig. 1. Geographical distribution of mean number of ENVISAT GOMOS NRT temperature data for level 7 (2.6 hPa) for June 2006.

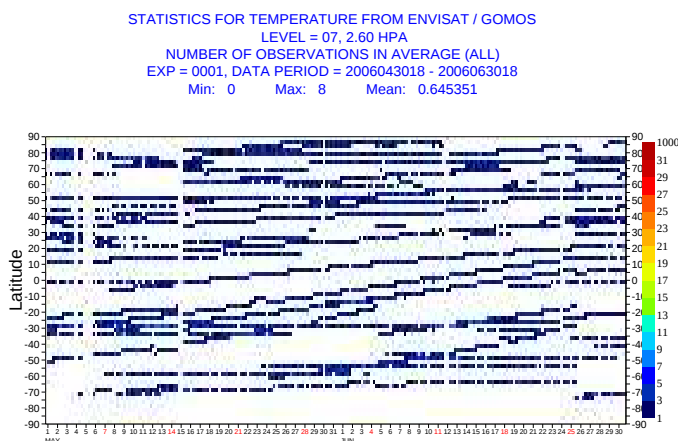


Fig. 2. Hovmoeller diagram of zonal mean number of data of ENVISAT GOMOS NRT temperature data per 6-hour cycle for level 7 (2.6 hPa) for June 2006.

3. GOMOS temperature data

The quality of GOMOS NRT temperature was found generally stable during June 2006.

The profile plots (temperature report: Figures 3-8) showed that, on global average, over most of the stratosphere and mesosphere the averaged GOMOS temperature is lower than that from the ECMWF temperature analyses, with departures of about -1% (about -2K) up to 1hPa, and within 0 and -2% (about -4K) higher up. The GOMOS temperature were found to be lower than the ECMWF temperature analyses at all latitudinal bands and at all levels (temperature report: Figures 3-8).

The scatter plots (temperature report: Figures 9-16) show the behaviour of the GOMOS temperatures and the departures at several levels more clearly. The scatter plots of the first-guess departures were, usually, within $\pm 4K$ in the stratosphere (below 2.6hPa) and in the troposphere. Larger scatter in the first guess departures were found above 2.6hPa, as a consequence of noisier observations as well as noisier first guess. We note also that the results presented here accounted for all star illumination conditions. No information is yet available to filter the observations according to the star illumination.

The Hovmoeller plots and the timeseries of GOMOS temperatures and departures at several levels are shown in Figures 17, 18, 21-24 of the temperature report, respectively. In the reporting period, the quality of the GOMOS temperature data was found stable at most latitudes, and at most vertical levels in the lower and mid stratosphere, compared with that in May.

4. GOMOS ozone data

The quality of GOMOS NRT ozone was found generally stable during June 2006, with the monitoring statistics still exhibiting large departures between observed and first guess ozone.

The profile plots (ozone report: Figures 3-8) showed that large differences between the GOMOS ozone data and the ECMWF analysis can still be found at most levels. In the period under consideration, the first guess departures are on global average positive (i.e. GOMOS observations have higher values than the ECMWF ozone analyses) at all vertical levels, with percentage values within +5 and +40% in the stratosphere and lower mesosphere. Even larger biases (larger than 50%) were found in the upper mesosphere.

When averaging over latitudinal bands, the global average picture is generally confirmed. The first guess departures exhibited large values (larger than 50% in places) at most levels in the troposphere, upper stratosphere and mesosphere and at all latitudinal bands. Particularly large biases (larger than 50%) were found at all levels at high latitudes in the Southern hemisphere.

The standard deviations of the departures and of the GOMOS ozone data were also large (much larger than 50%) at all vertical levels, indicative of large noise in the data.

The scatter plots (ozone report: Figures 9-16) confirm that there is a very large scatter in the GOMOS ozone data at all vertical levels and at all latitudes, which lead to large scatter in the first guess departures. The plots also show unrealistically low (around 0 DU) GOMOS ozone values at most vertical levels.

The timeseries of GOMOS ozone and departures at several levels and the Hovmoeller plots are shown in Figures 17-20, and 21-22 of the ozone report, respectively. Neither the timeseries nor the Hovmoeller plots exhibit in June a behaviour different from that seen in May, and they generally confirm the large biases between observations and first guess.

5. Water vapour data

There were no valid water vapour data in the GOMOS BUFR files. The water vapour entries were set to missing values.

6. 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 were actively assimilated.

All ozone values are in Dobson Units (DU), and temperatures in K. As said above, no information is yet available on star illumination condition in the BUFR files. Hence it is not possible to filter GOMOS observations based on this criterion. The results presented in this reports made use of all the observations available in the BUFR files.

REPORT ABOUT ENVISAT GOMOS NRT OZONE DATA (GOM_RR_2P) FOR JUNE 2006

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July 7, 2006

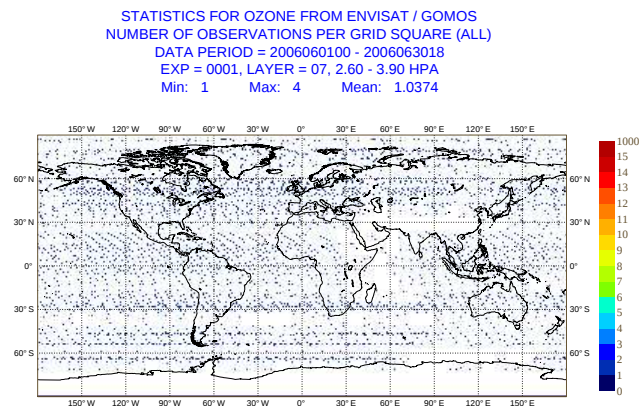


Fig. 1. Geographical distribution of mean number of ENVISAT GOMOS NRT ozone data for layer 7 (2.60-3.90 hPa) for June 2006.

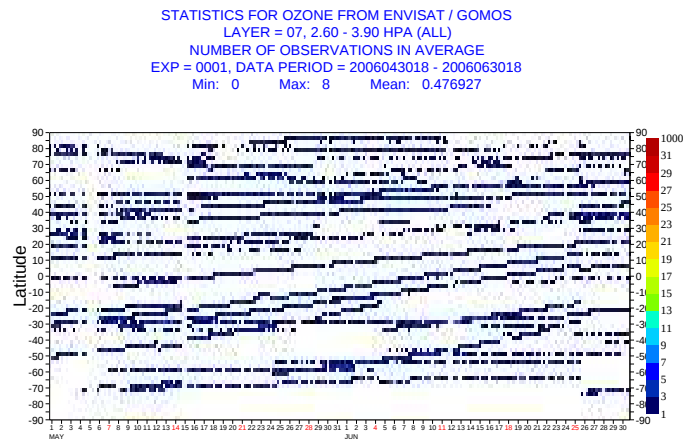


Fig. 2. Hovmoeller diagram of zonal mean number of data of ENVISAT GOMOS NRT ozone data per 6-hour cycle for layer 7 (2.60-3.90 hPa) for June 2006.

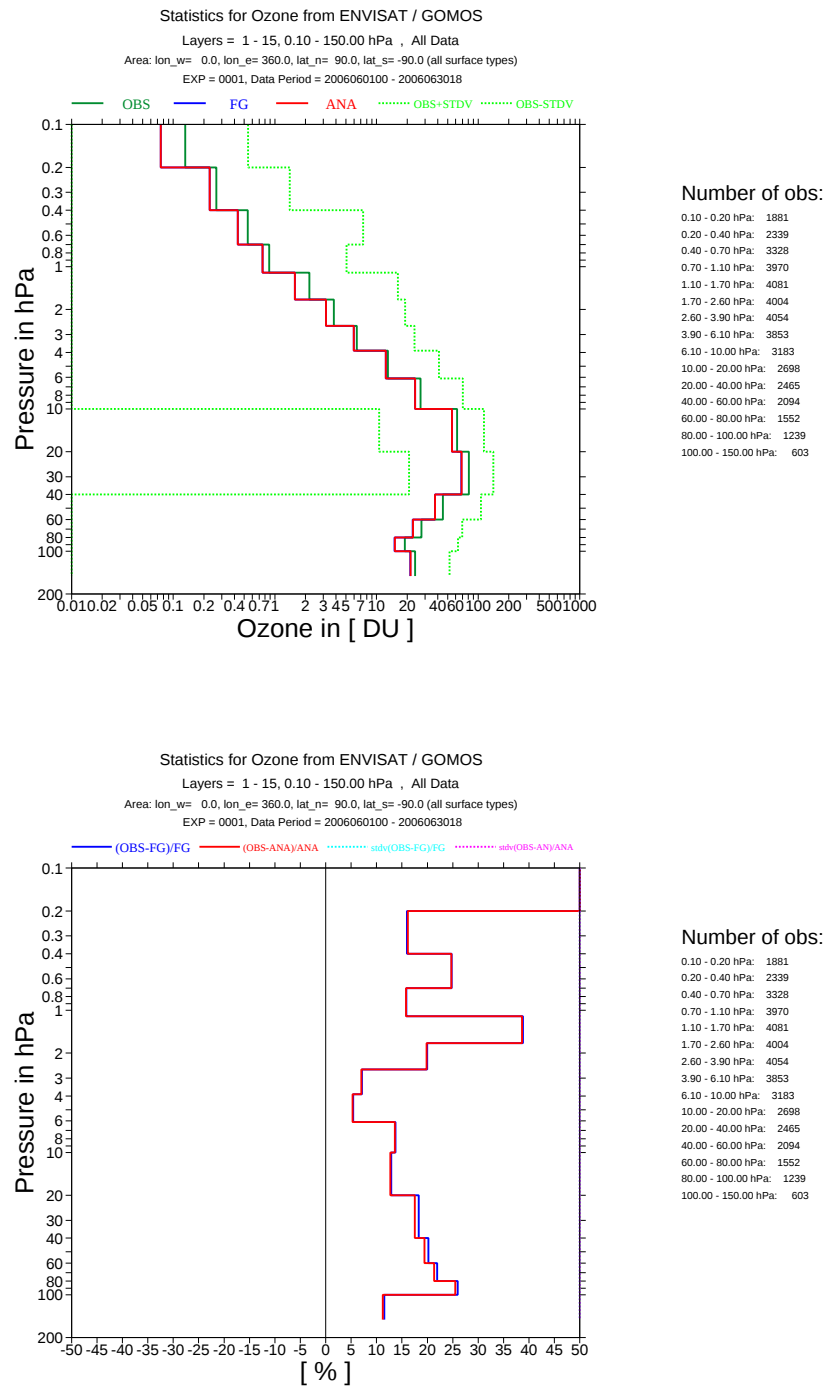


Fig. 3. Time mean vertical distribution of ENVISAT GOMOS NRT ozone data in DU for June 2006 (global mean). The top plot shows the mean analysis values (red), the mean first-guess (blue), the mean observation (red), and the mean observation (green) $\pm$ 1 standard deviation (green dotted lines). The bottom plot shows the departures and the standard deviation of the departures in the partial columns for the 15 layers listed to the right of the diagrams.

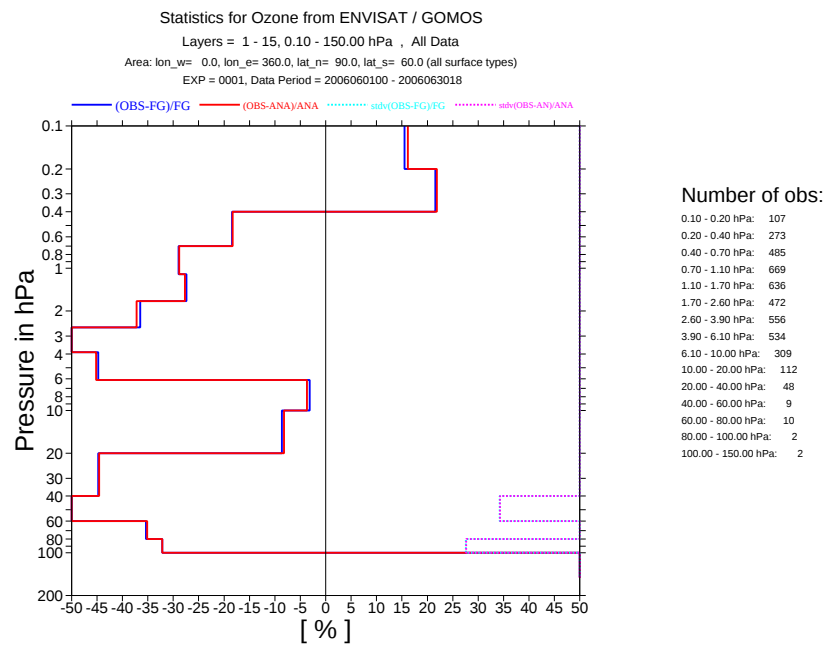
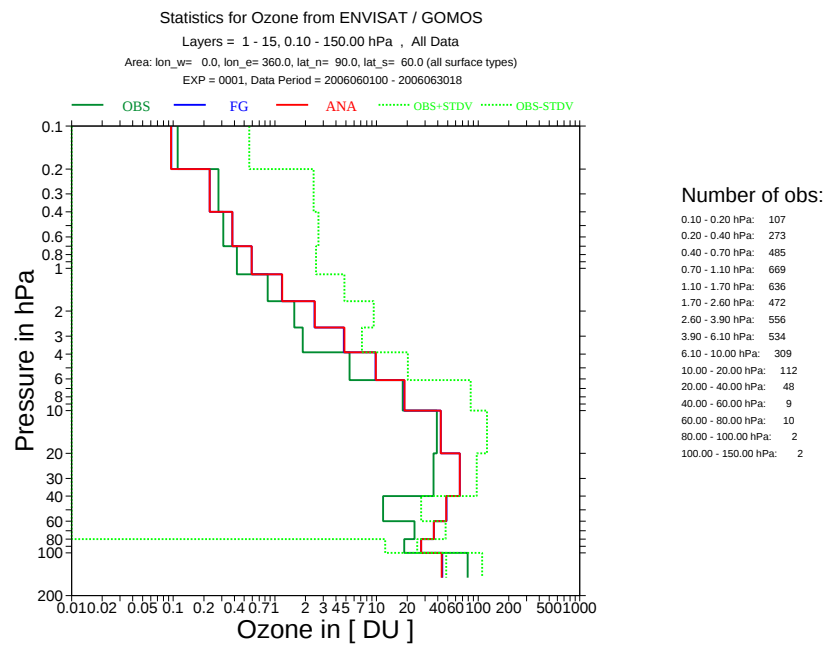


Fig. 4. As Fig. 3 but for 90N-60N.

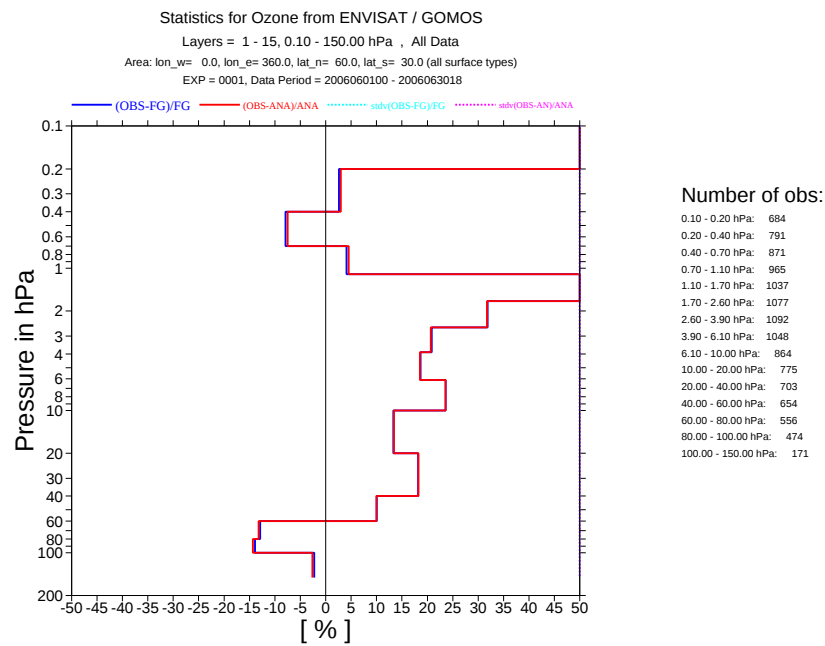
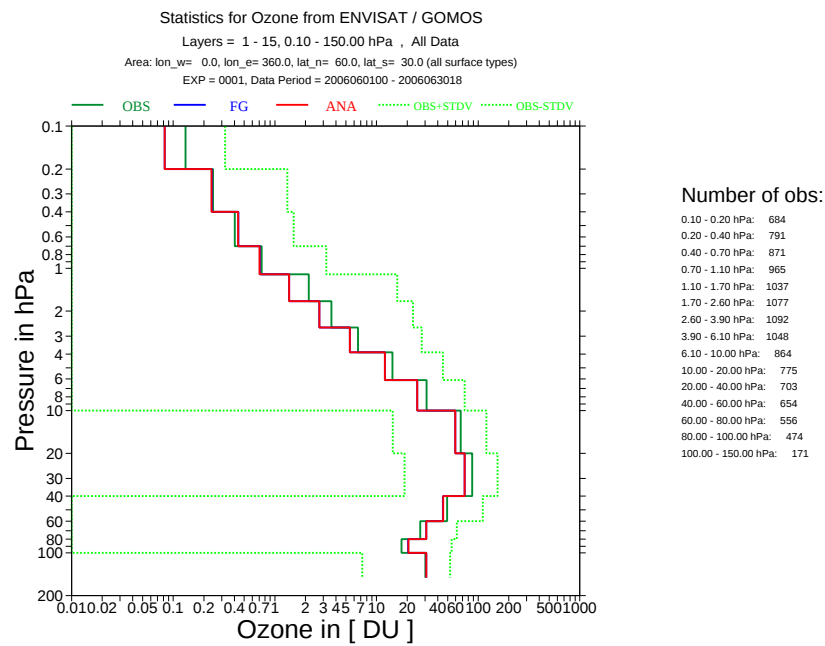


Fig. 5. As Fig. 3 but for 60-30N.

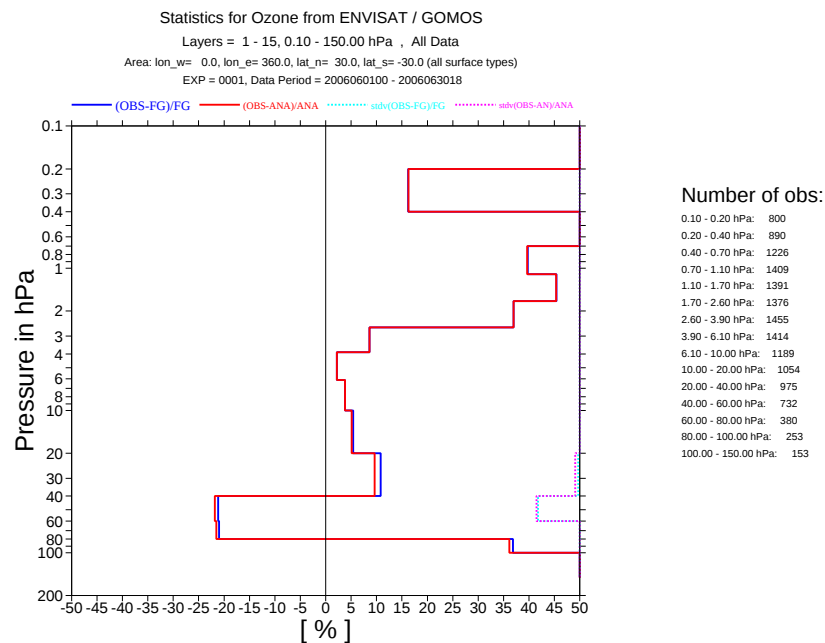
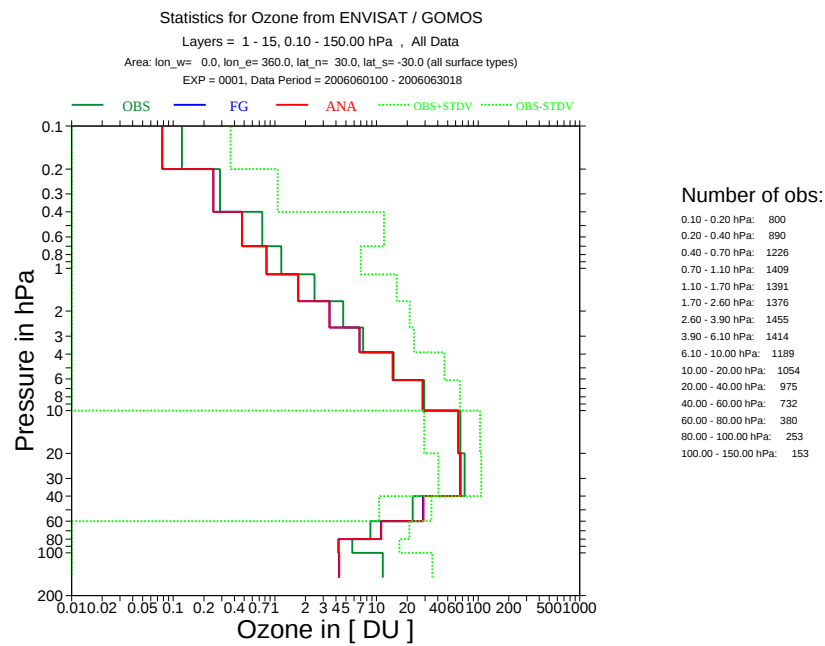


Fig. 6. As Fig. 3 but for 30N-30S.

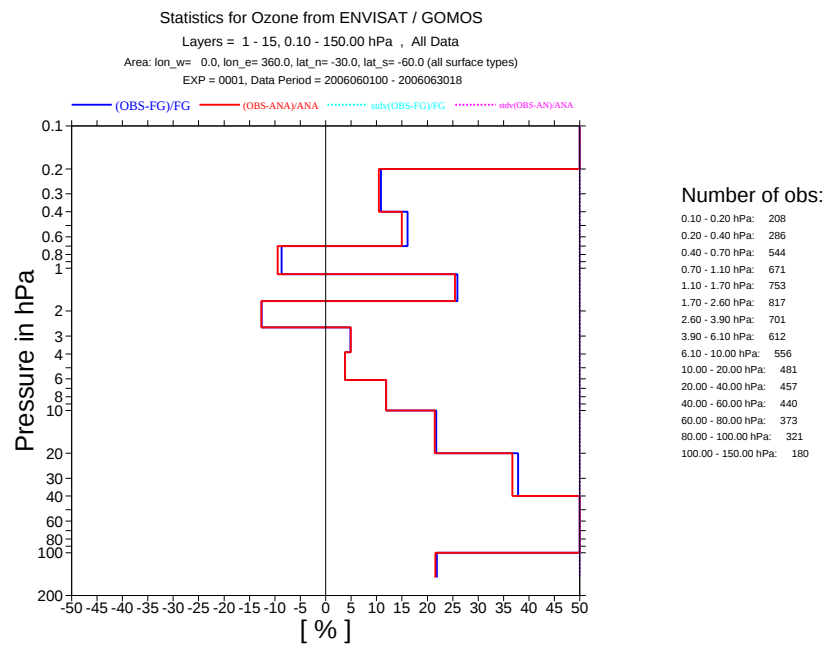
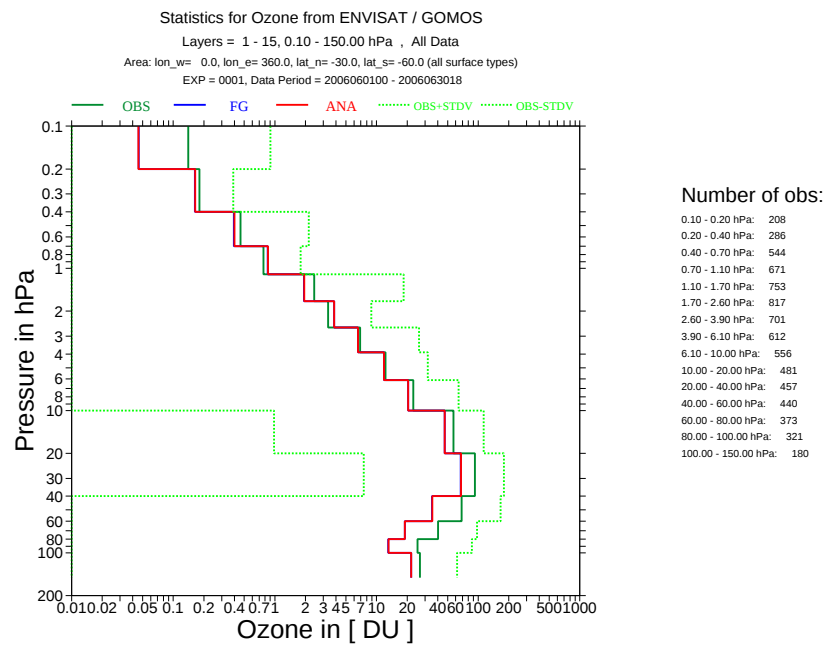


Fig. 7. As Fig. 3 but for 30S-60S.

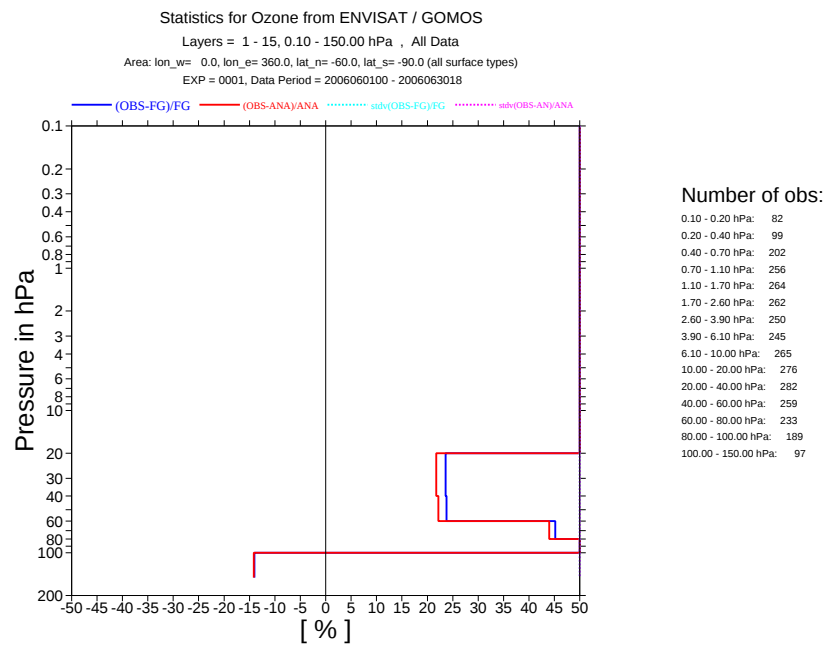
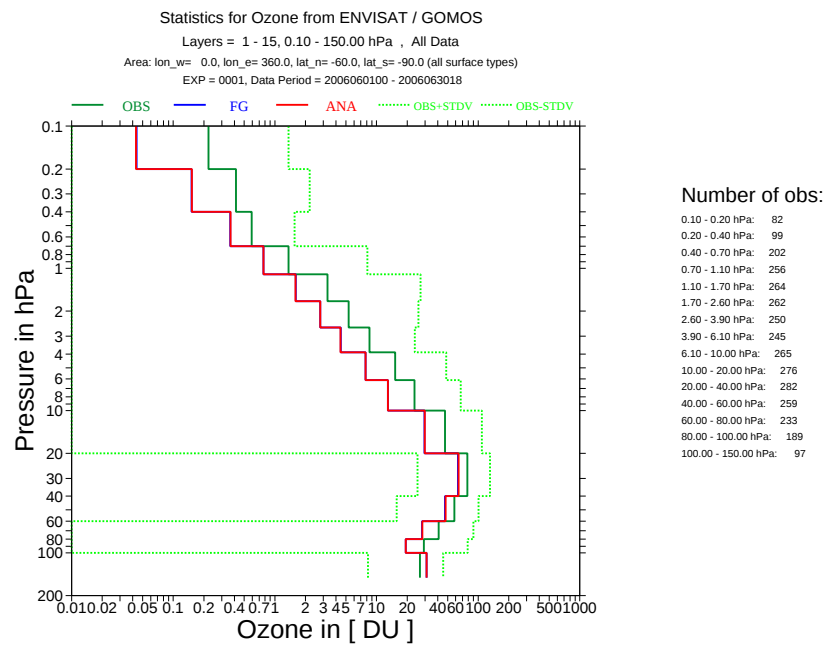


Fig. 8. As Fig. 3 but for 60-90S.

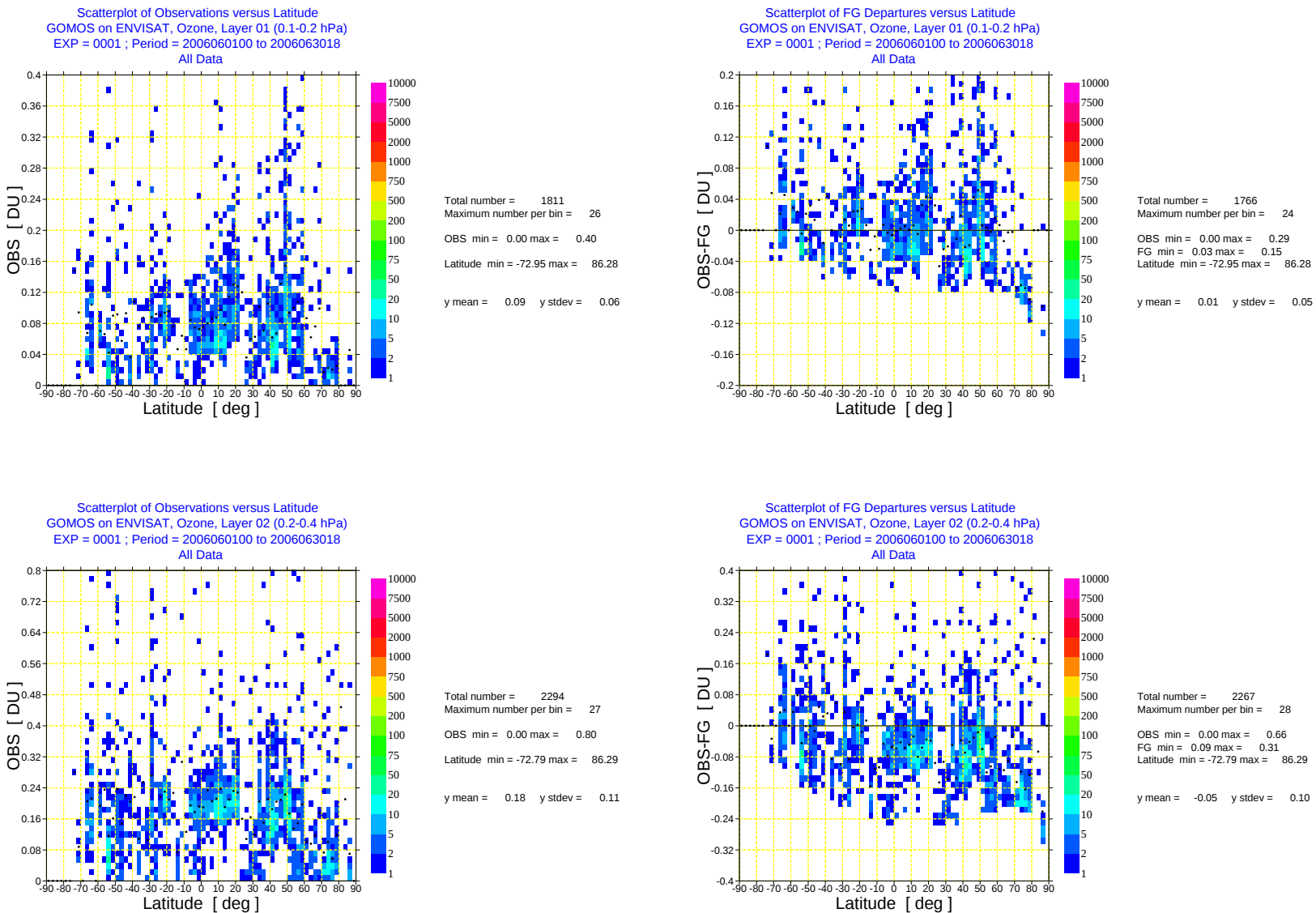


Fig. 9. Scatter plot of ENVISAT GOMOS NRT ozone data against latitude (right) and scatter plot of first-ness departures of ENVISAT GOMOS NRT ozone data against latitude (right) for June 2006 for layer 1 (0.1-0.2 hPa) and layer 2 (0.2-0.4 hPa). The colours show the number of data per bin, the black dots the mean value per bin.

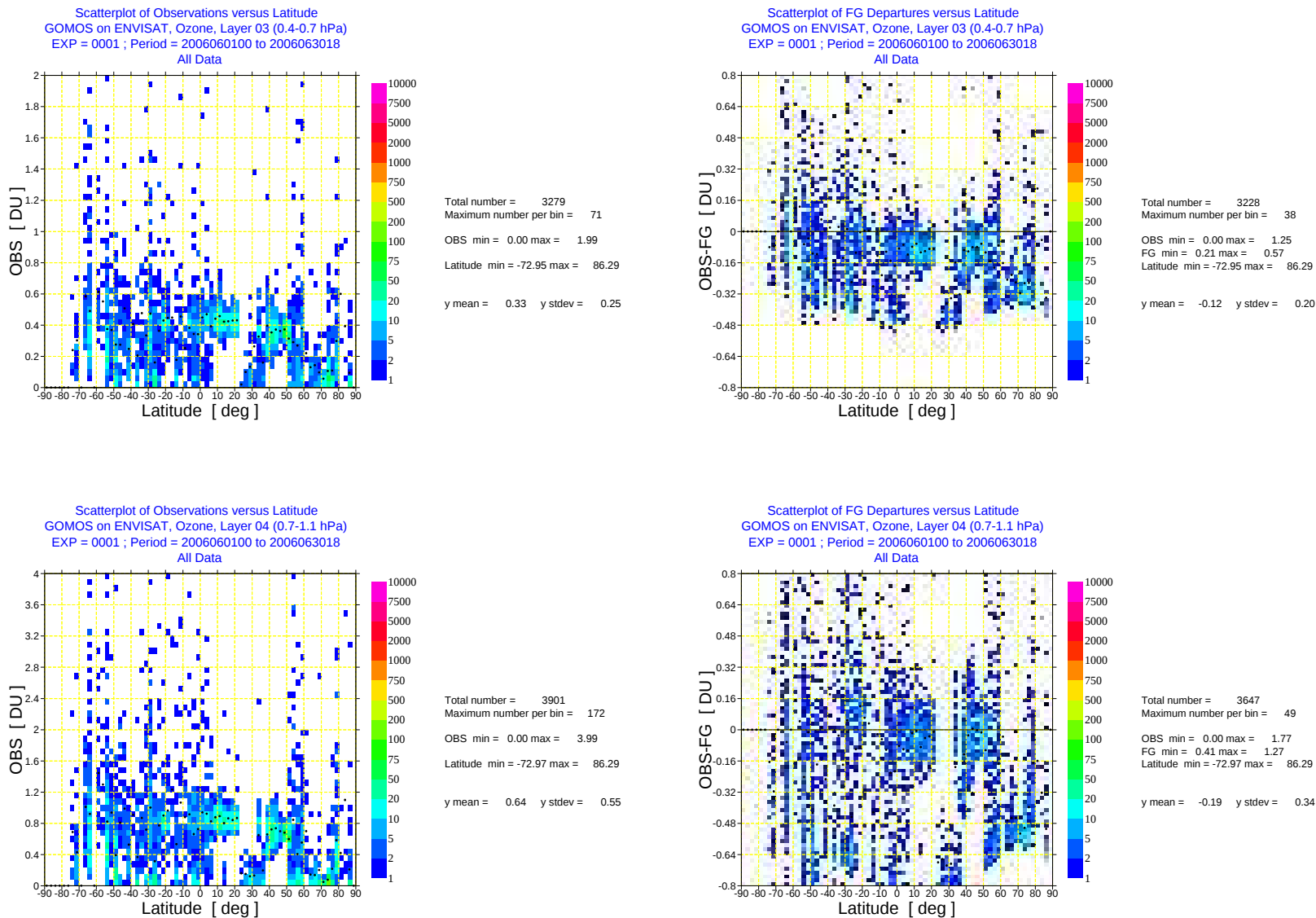


Fig. 10. As Fig. 9 but for layer 3 (0.4-0.7 hPa) and layer 4 (0.7-1.1 hPa).

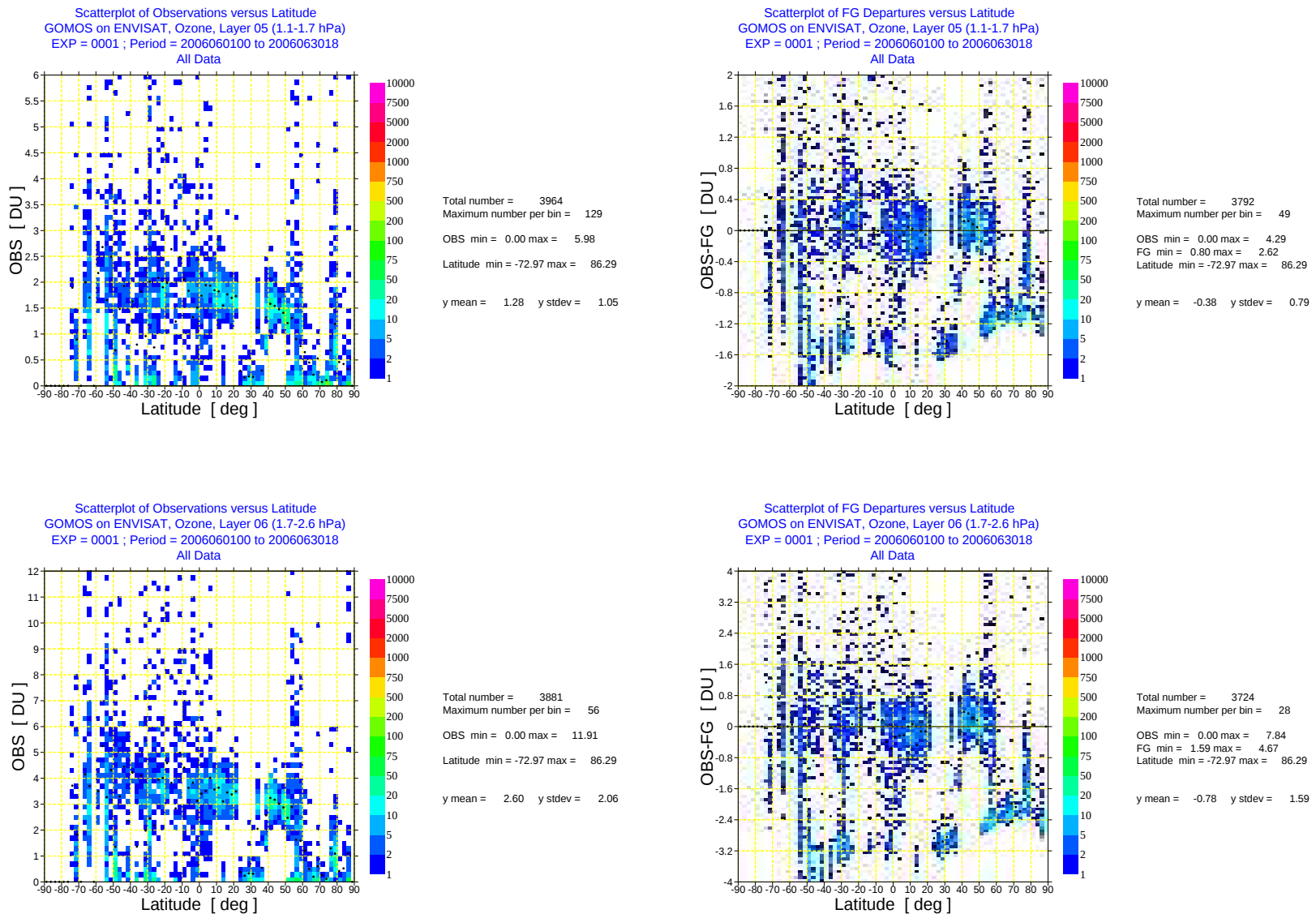


Fig. 11. As Fig. 9 but for layer 5 (1.1-1.7 hPa) and layer 6 (1.7-2.6 hPa).

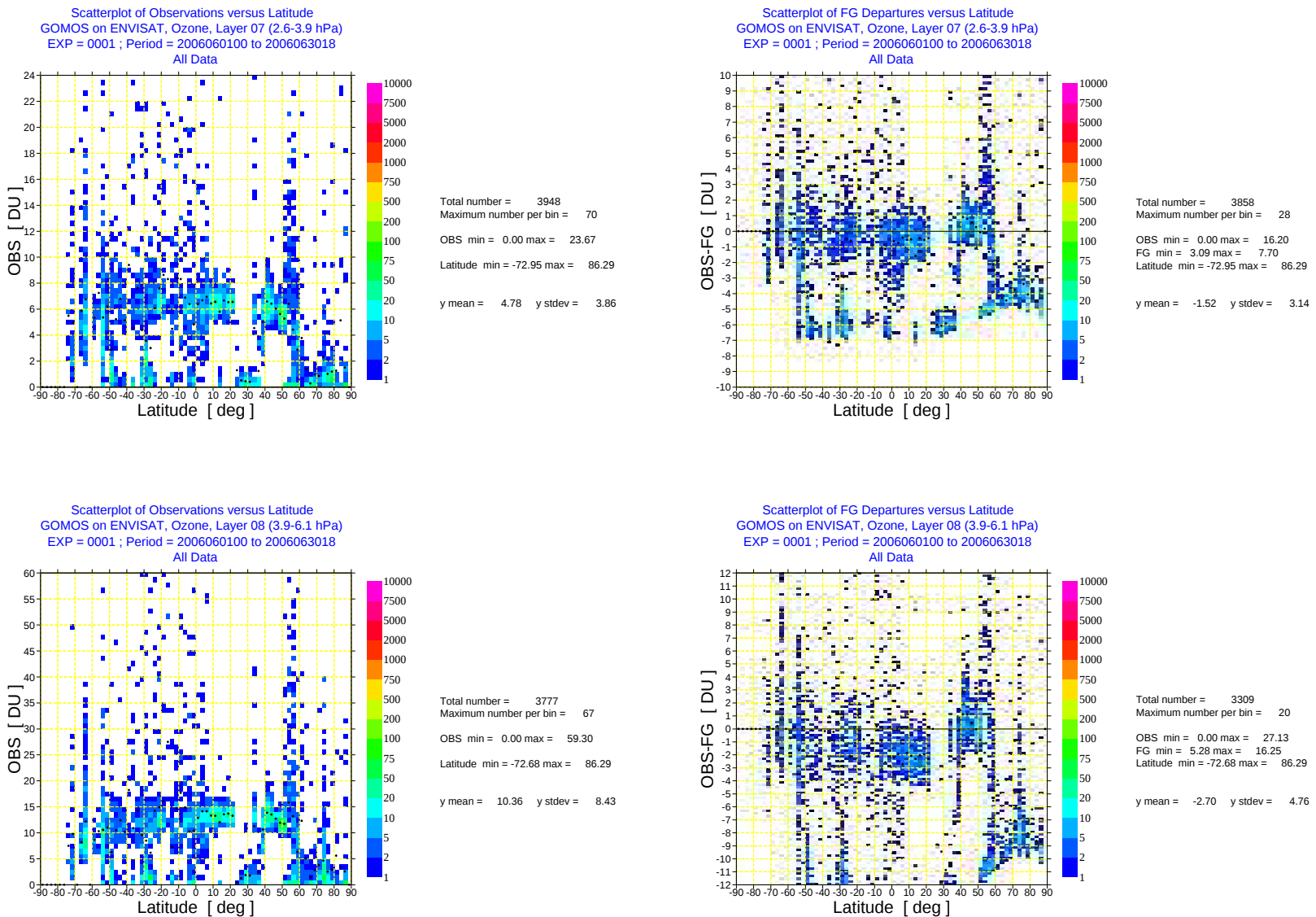


Fig. 12. As Fig. 9 but for layer 7 (2.6-3.9 hPa) and layer 8 (3.9-6.1 hPa).

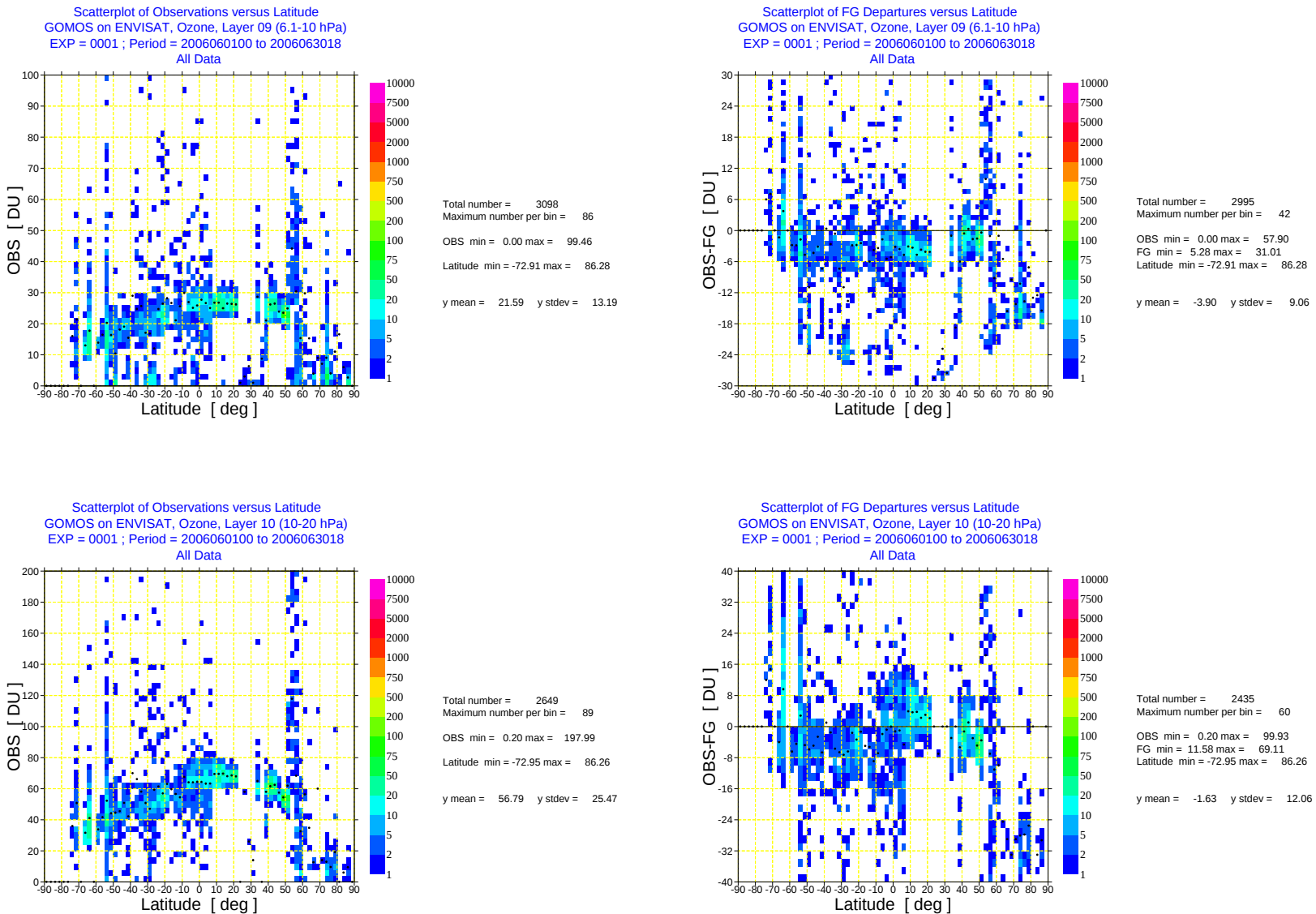


Fig. 13. As Fig. 9 but for layer 9 (6.1-10 hPa) and layer 10 (10-20 hPa).

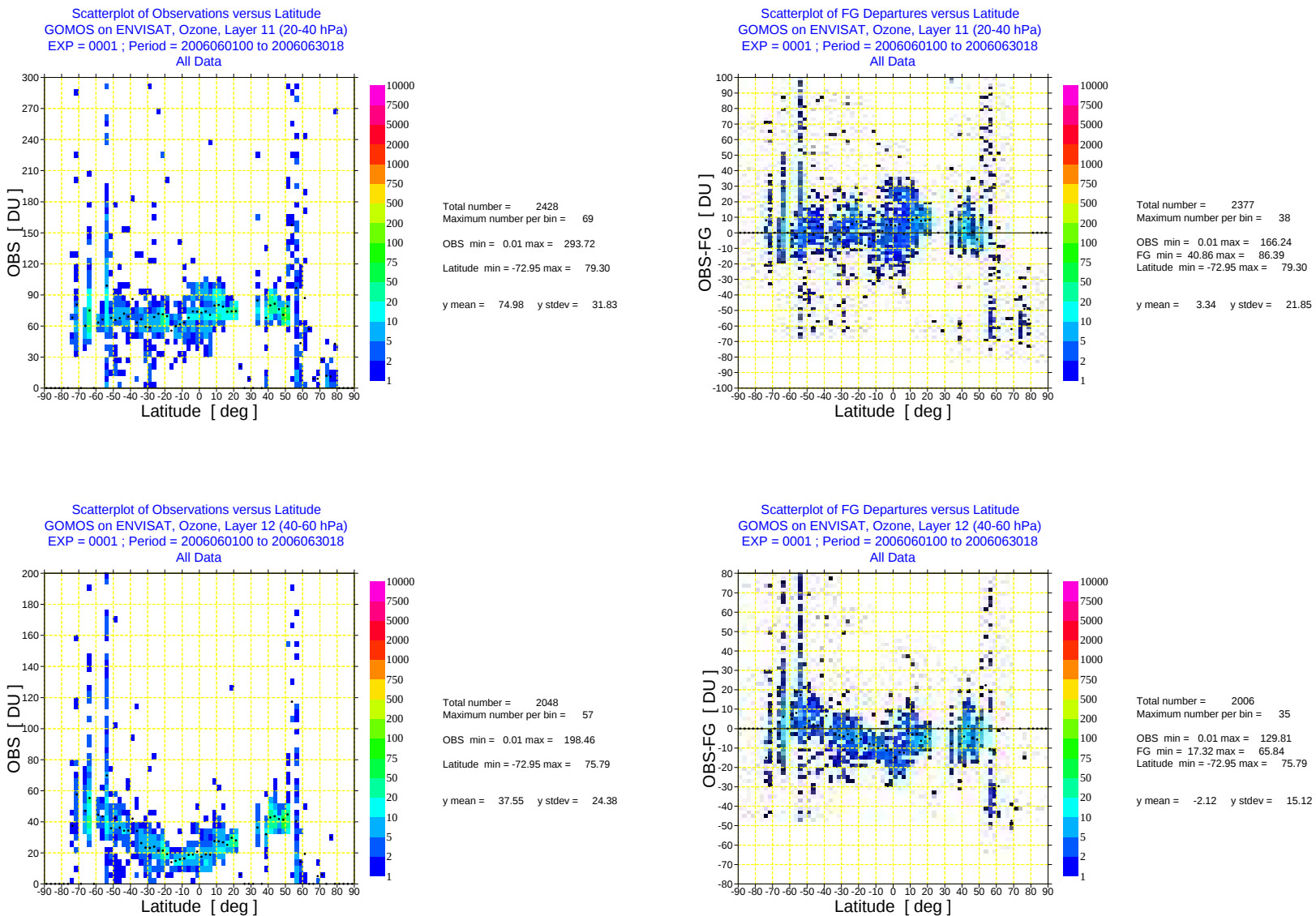


Fig. 14. As Fig. 9 but for layer 11 (20-40 hPa) and layer 12 (40-60 hPa).

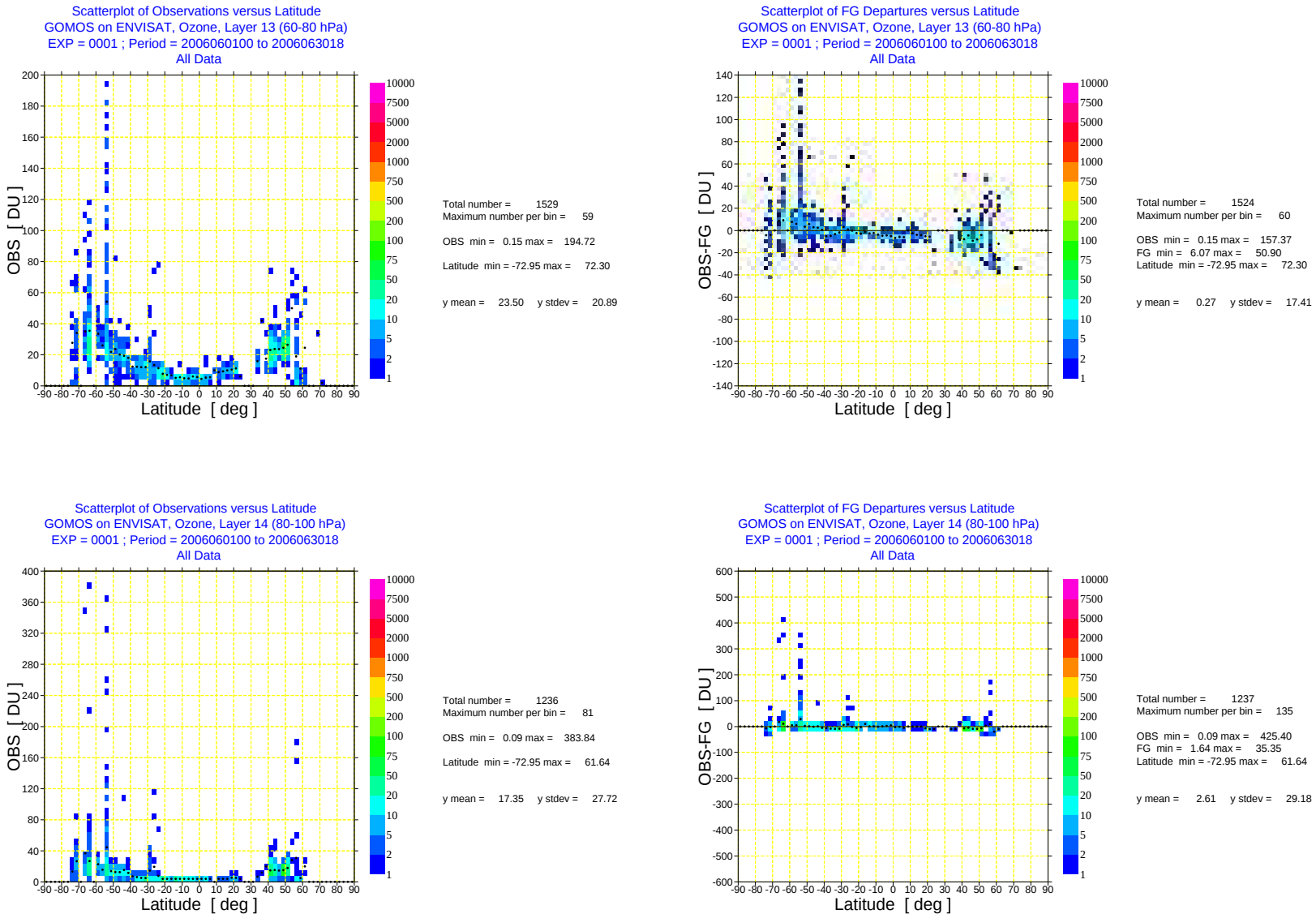


Fig. 15. As Fig. 9 but for layer 13 (60-80 hPa) and layer 14 (80-100 hPa).

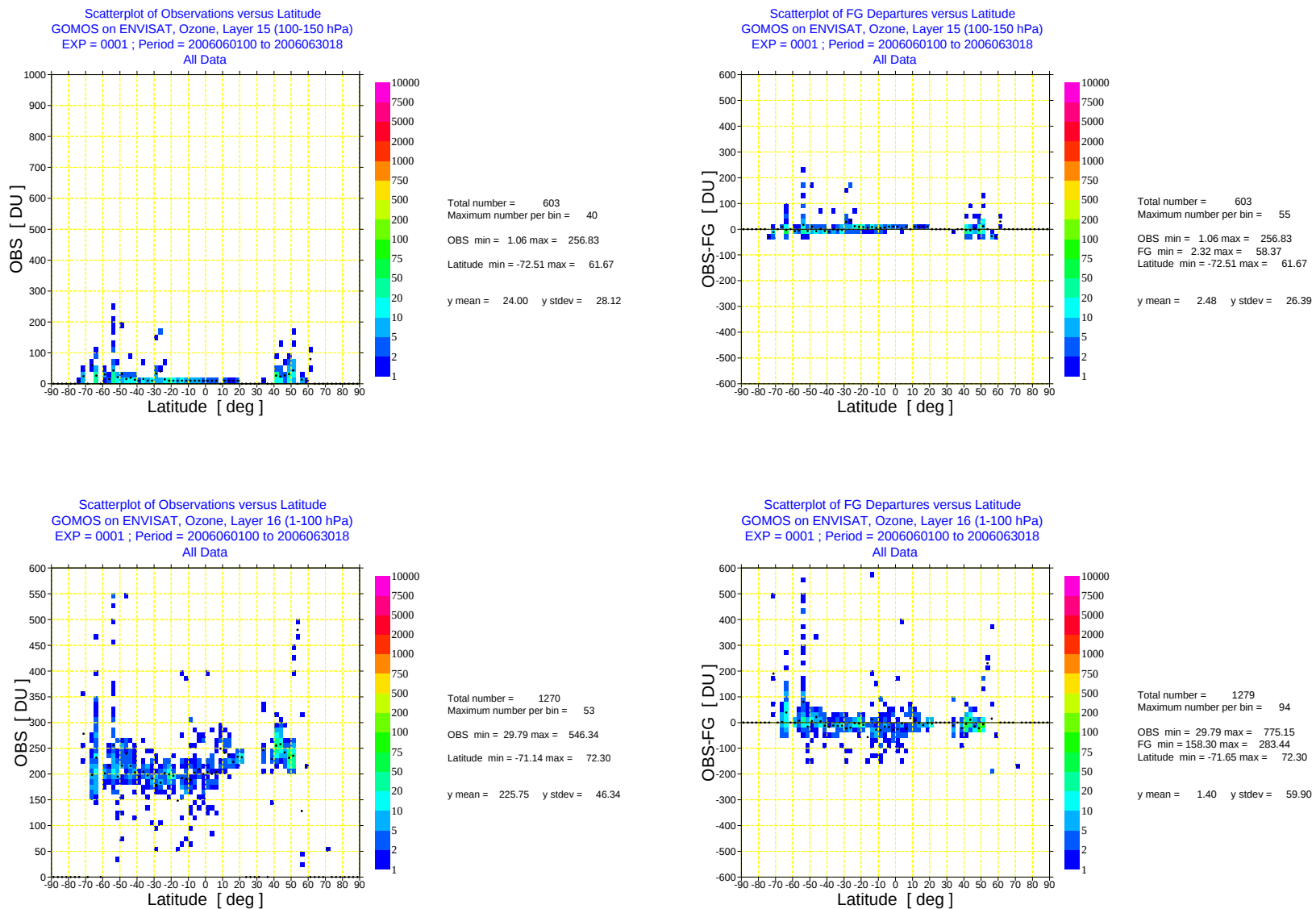


Fig. 16. As Fig. 9 but for layer 15 (100-150 hPa) and layer 16 (1-100 hPa).

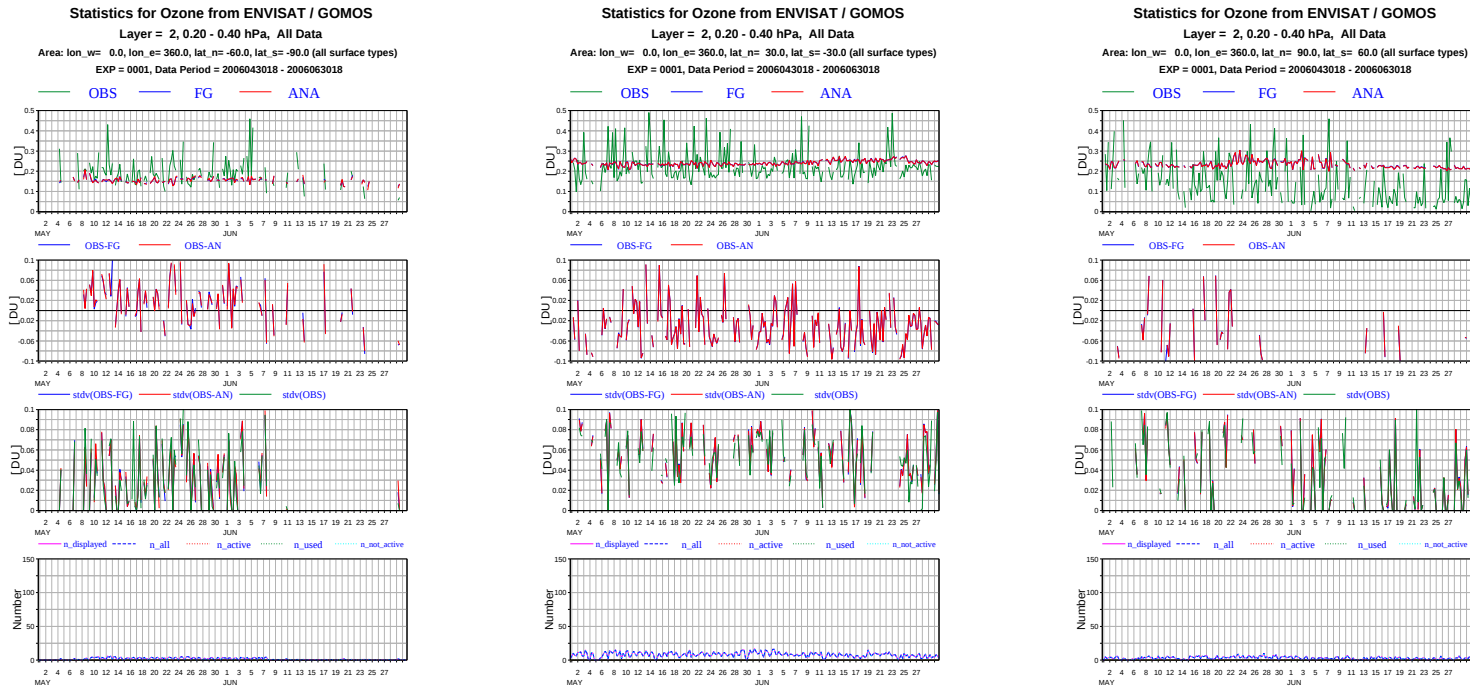


Fig. 17. Timeseries of mean ENVISAT GOMOS NRT ozone data, first guess and analysis values (top panels), first-guess and analysis departures (second panels), standard deviations (third panels) and number of data (bottom panels) per 6-hour cycle for layer 2 (0.2-0.4 hPa) 90-60N, 30N-30S, 60-90S for the period May - June 2006.

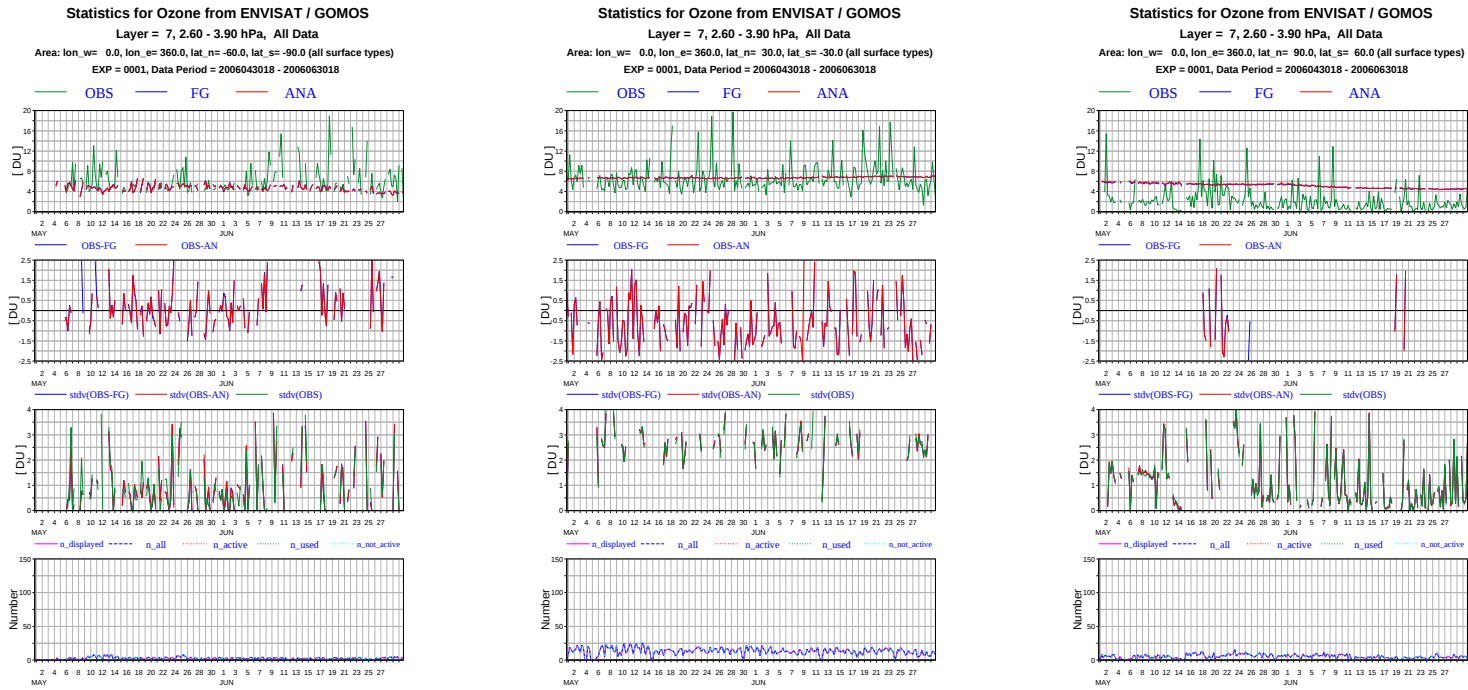


Fig. 18. As Figure 17, but for layer 7 (2.6-3.9 hPa).

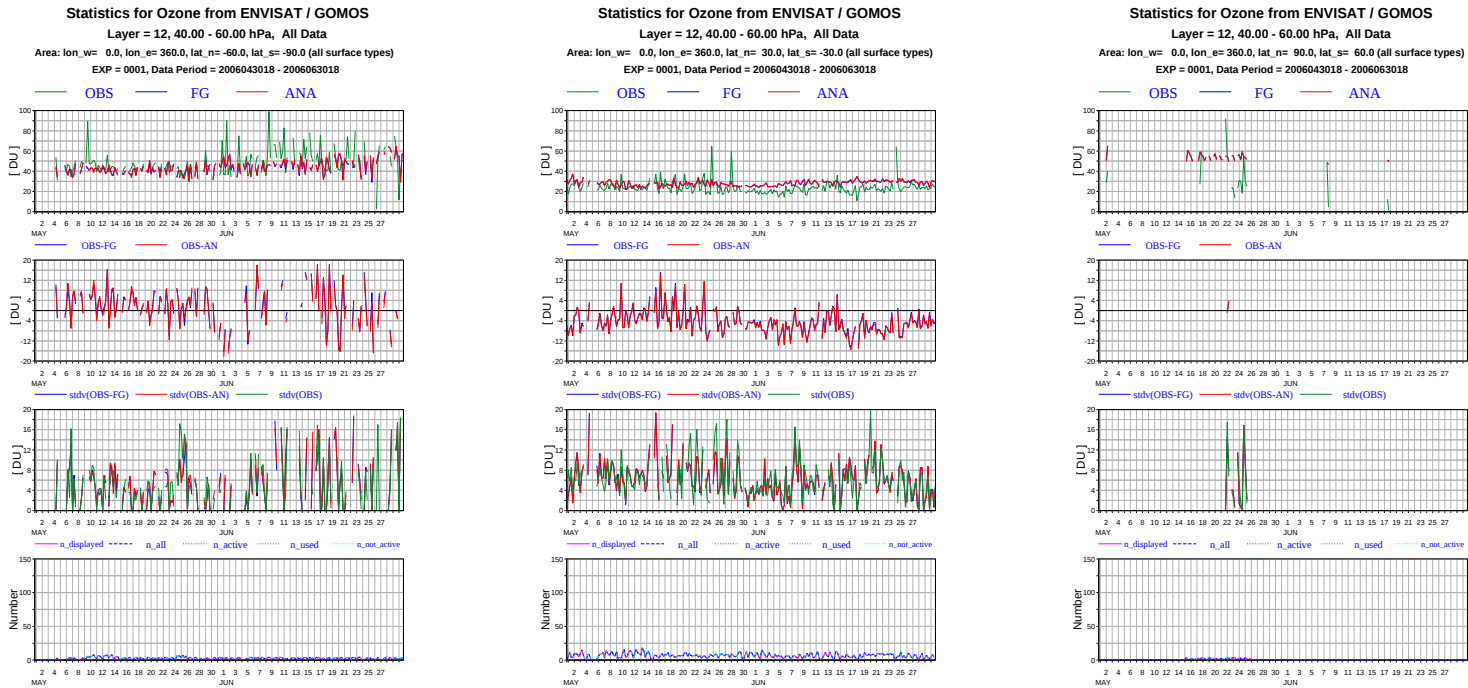


Fig. 19. As Figure 17, but for layer 12 (40-80 hPa).

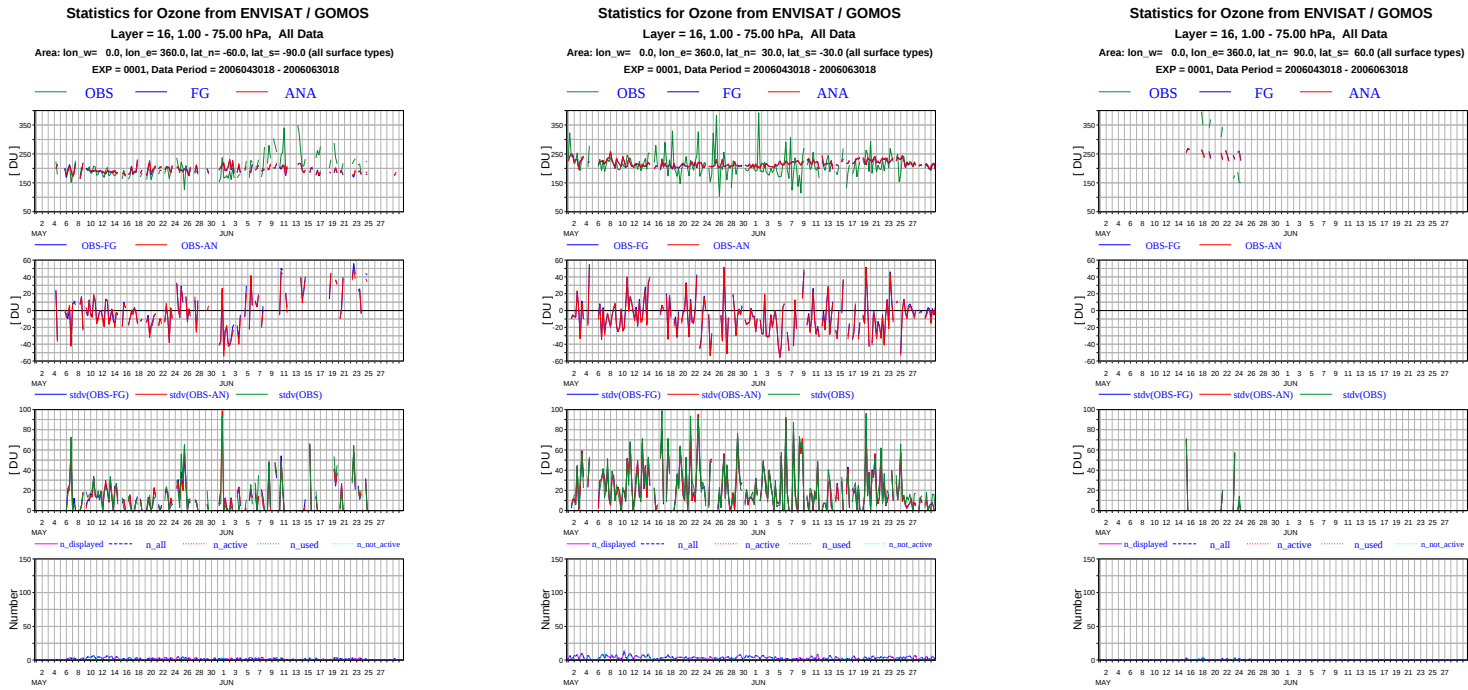


Fig. 20. As Figure 17, but for layer 16 (1-100 hPa).

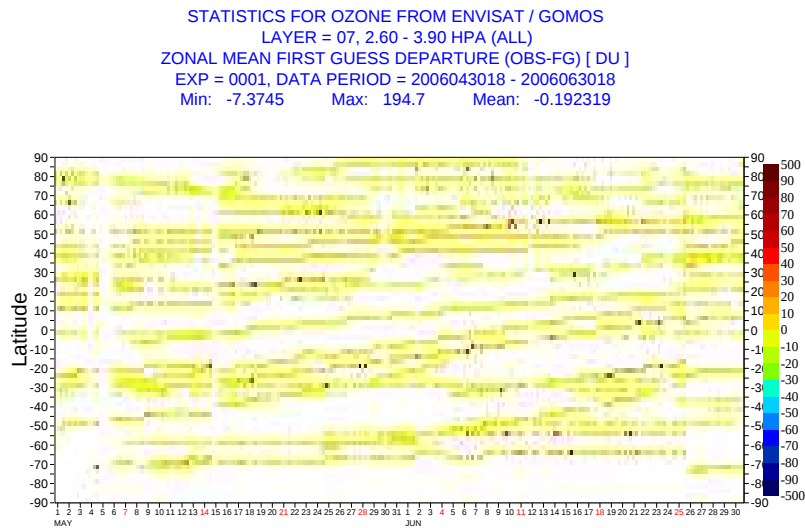
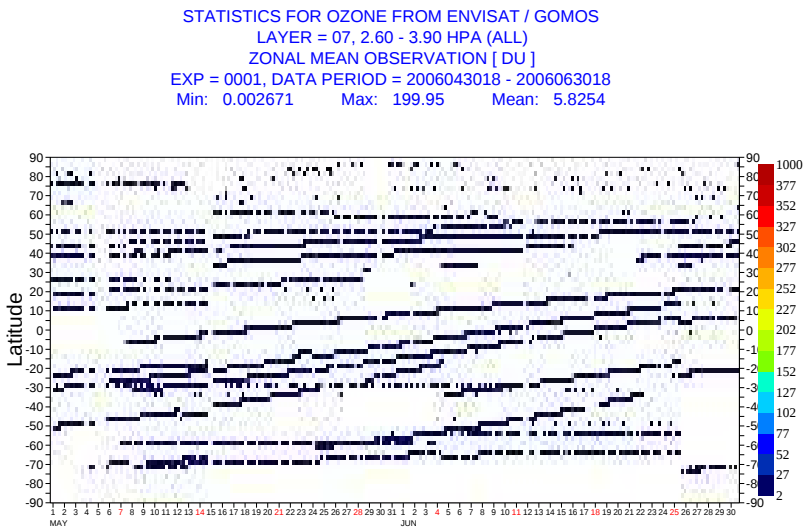
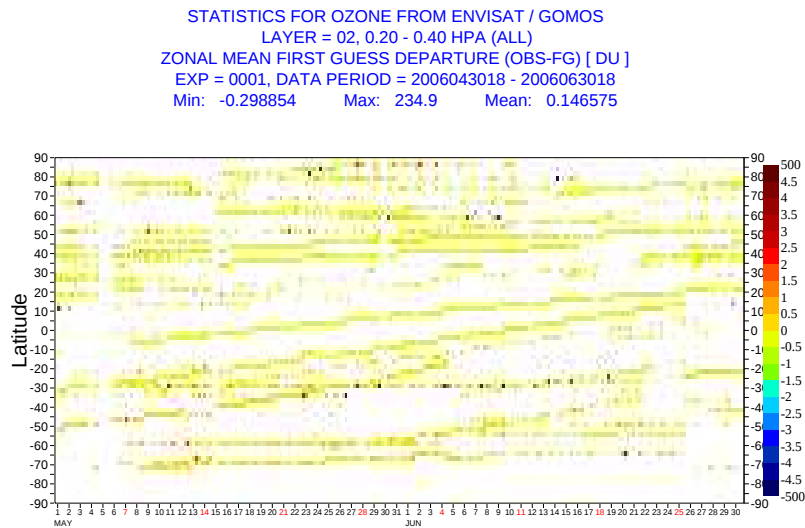
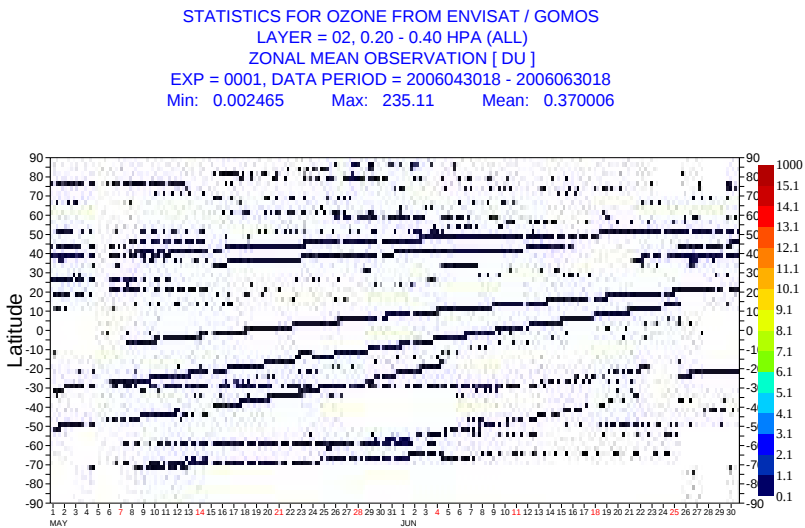
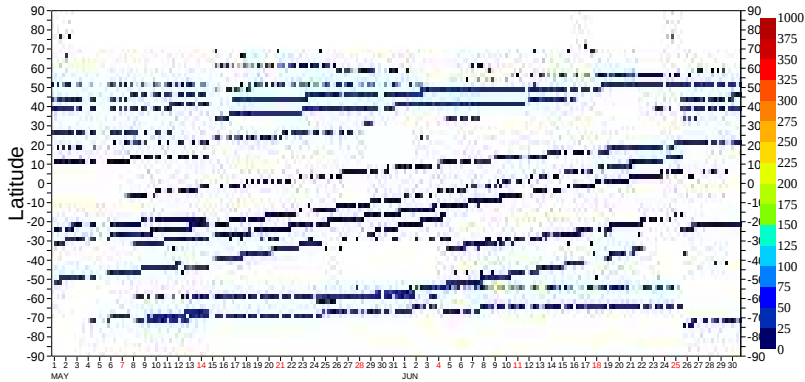
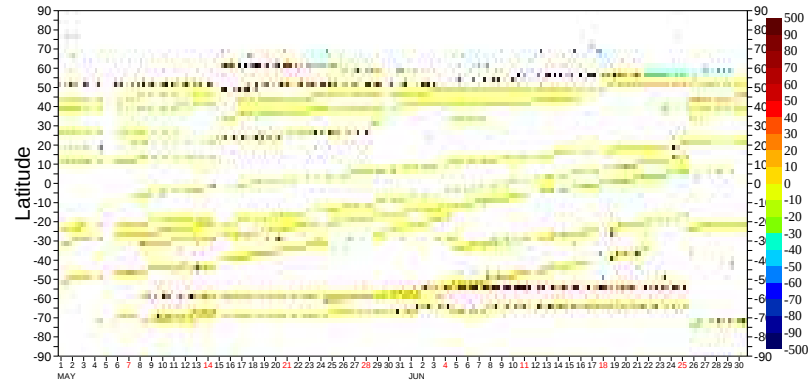


Fig. 21. Hovmöller diagram of zonal mean ENVISAT GOMOS NRT ozone data per 6-hour cycle for June 2006 and of the zonal mean first-guess departures for layer 2 (0.2-0.4 hPa) and layer 7 (2.6-3.9 hPa).

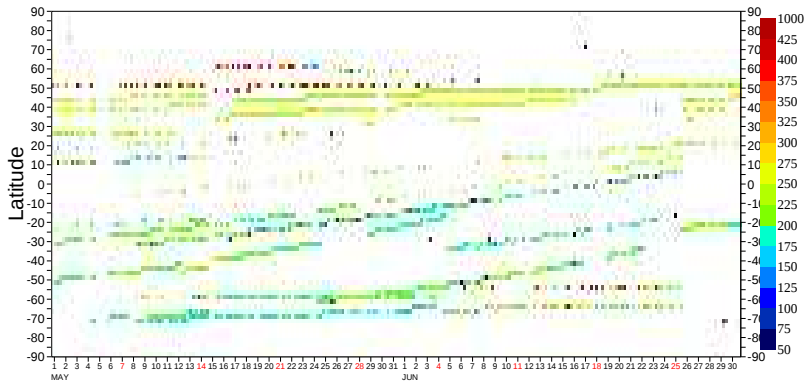
STATISTICS FOR OZONE FROM ENVISAT / GOMOS
LAYER = 12, 40.00 - 60.00 hPa (ALL)
ZONAL MEAN OBSERVATION [DU]
EXP = 0001, DATA PERIOD = 2006043018 - 2006063018
Min: 0.123594 Max: 814.05 Mean: 42.631



STATISTICS FOR OZONE FROM ENVISAT / GOMOS
LAYER = 12, 40.00 - 60.00 hPa (ALL)
ZONAL MEAN FIRST GUESS DEPARTURE (OBS-FG) [DU]
EXP = 0001, DATA PERIOD = 2006043018 - 2006063018
Min: -51.123 Max: 774.85 Mean: 6.0247



STATISTICS FOR OZONE FROM ENVISAT / GOMOS
LAYER = 16, 1.00 - 75.00 hPa (ALL)
ZONAL MEAN OBSERVATION [DU]
EXP = 0001, DATA PERIOD = 2006043018 - 2006063018
Min: 27.025 Max: 843.65 Mean: 233.37



STATISTICS FOR OZONE FROM ENVISAT / GOMOS
LAYER = 16, 1.00 - 75.00 hPa (ALL)
ZONAL MEAN FIRST GUESS DEPARTURE (OBS-FG) [DU]
EXP = 0001, DATA PERIOD = 2006043018 - 2006063018
Min: -199.1 Max: 608.61 Mean: 8.4558

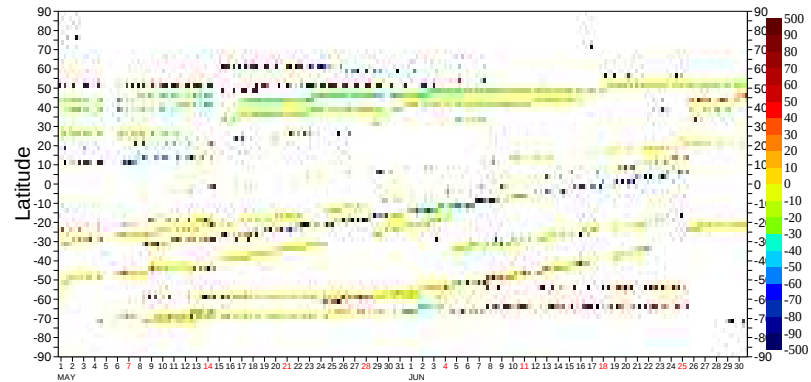


Fig. 22. As Fig. 18 but for layer 12 (40-60 hPa) and layer 16 (1-100 hPa).

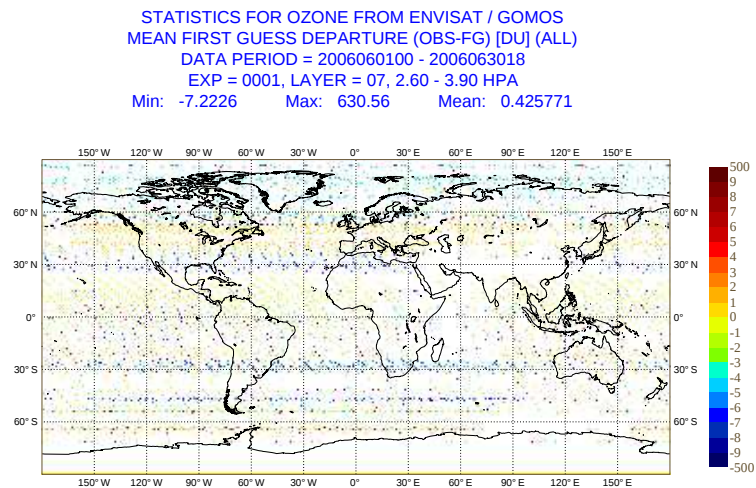
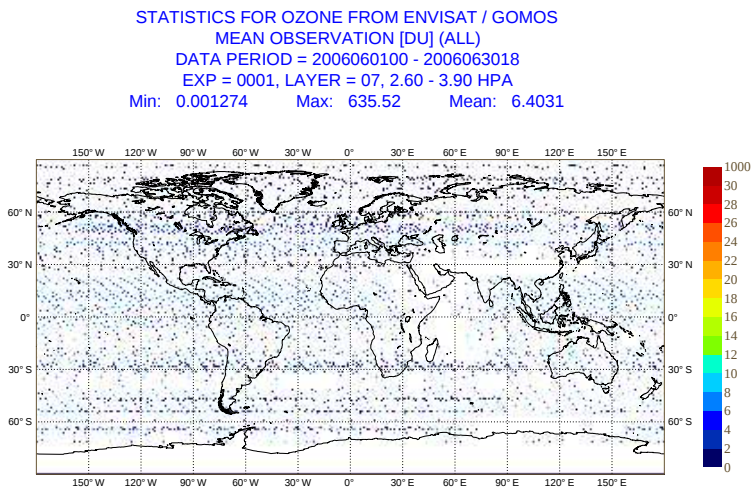
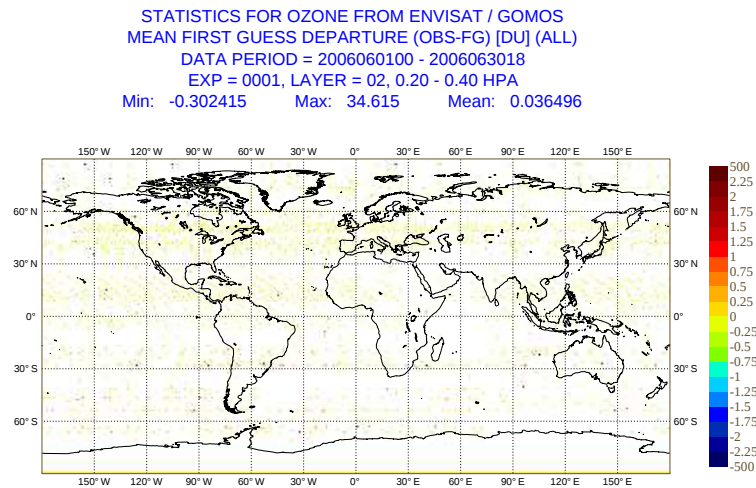
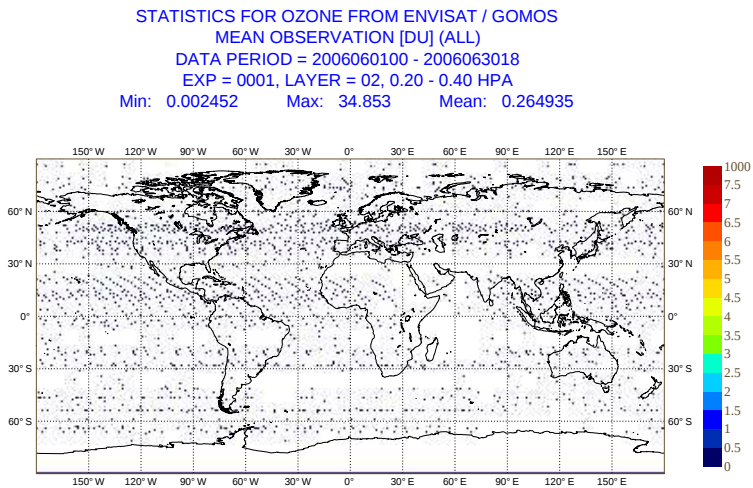
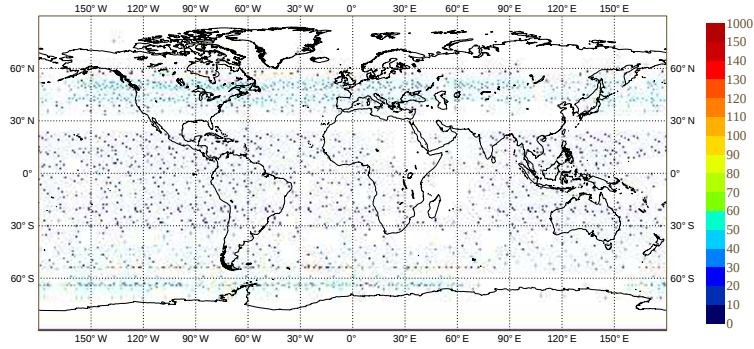
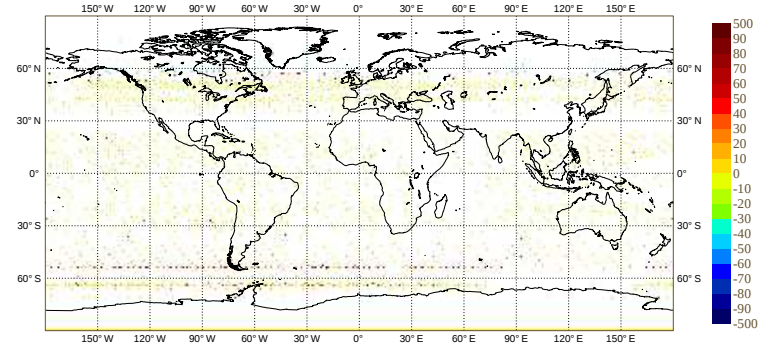


Fig. 23. Geographical distribution of mean ENVISAT GOMOS NRT ozone data and mean first-guess departures for June 2006 for layer 2 (0.2-0.4 hPa) and layer 7 (2.6-3.9 hPa).

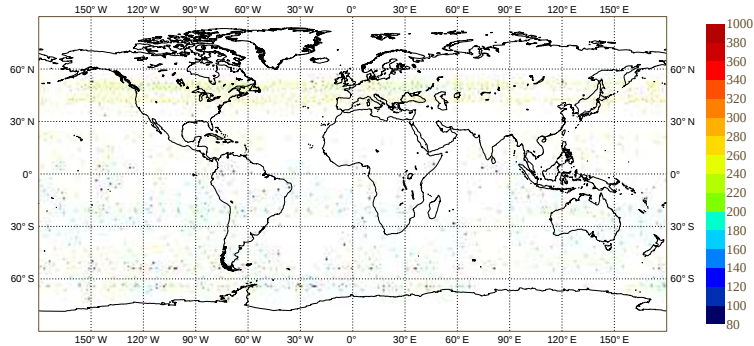
STATISTICS FOR OZONE FROM ENVISAT / GOMOS
MEAN OBSERVATION [DU] (ALL)
DATA PERIOD = 2006060100 - 2006063018
EXP = 0001, LAYER = 12, 40.00 - 60.00 HPA
Min: 0.123594 Max: 905.66 Mean: 45.091



STATISTICS FOR OZONE FROM ENVISAT / GOMOS
MEAN FIRST GUESS DEPARTURE (OBS-FG) [DU] (ALL)
DATA PERIOD = 2006060100 - 2006063018
EXP = 0001, LAYER = 12, 40.00 - 60.00 HPA
Min: -51.123 Max: 860.36 Mean: 7.5786



STATISTICS FOR OZONE FROM ENVISAT / GOMOS
MEAN OBSERVATION [DU] (ALL)
DATA PERIOD = 2006060100 - 2006063018
EXP = 0001, LAYER = 16, 1.00 - 75.00 HPA
Min: 29.784 Max: 824.93 Mean: 230.3



STATISTICS FOR OZONE FROM ENVISAT / GOMOS
MEAN FIRST GUESS DEPARTURE (OBS-FG) [DU] (ALL)
DATA PERIOD = 2006060100 - 2006063018
EXP = 0001, LAYER = 16, 1.00 - 75.00 HPA
Min: -199.1 Max: 647.22 Mean: 2.8429

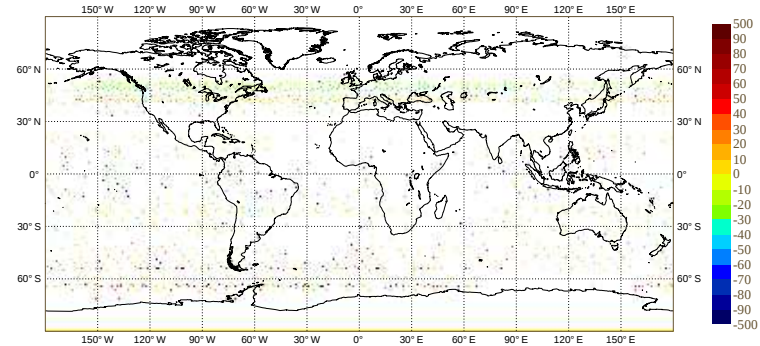


Fig. 24. As Fig. 20 but for layer 12 (40-60 hPa) and layer 16 (1-100 hPa).

REPORT ABOUT ENVISAT GOMOS NRT TEMPERATURE DATA (GOM_RR_2P) FOR JUNE 2006

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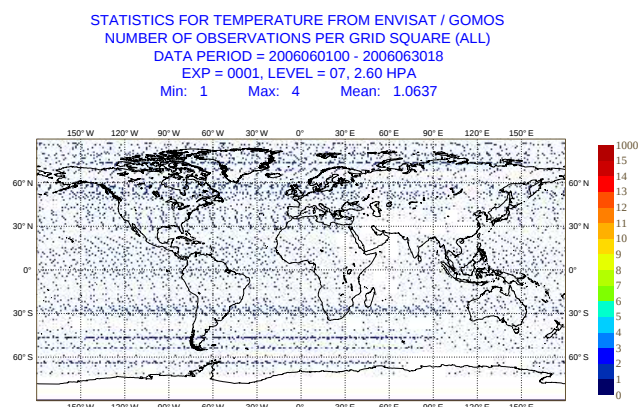


Fig. 1. Geographical distribution of mean number of ENVISAT GOMOS NRT temperature data for level 7 (2.6 hPa) for June 2006.

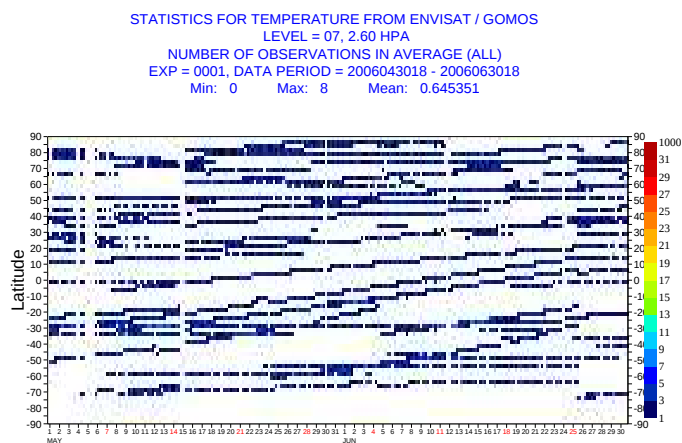


Fig. 2. Hovmoeller diagram of zonal mean number of data of ENVISAT GOMOS NRT temperature data per 6-hour cycle for level 7 (2.6 hPa) for June 2006.

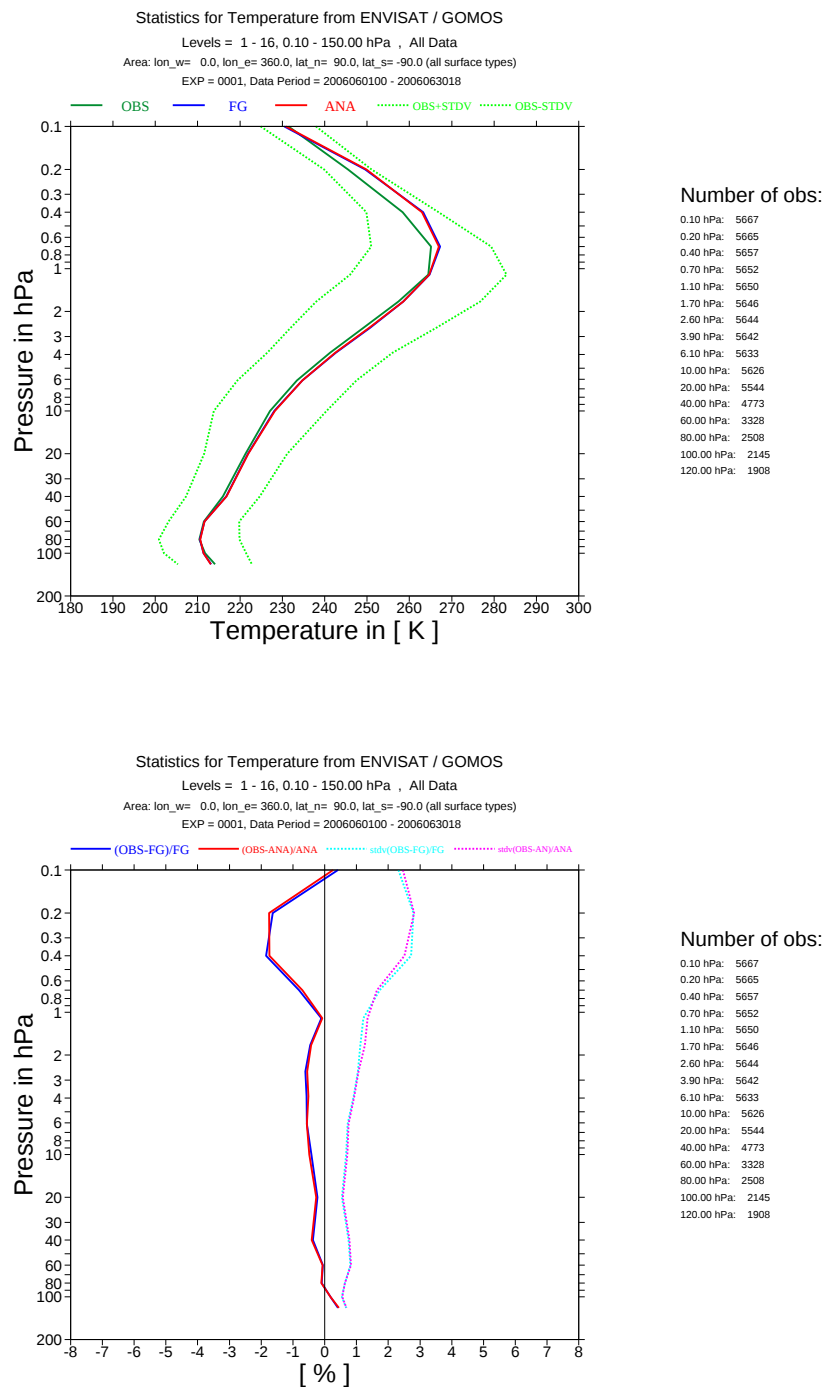


Fig. 3. Time mean vertical distribution of ENVISAT GOMOS NRT temperature data in K for June 2006 (global mean). The top plot shows the mean analysis values (red), the mean first-guess (blue), the mean observation (green), and the mean observation ± 1 standard deviation (green dotted lines). The bottom plot shows the departures and the standard deviation of the departures in %. Plotted are the partial columns for the 16 levels listed to the right of the diagrams.

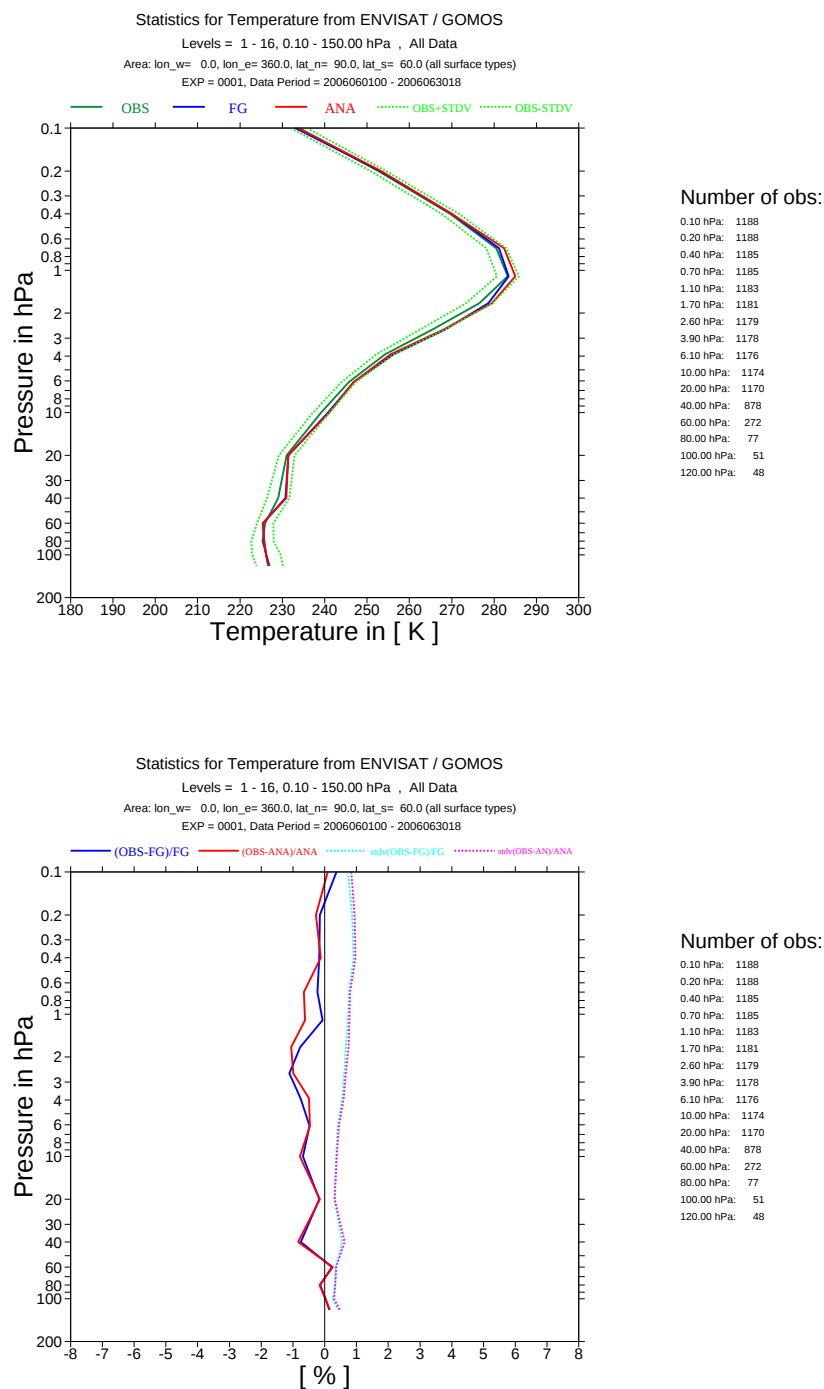


Fig. 4. As Fig. 3 but for 90N-60N.

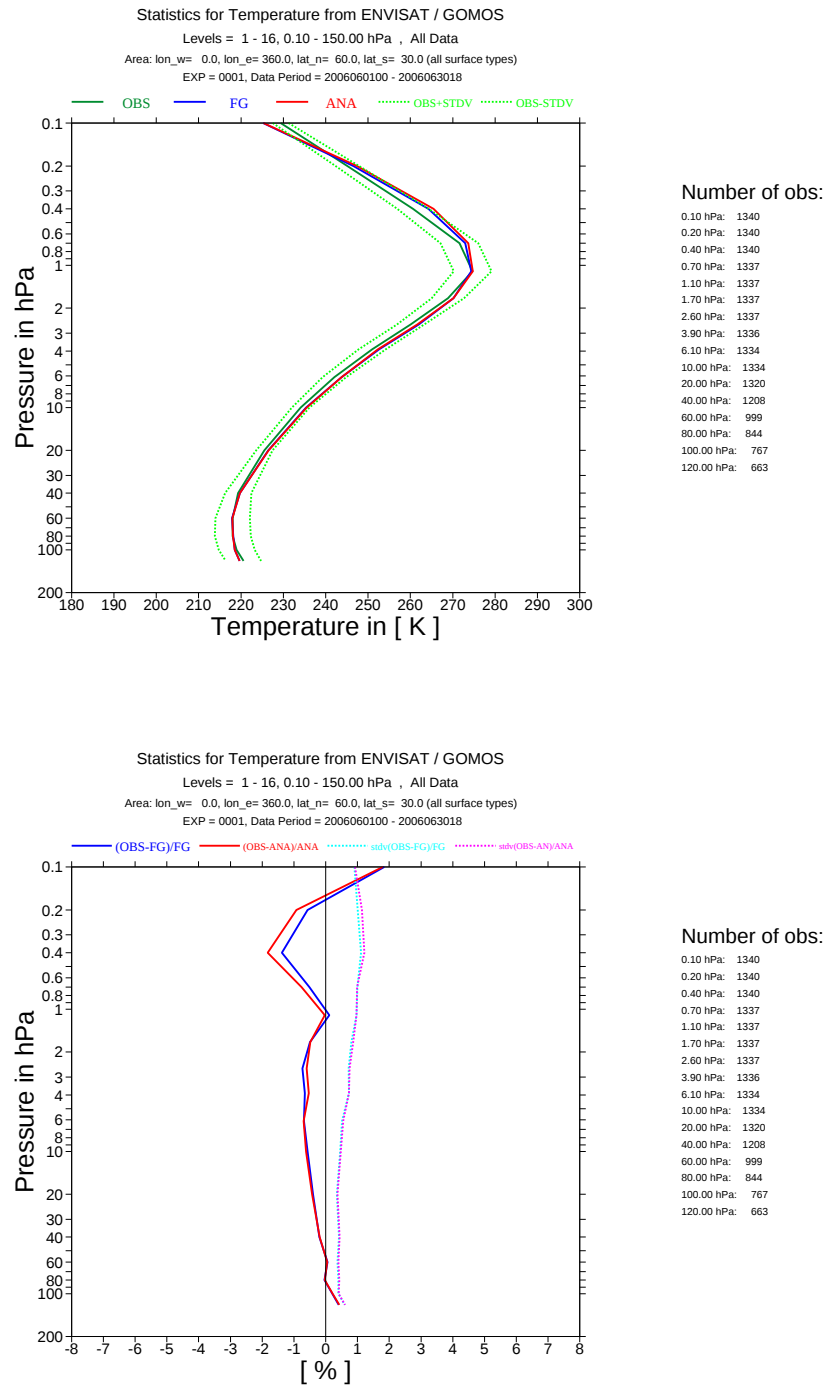


Fig. 5. As Fig. 3 but for 60-30N.

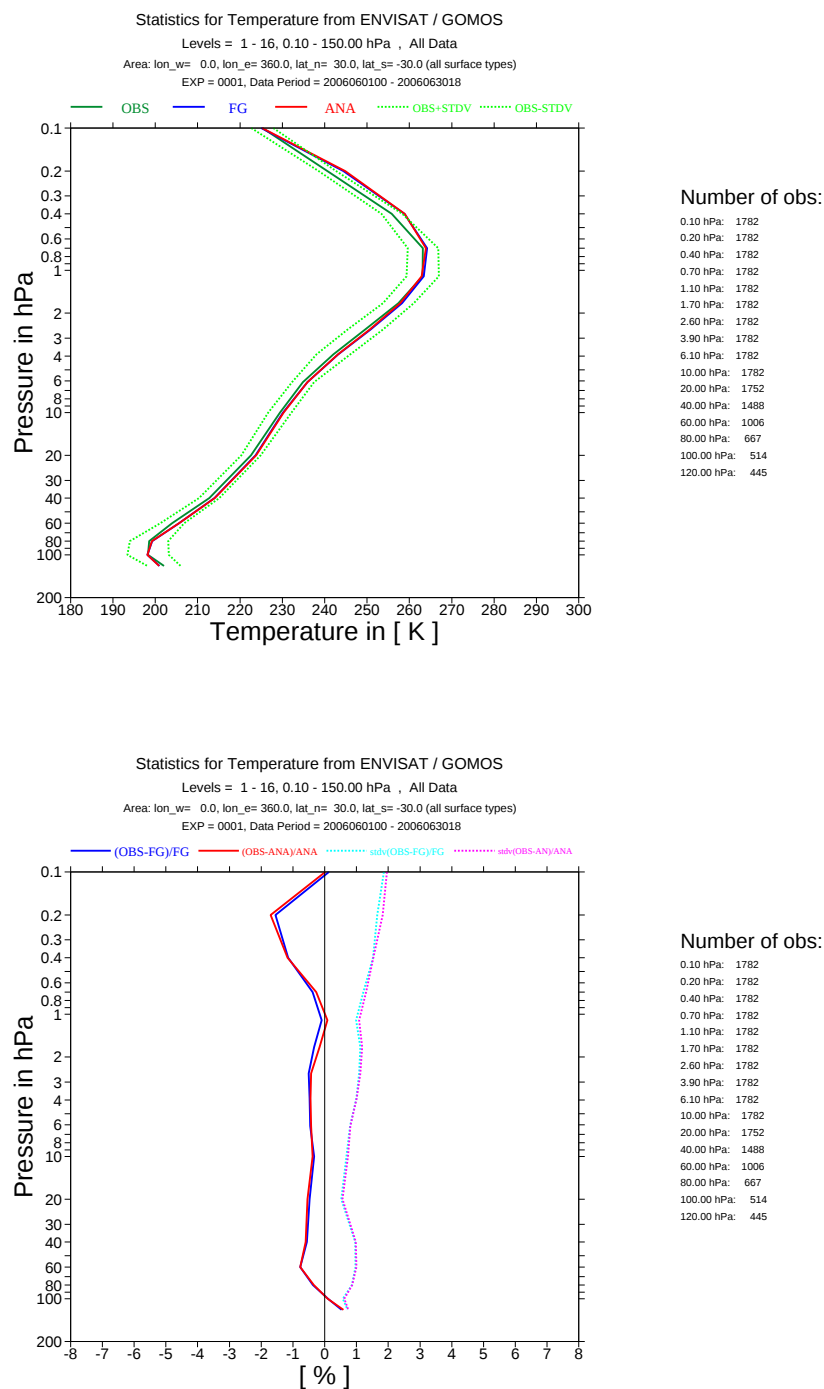


Fig. 6. As Fig. 3 but for 30N-30S.

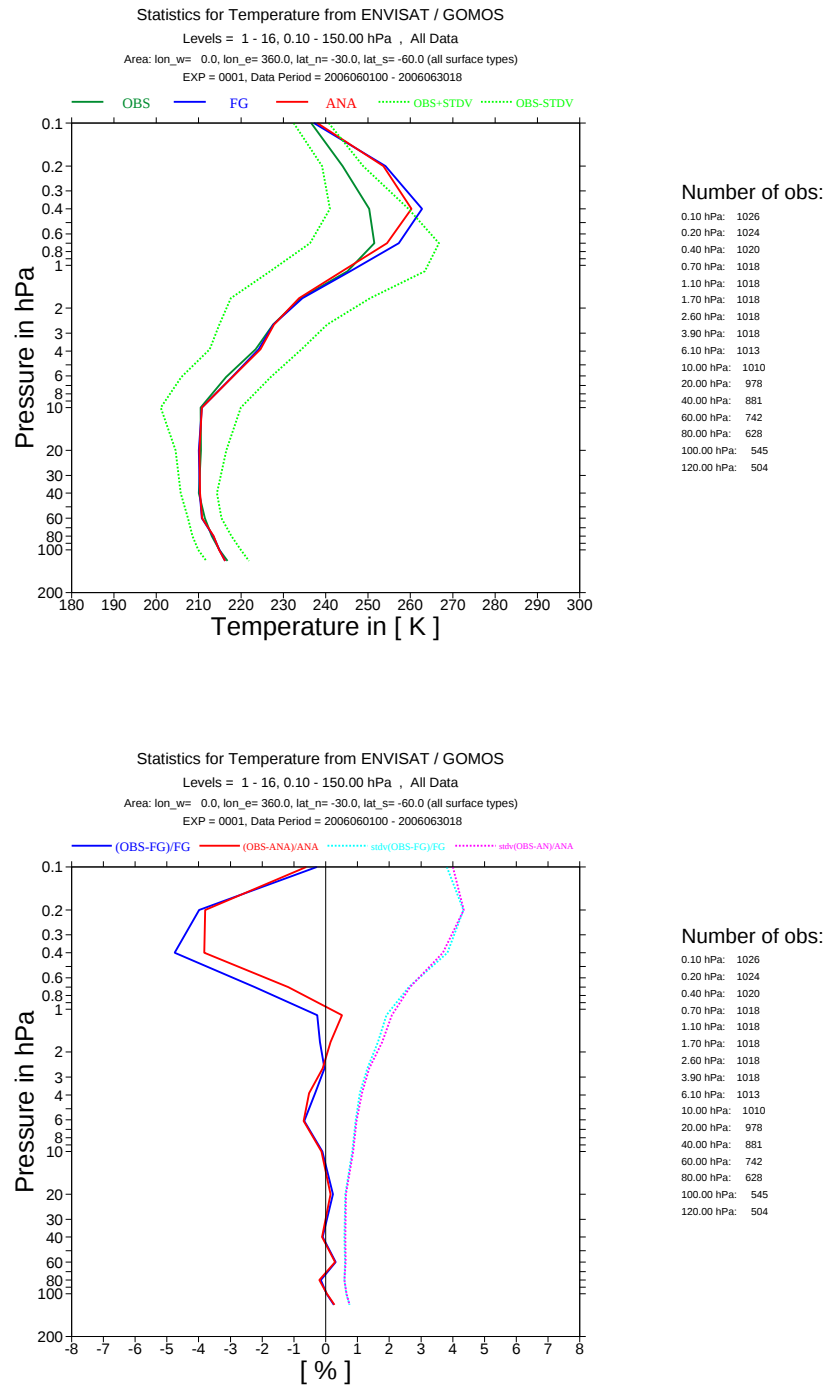


Fig. 7. As Fig. 3 but for 30-60S.

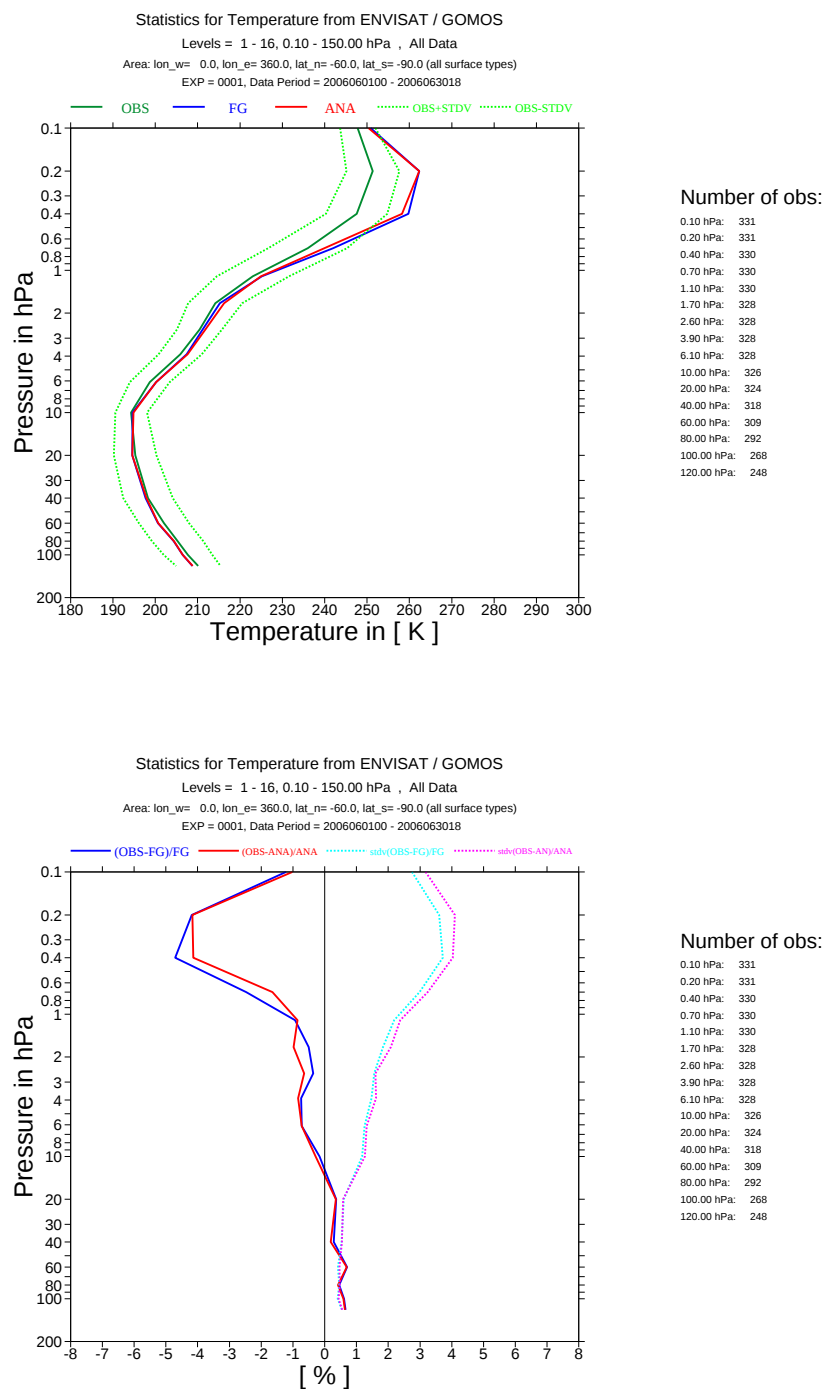


Fig. 8. As Fig. 3 but for 60-90S.

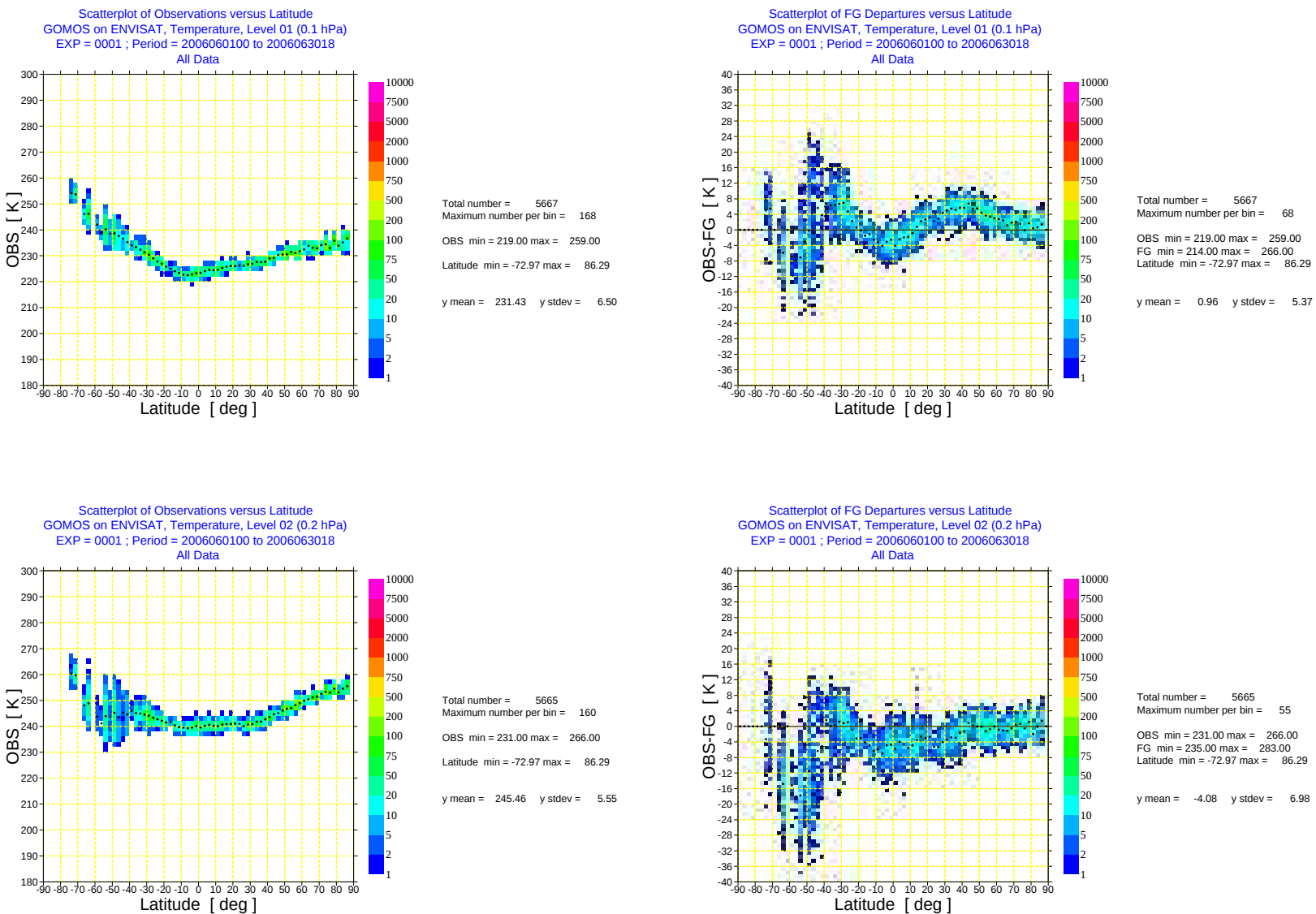


Fig. 9. Scatter plot of ENVISAT GOMOS NRT temperature data against latitude (left) and scatter plot of first-guess departures of ENVISAT GOMOS NRT temperature data against latitude (right) for June 2006 for level 1 (0.1 hPa) and level 2 (0.2 hPa). The colours show the number of data per bin, and the black dots the mean value per bin.

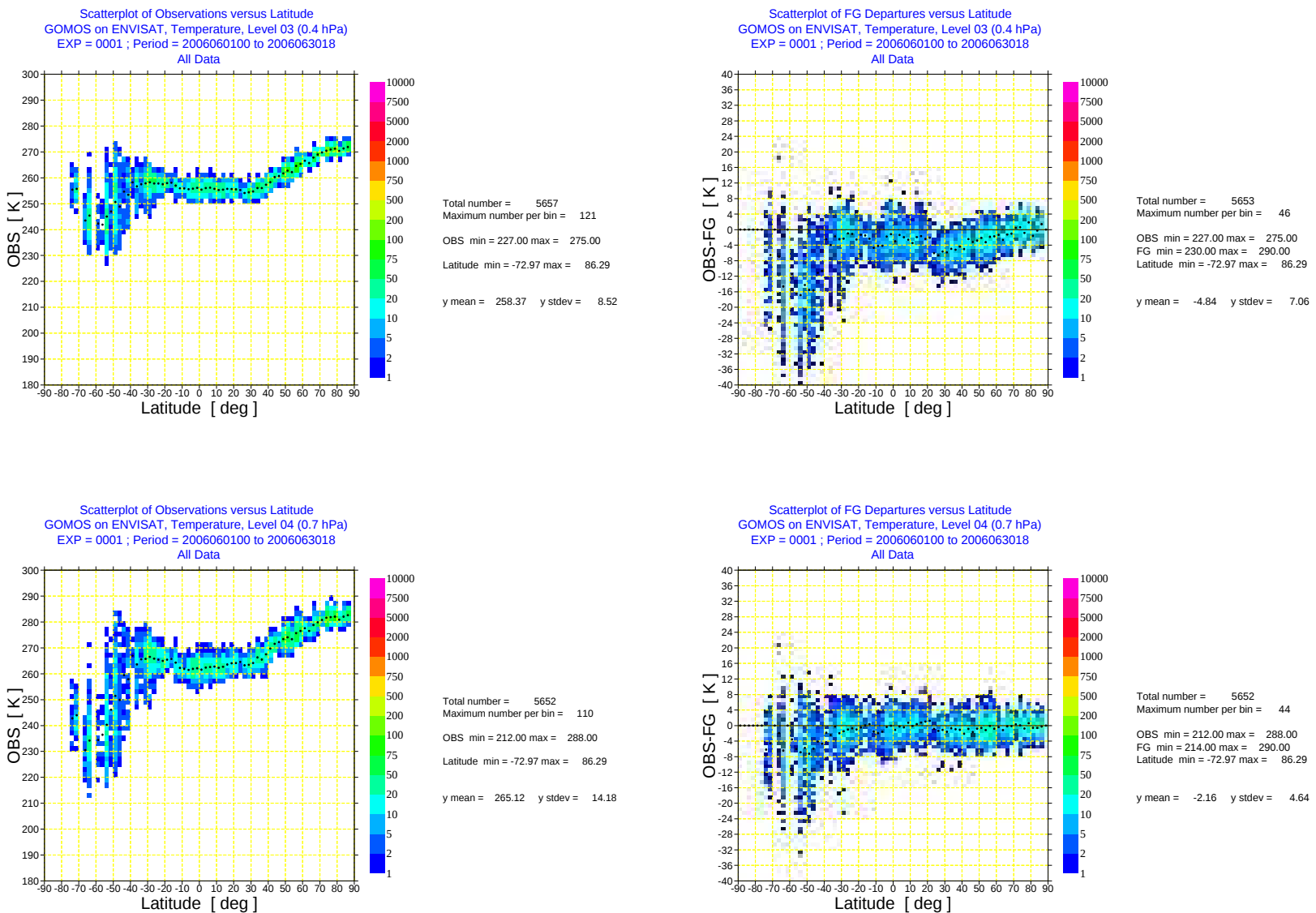


Fig. 10. As Fig. 9 but for level 3 (0.4 hPa) and level 4 (0.7 hPa).

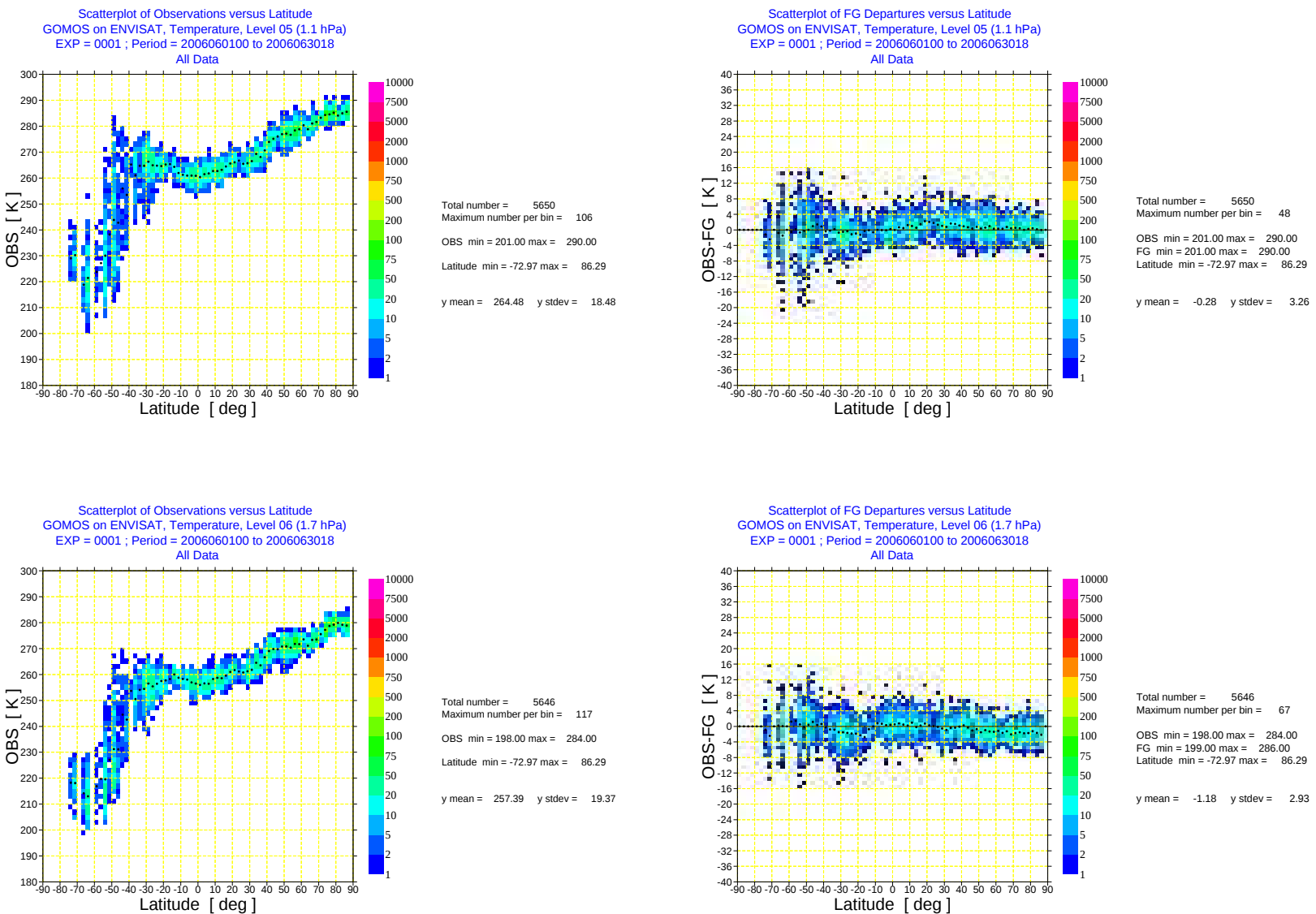


Fig. 11. As Fig. 9 but for level 5 (1.1 hPa) and level 6 (1.7 hPa).

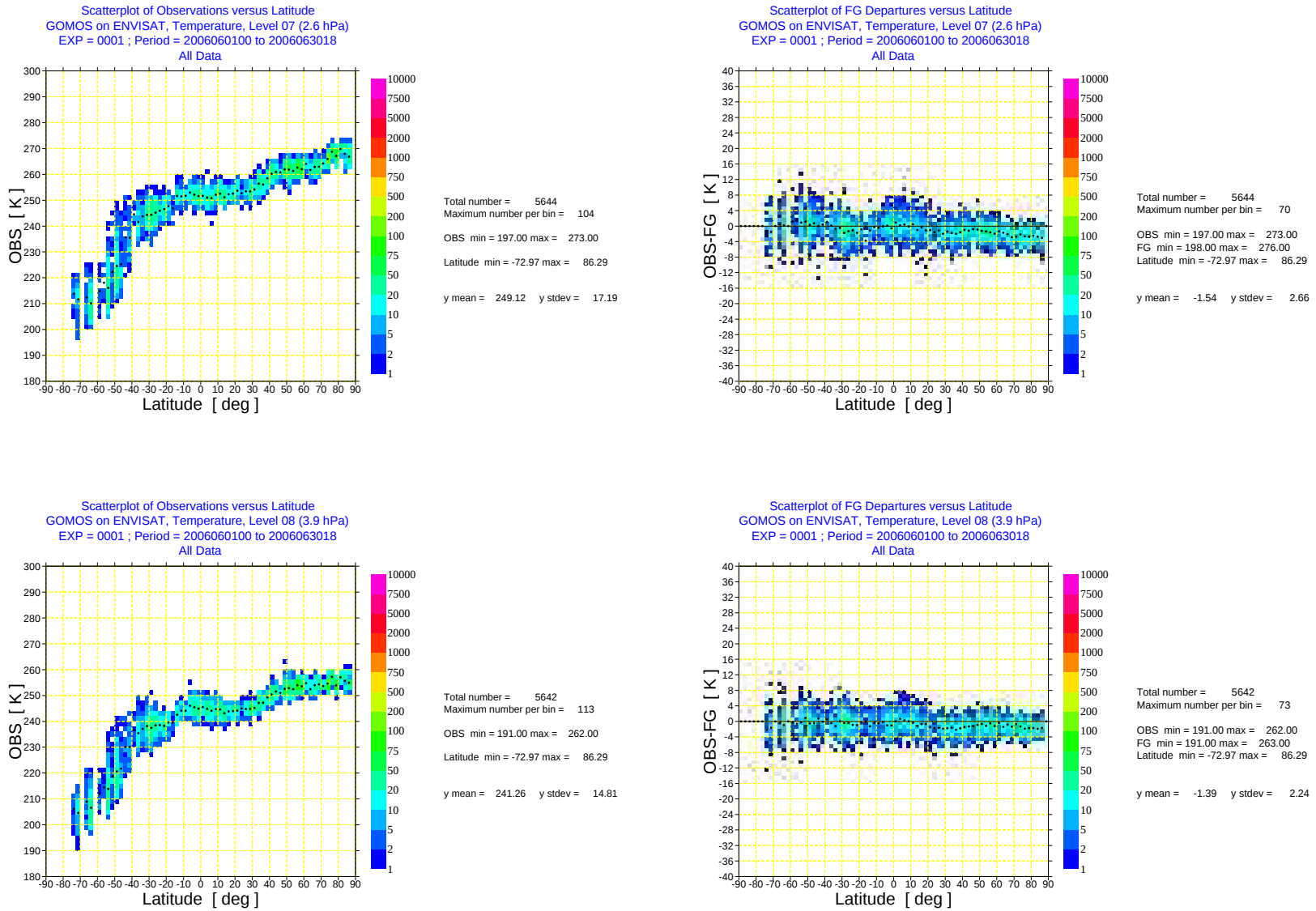


Fig. 12. As Fig. 9 but for level 7 (2.6 hPa) and level 8 (3.9 hPa).

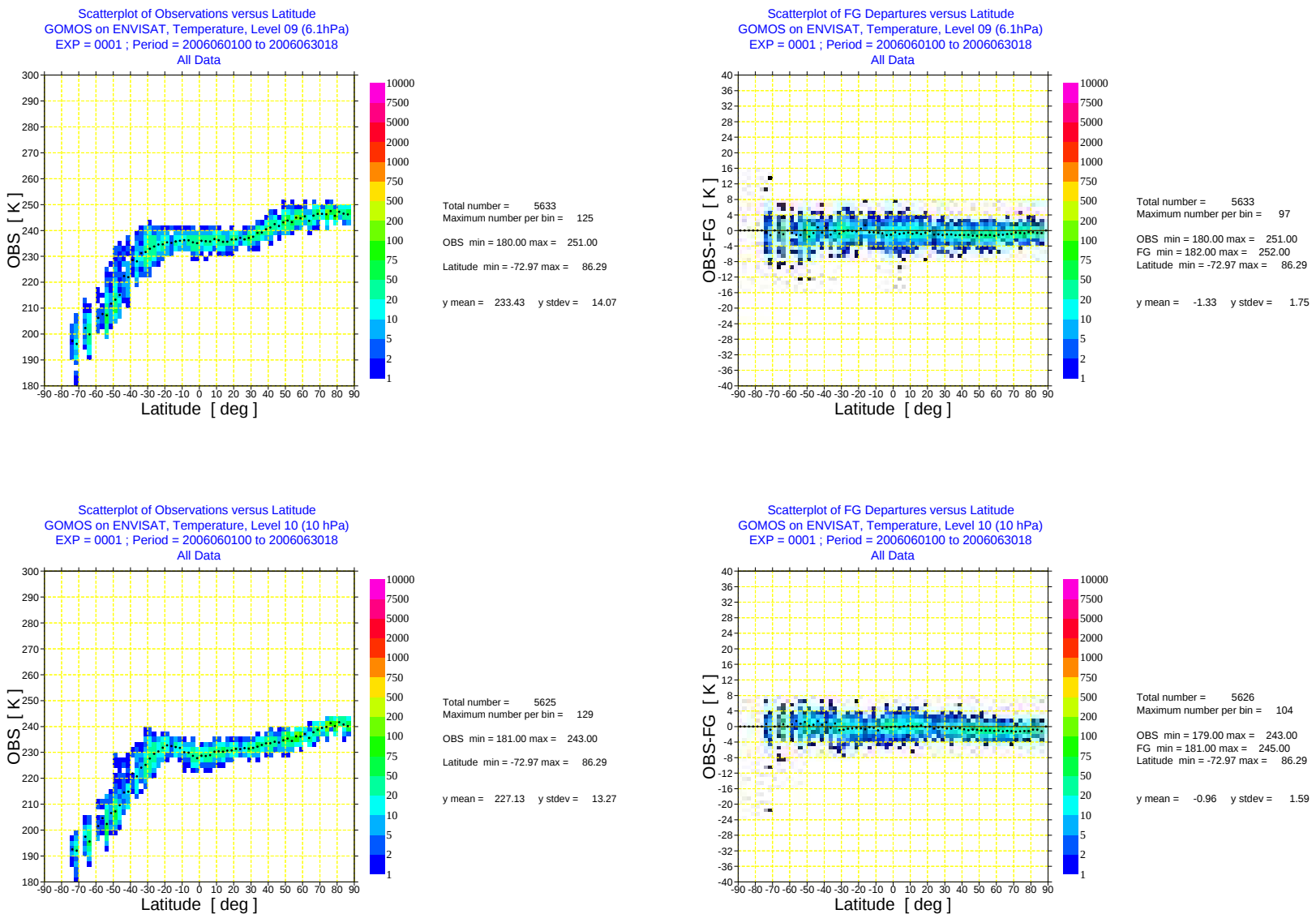


Fig. 13. As Fig. 9 but for level 9 (6.1 hPa) and level 10 (10 hPa).

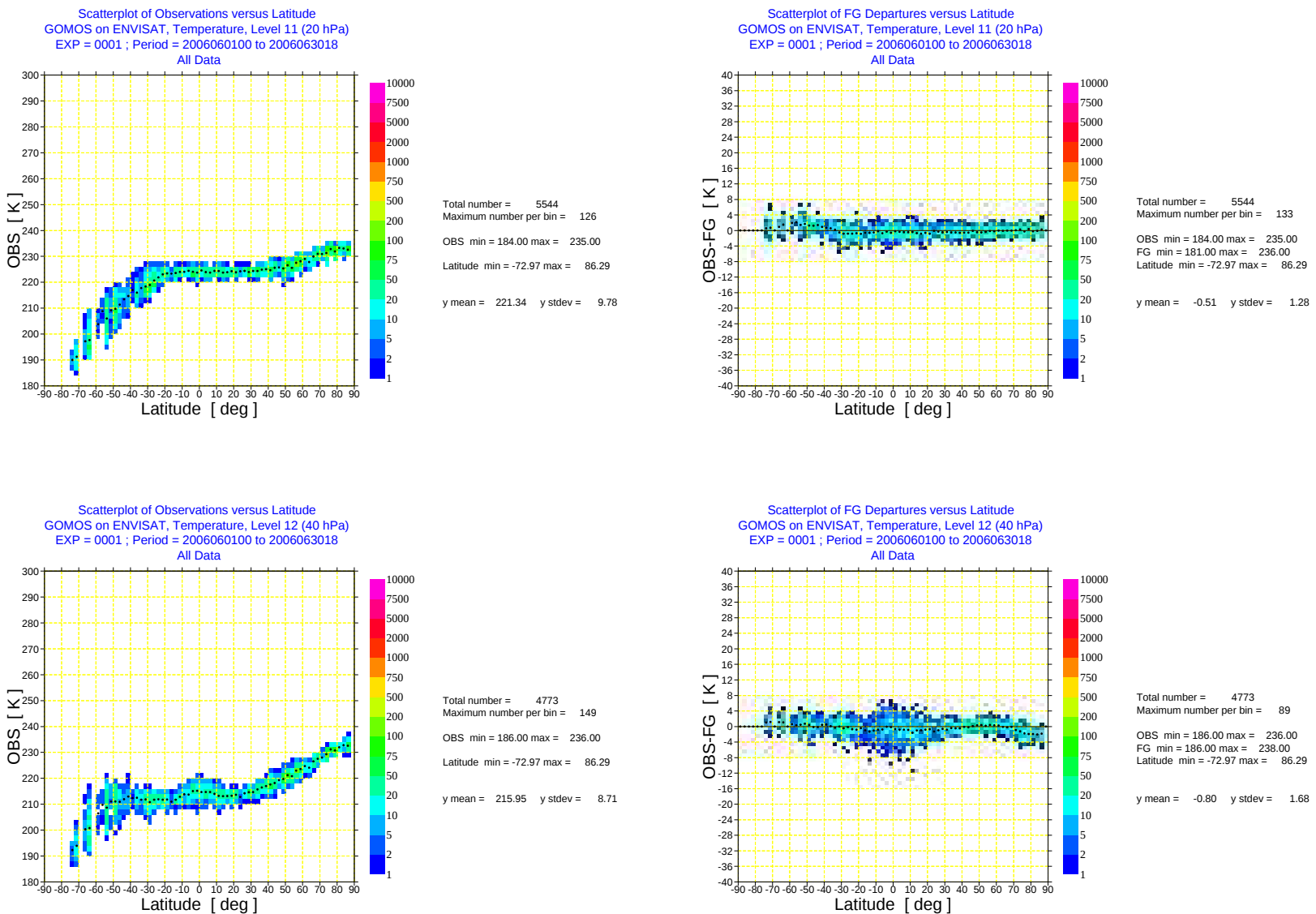


Fig. 14. As Fig. 9 but for level 11 (20 hPa) and level 12 (40 hPa).

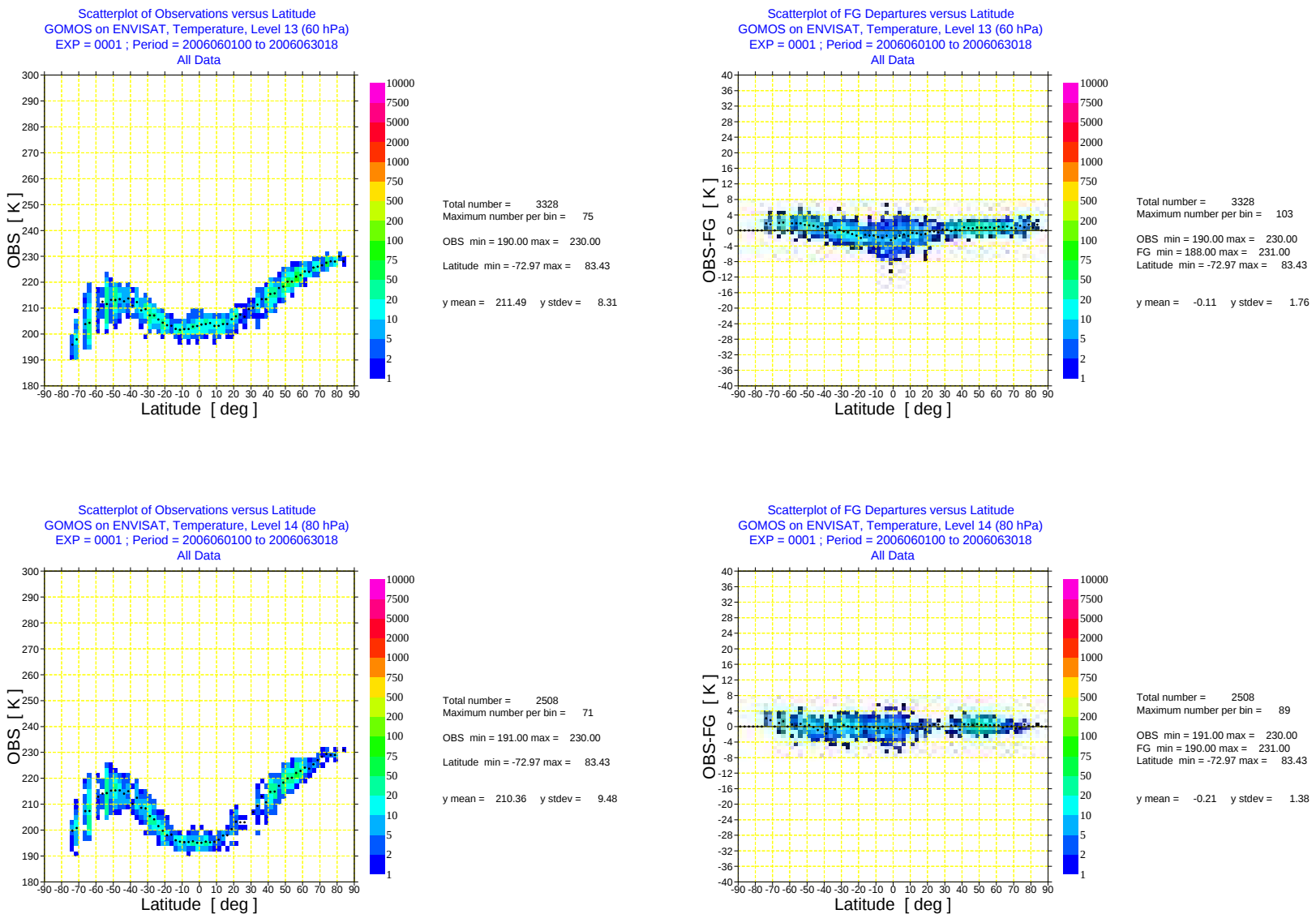


Fig. 15. As Fig. 9 but for level 13 (60 hPa) and level 14 (80 hPa).

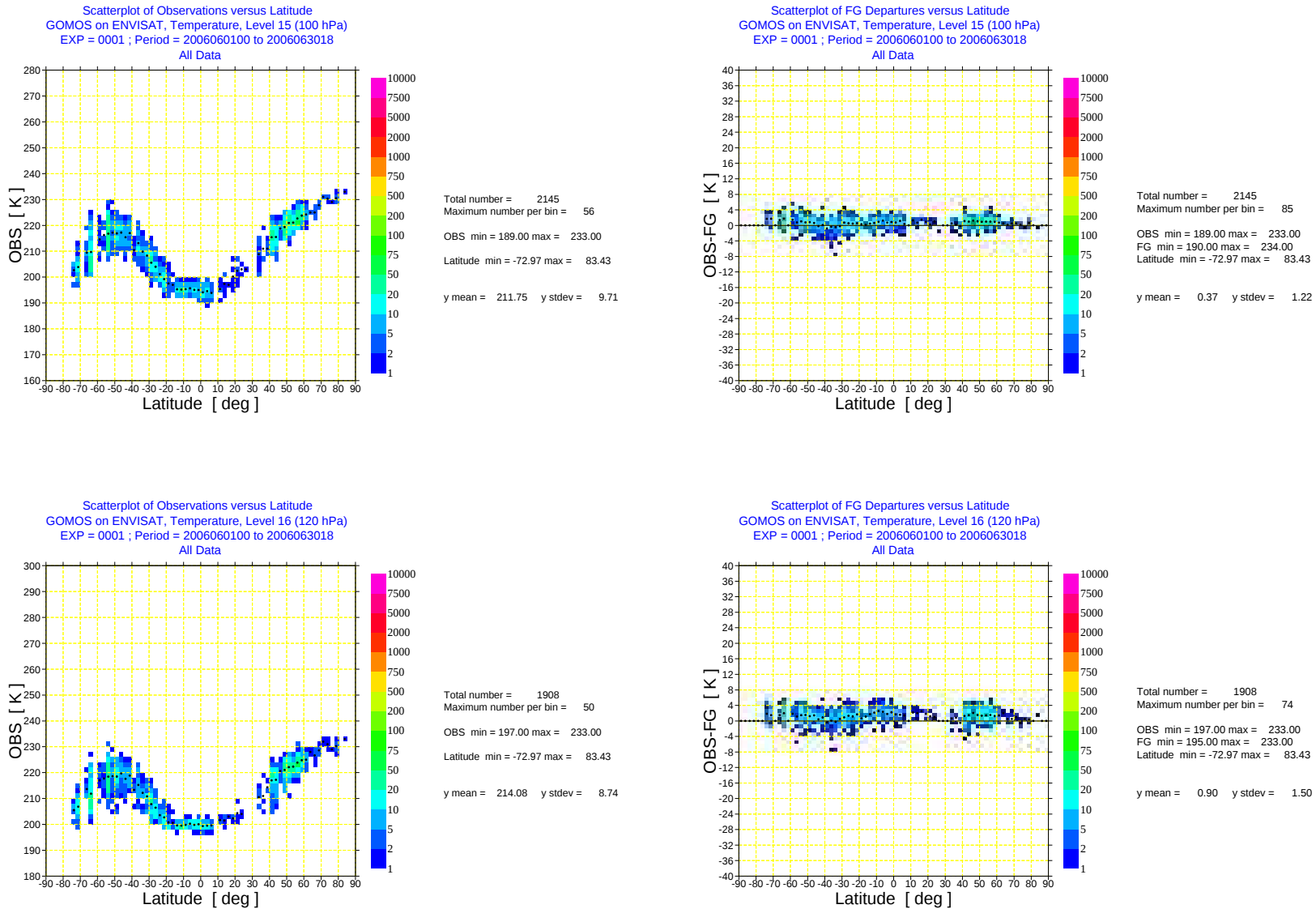


Fig. 16. As Fig. 9 but for level 15 (100 hPa) and level 16 (120 hPa).

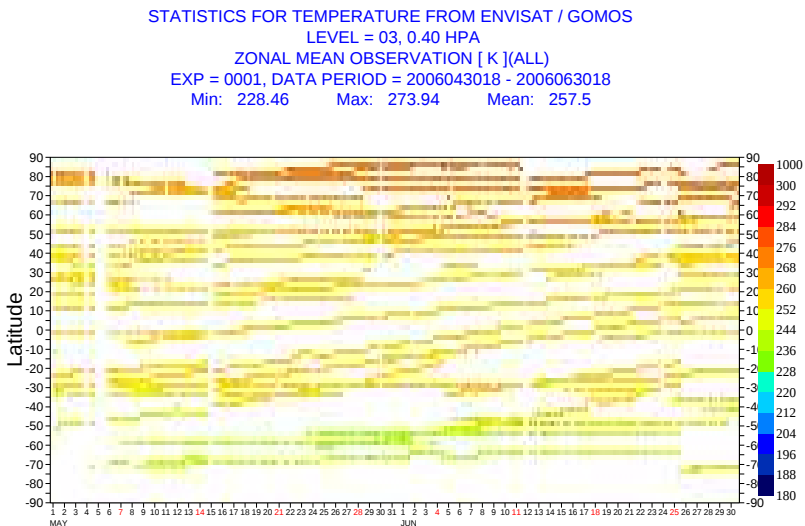
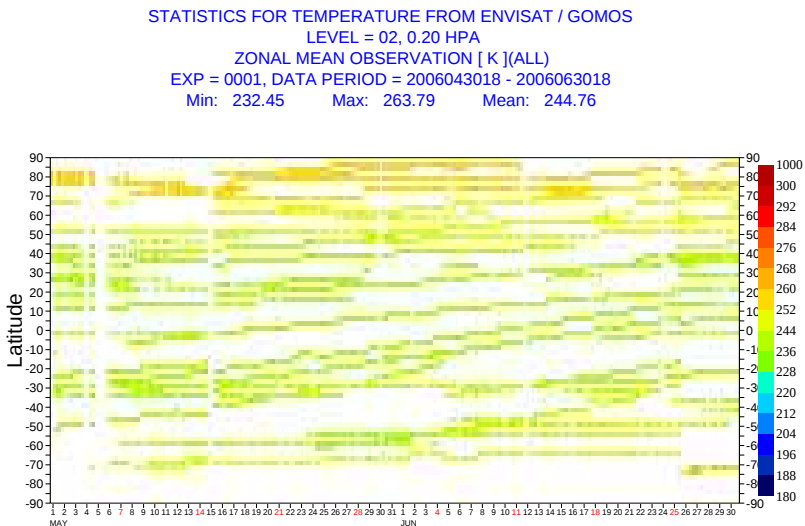
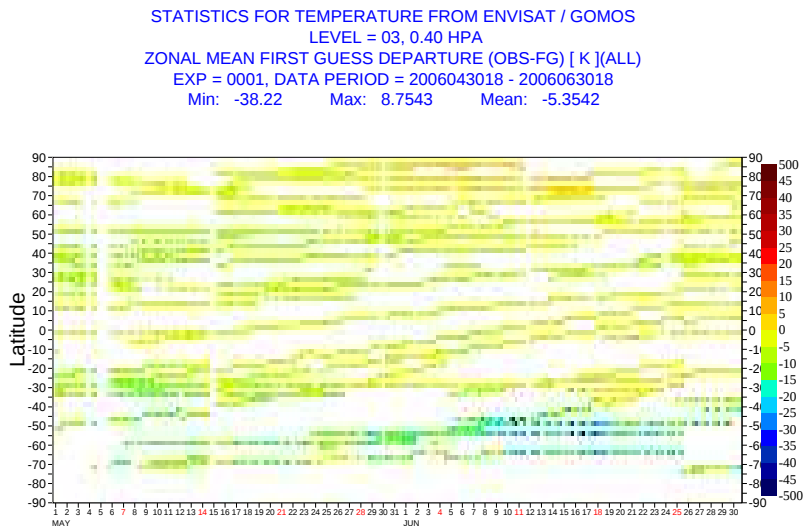
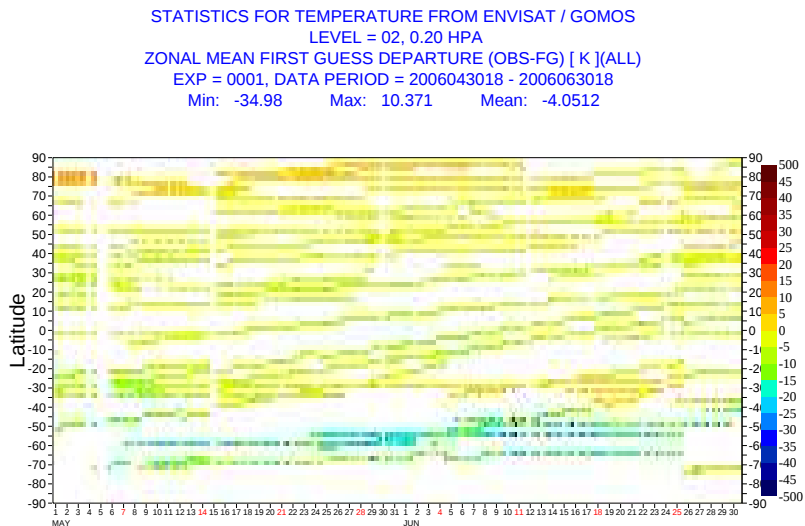


Fig. 17. Hovmöller diagram of zonal mean ENVISAT GOMOS NRT temperature data per 6-hour cycle and of the zonal mean first-guess departures for level 2 (0.2 hPa) and level 3 (0.4 hPa) for June 2006.

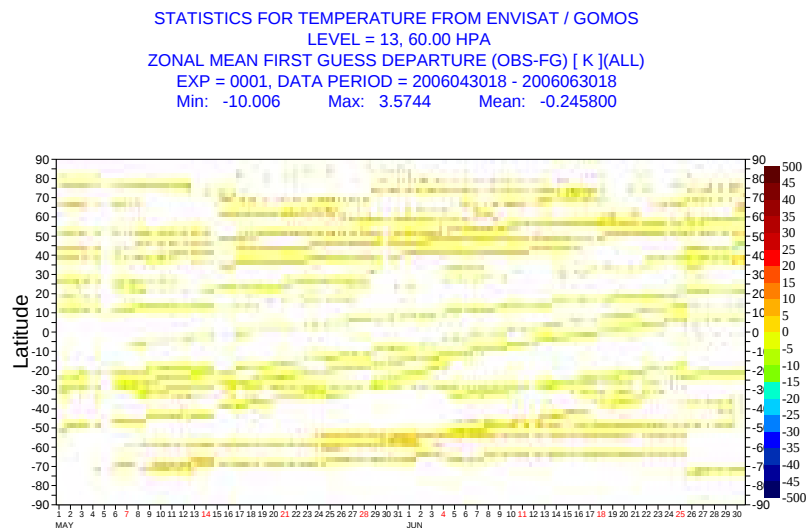
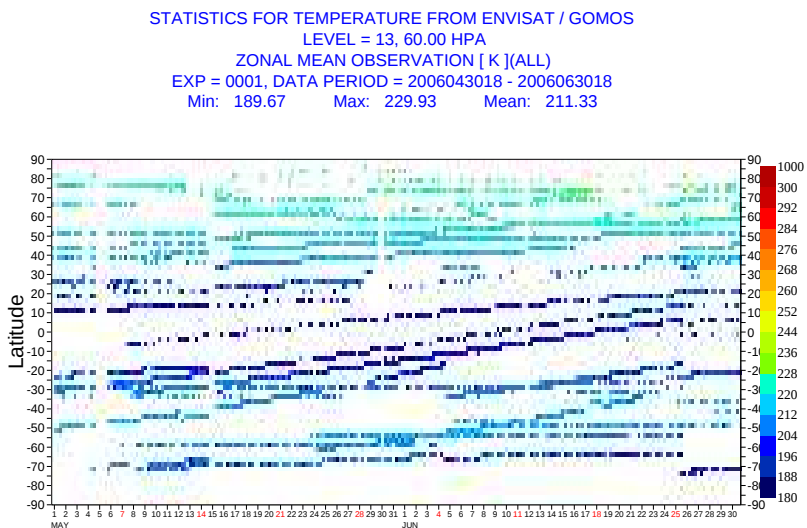
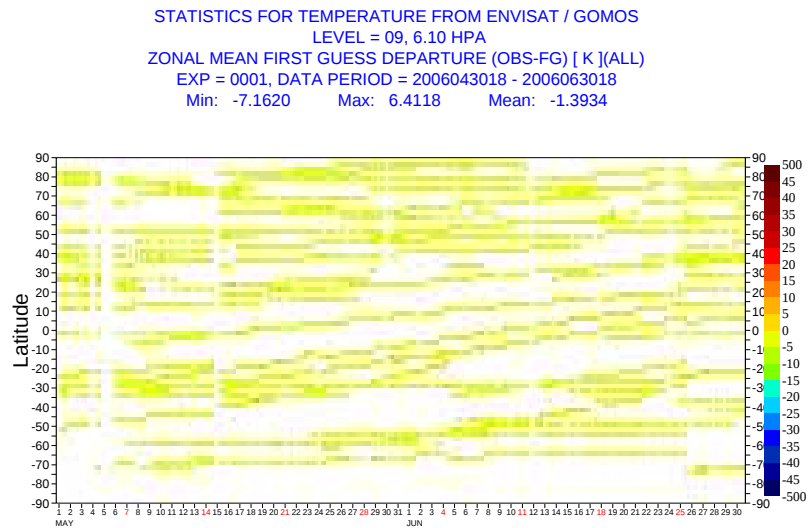
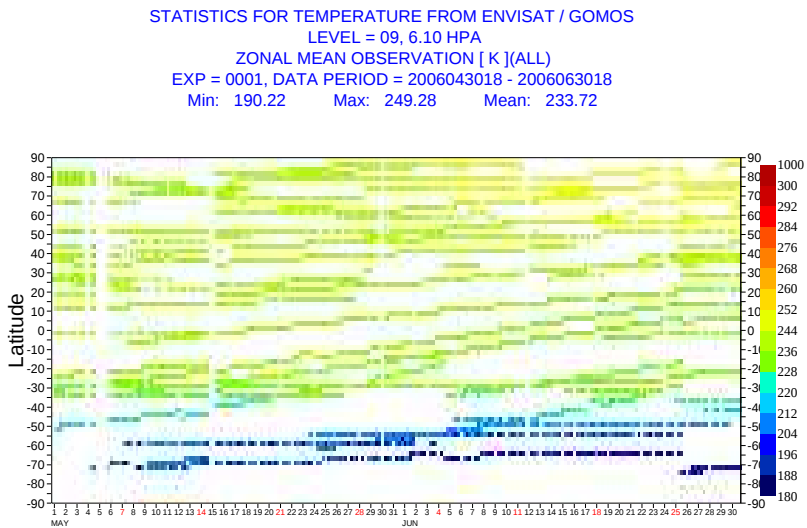


Fig. 18. As Fig. 17 but for level 9 (6.1 hPa) and level 13 (60 hPa).

Fig. 19. Geographical distribution of mean ENVISAT GOMOS NRT temperature data and mean first-guess departures for level 2 (0.2 hPa) and level 3 (0.4 hPa) for June 2006.

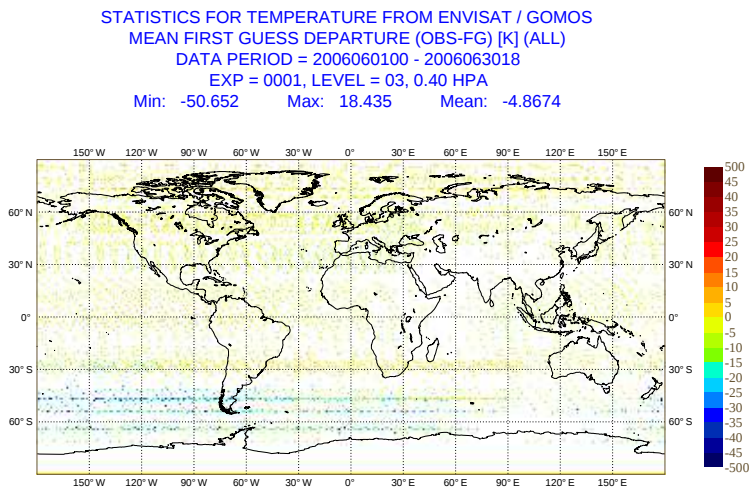
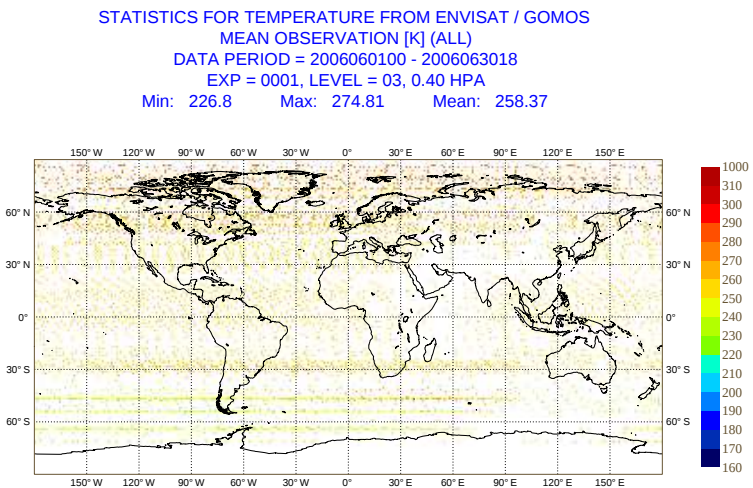
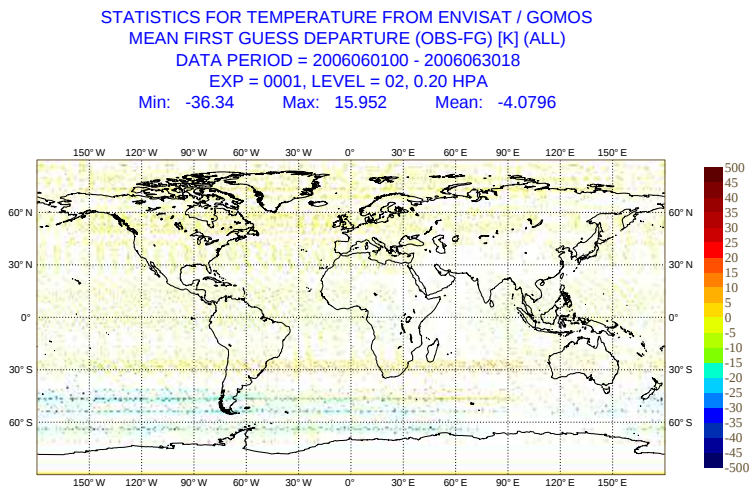
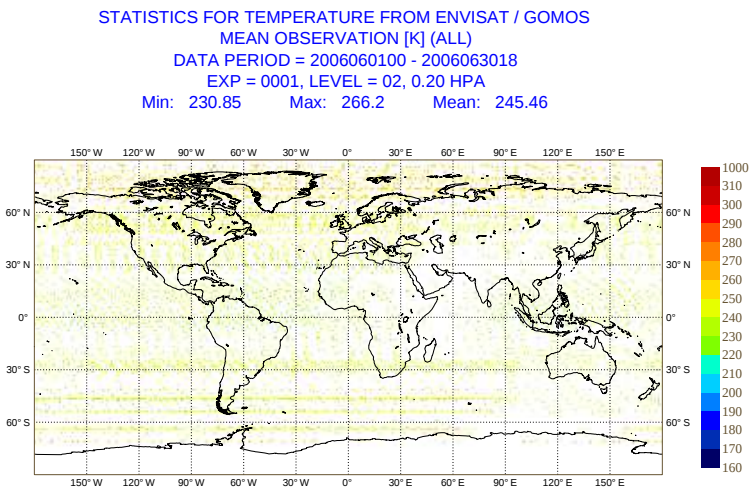
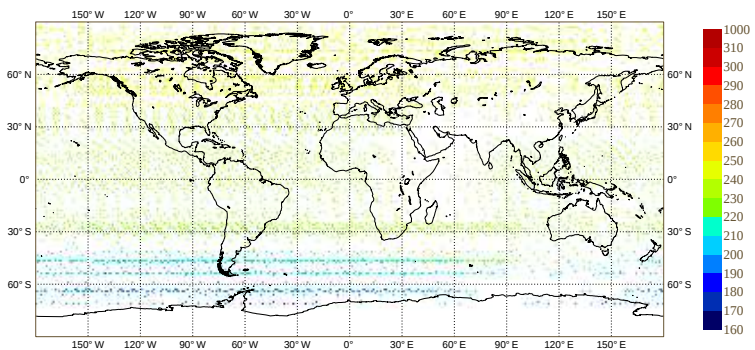
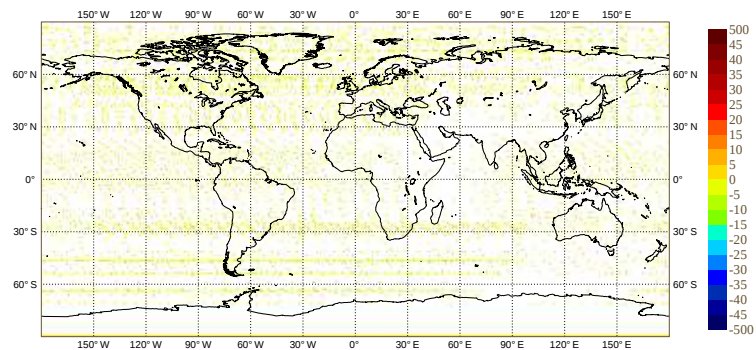


Fig. 20. As Fig. 19 but for level 9 (6.1 hPa) and level 13 (60 hPa).

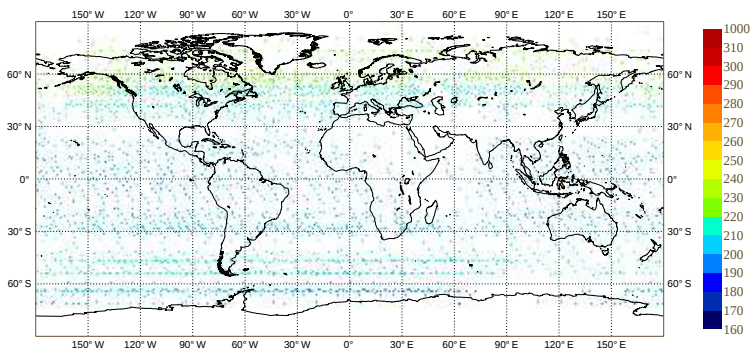
STATISTICS FOR TEMPERATURE FROM ENVISAT / GOMOS
 MEAN OBSERVATION [K] (ALL)
 DATA PERIOD = 2006060100 - 2006063018
 EXP = 0001, LEVEL = 09, 6.10 HPA
 Min: 180.33 Max: 250.73 Mean: 233.43



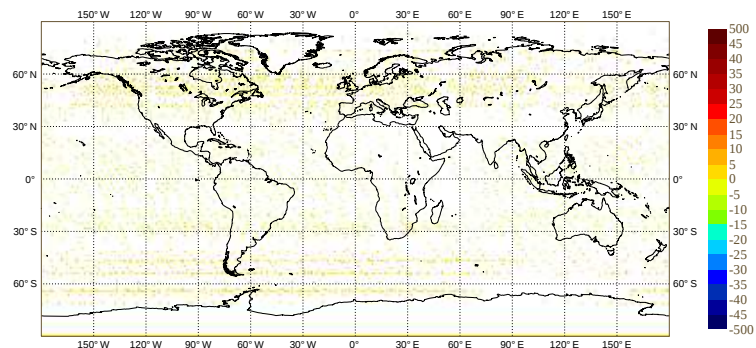
STATISTICS FOR TEMPERATURE FROM ENVISAT / GOMOS
 MEAN FIRST GUESS DEPARTURE (OBS-FG) [K] (ALL)
 DATA PERIOD = 2006060100 - 2006063018
 EXP = 0001, LEVEL = 09, 6.10 HPA
 Min: -13.496 Max: 12.7 Mean: -1.3278



STATISTICS FOR TEMPERATURE FROM ENVISAT / GOMOS
 MEAN OBSERVATION [K] (ALL)
 DATA PERIOD = 2006060100 - 2006063018
 EXP = 0001, LEVEL = 13, 60.00 HPA
 Min: 189.67 Max: 229.93 Mean: 211.49



STATISTICS FOR TEMPERATURE FROM ENVISAT / GOMOS
 MEAN FIRST GUESS DEPARTURE (OBS-FG) [K] (ALL)
 DATA PERIOD = 2006060100 - 2006063018
 EXP = 0001, LEVEL = 13, 60.00 HPA
 Min: -10.745 Max: 5.8577 Mean: -0.119989



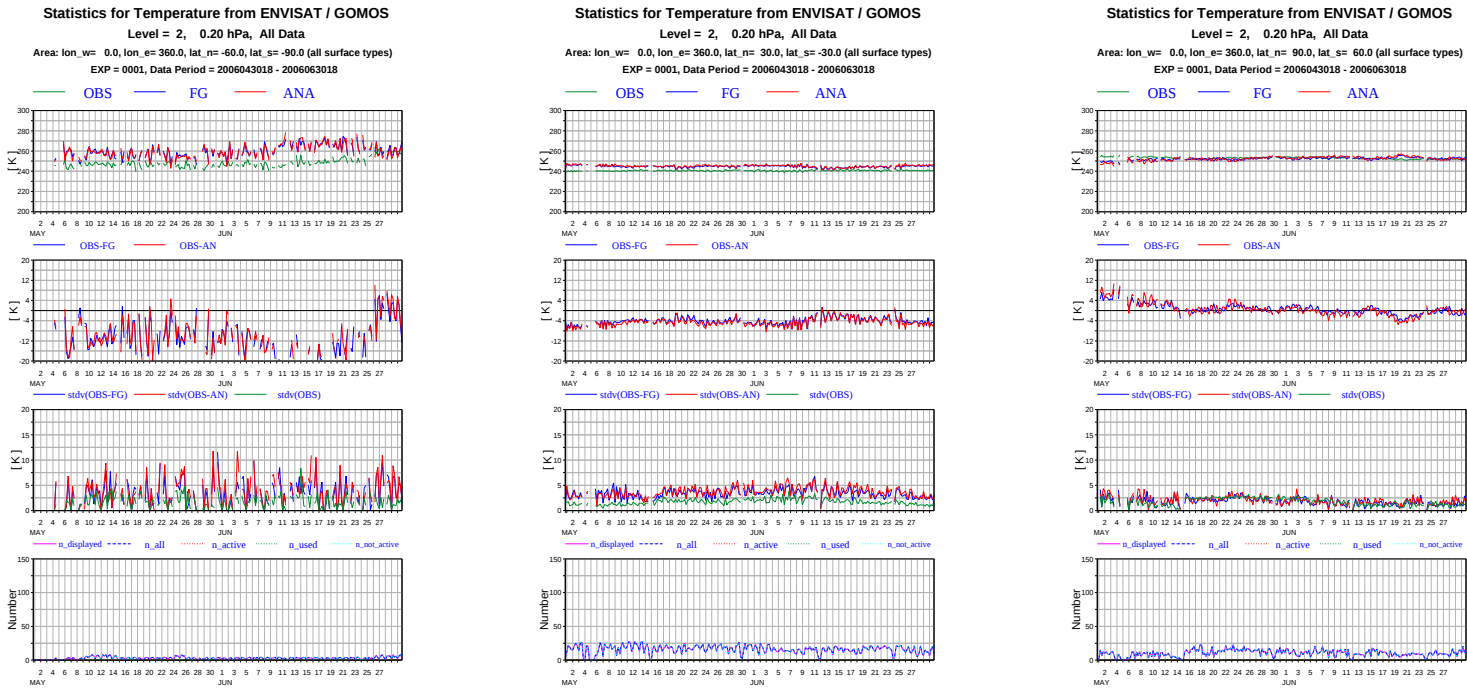


Fig. 21. Timeseries of mean ENVISAT GOMOS NRT temperature data, first guess and analysis values (top panels), first-guess and analysis departures (second panels), standard deviations (third panels), and number of data (bottom panels) per 6-hour cycle for level 2 (0.2 hPa) 90-60N, 30N-30S, 60-90S for the period May - June 2006.

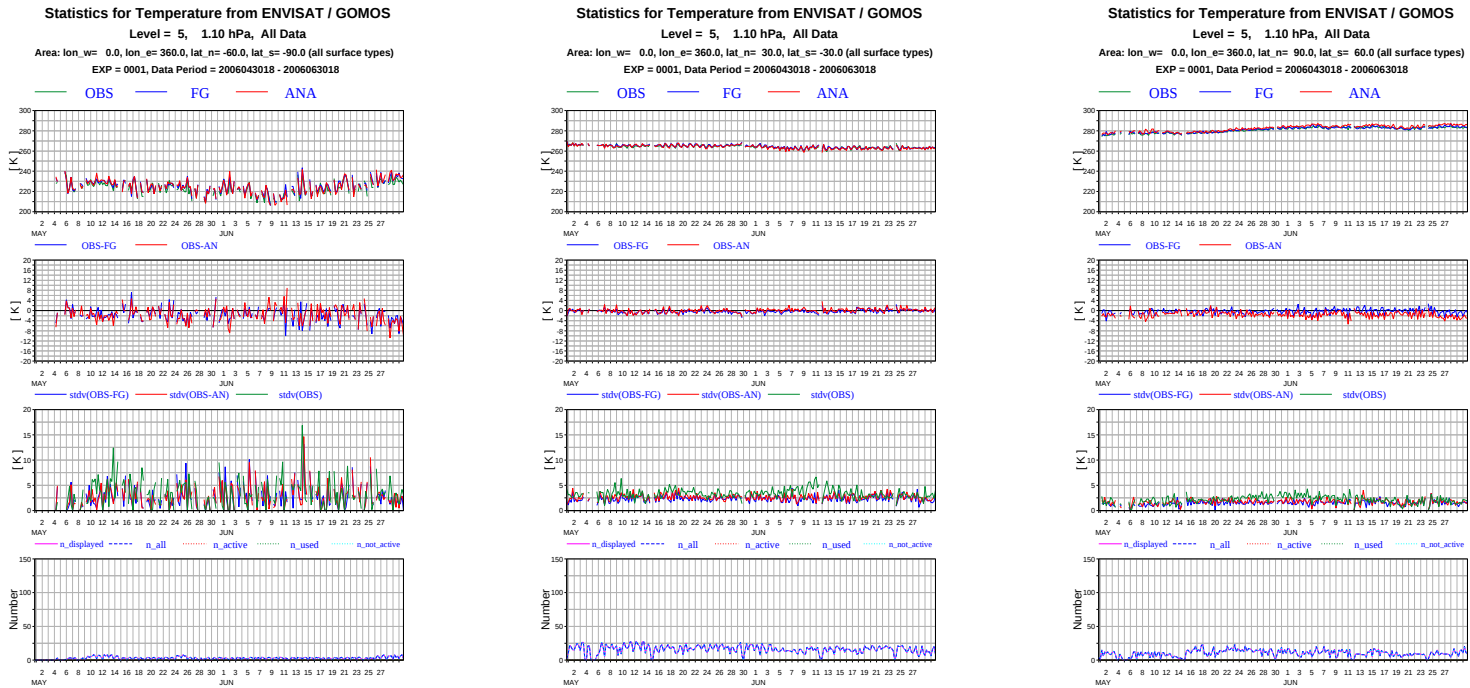


Fig. 22. As Figure 21, but for level 5 (1.1 hPa).

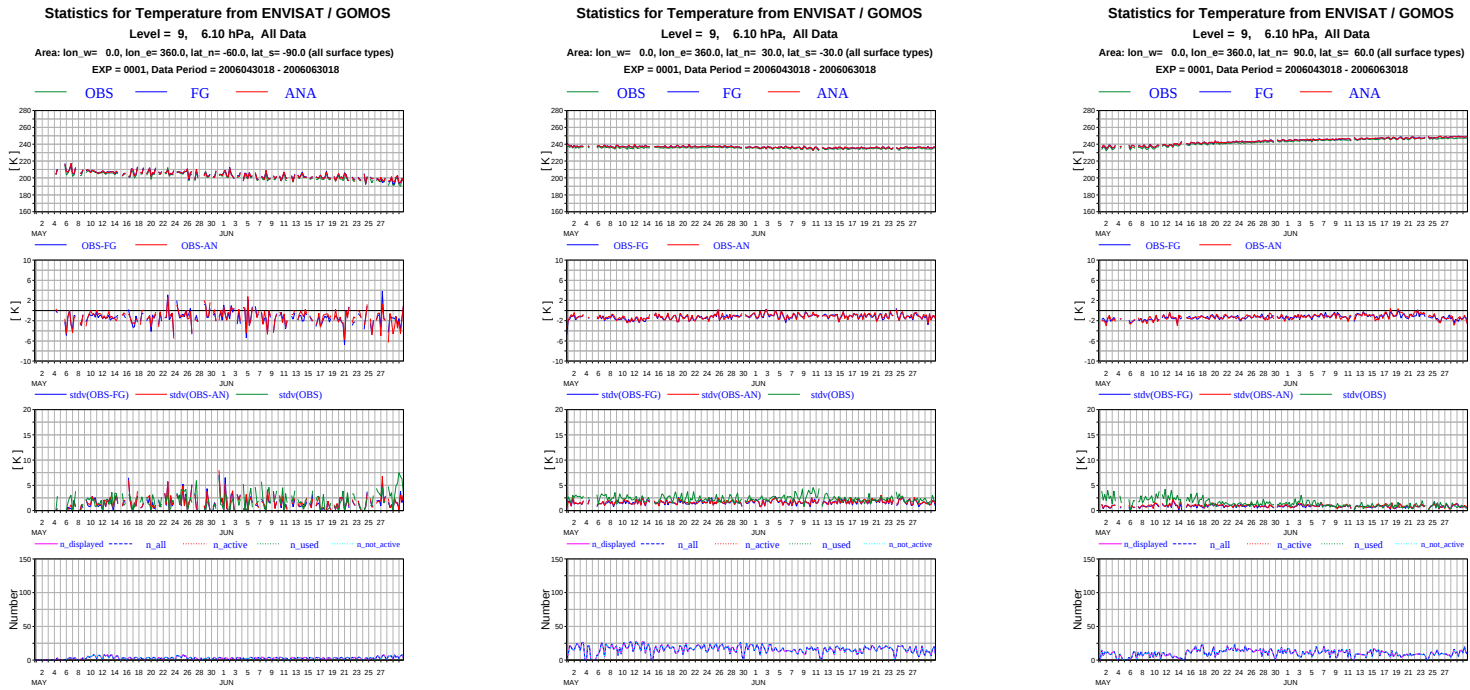


Fig. 23. As Figure 21, but for level 9 (6.1 hPa).

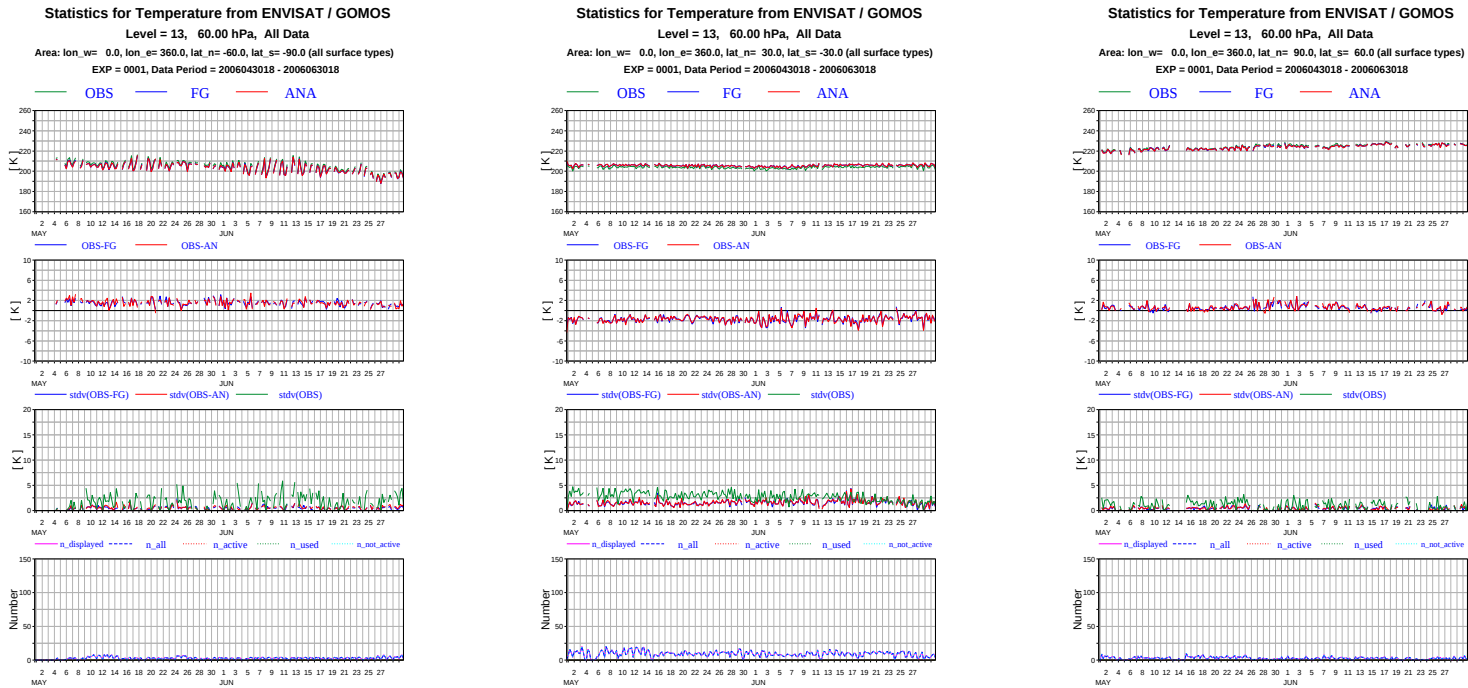


Fig. 24. As Figure 21, but for level 13 (60 hPa).