



Supplement of

Modelling stratospheric composition for the Copernicus Atmosphere Monitoring Service: multi-species evaluation of IFS-COMPO Cy49

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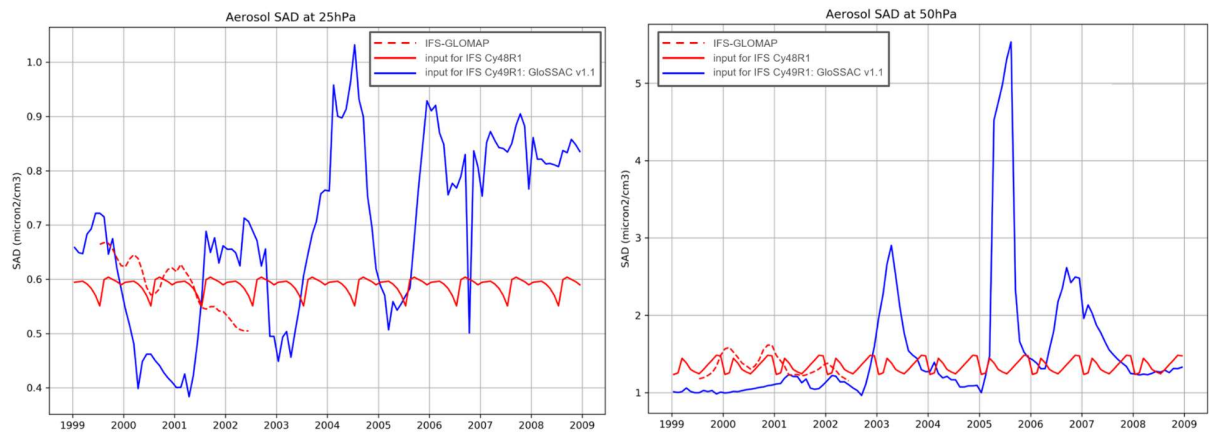


Figure S1. Surface Area Density of stratospheric aerosols in the Tropics (30°S-30°N) at pressure levels 25hPa (left) and 50hPa (right): output of the experimental IFS-GLOMAP configuration for years 1999-2002 (red dashed line); resulting input climatology for IFS-Compo Cy48R1 (red solid line); new input climatology GloSSAC for IFS-Compo Cy49R1 (blue solid line).

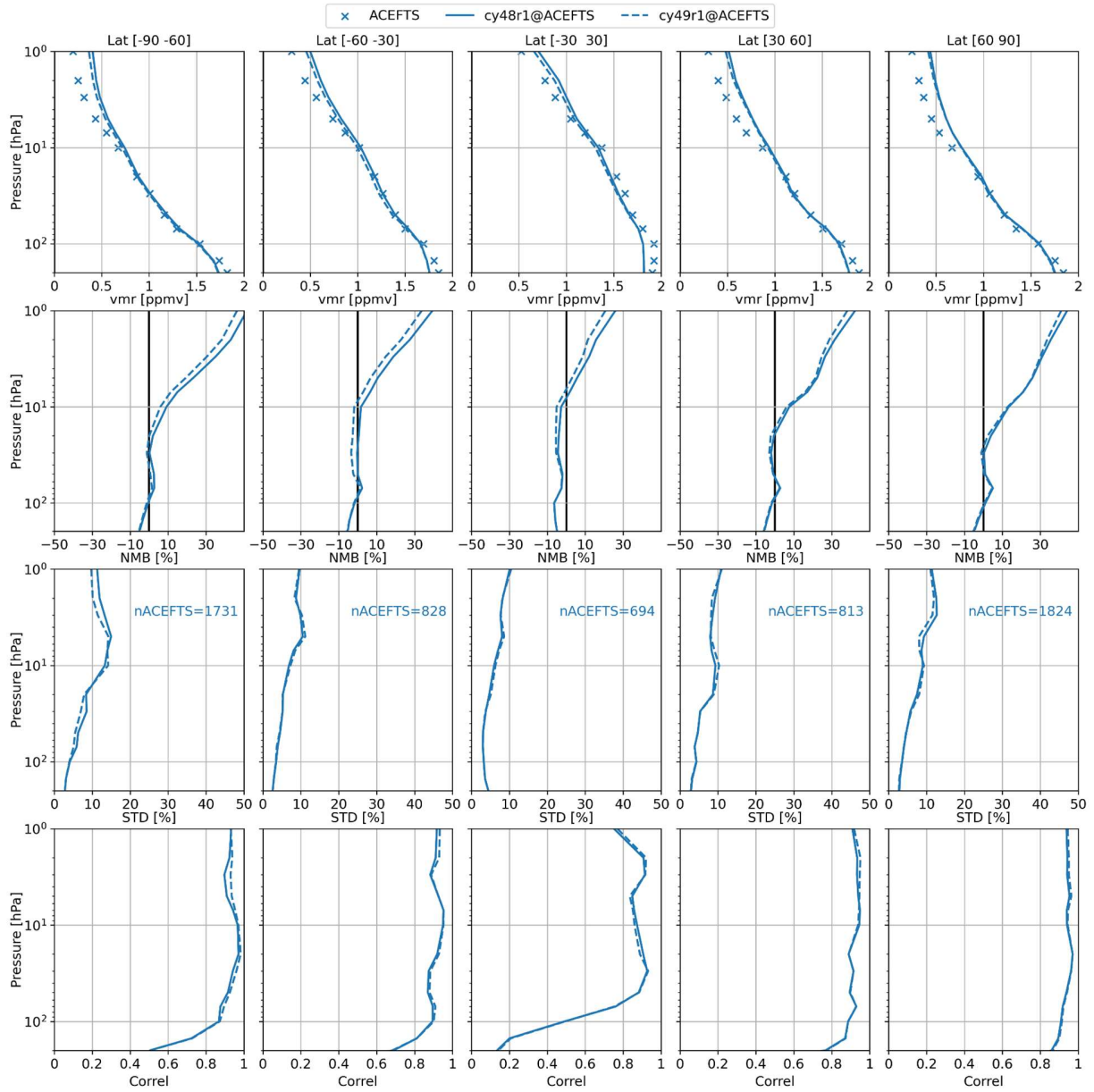
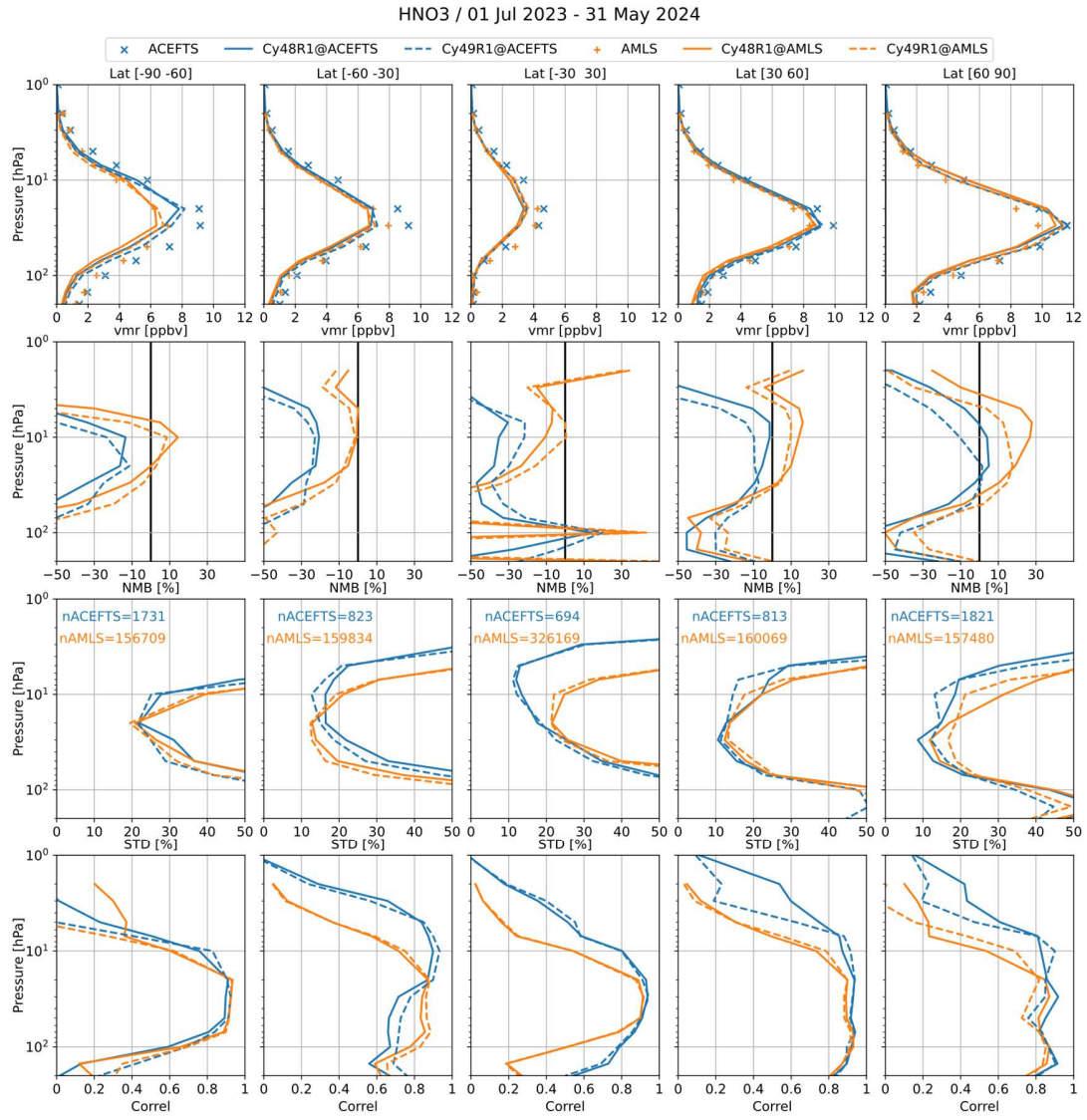
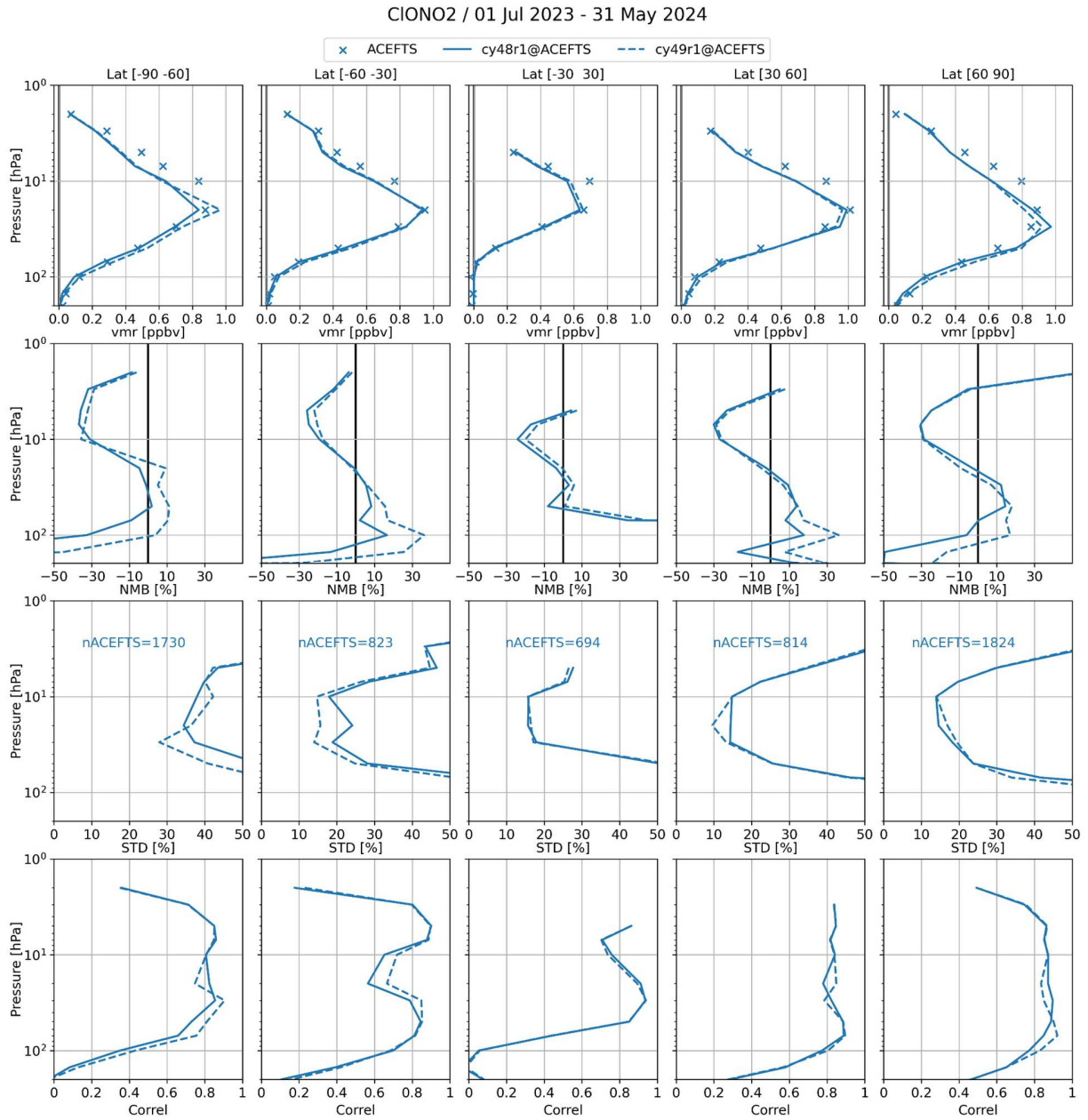


Figure S2. Same as Figure 4 but for CH₄, using only ACE-FTS observations.

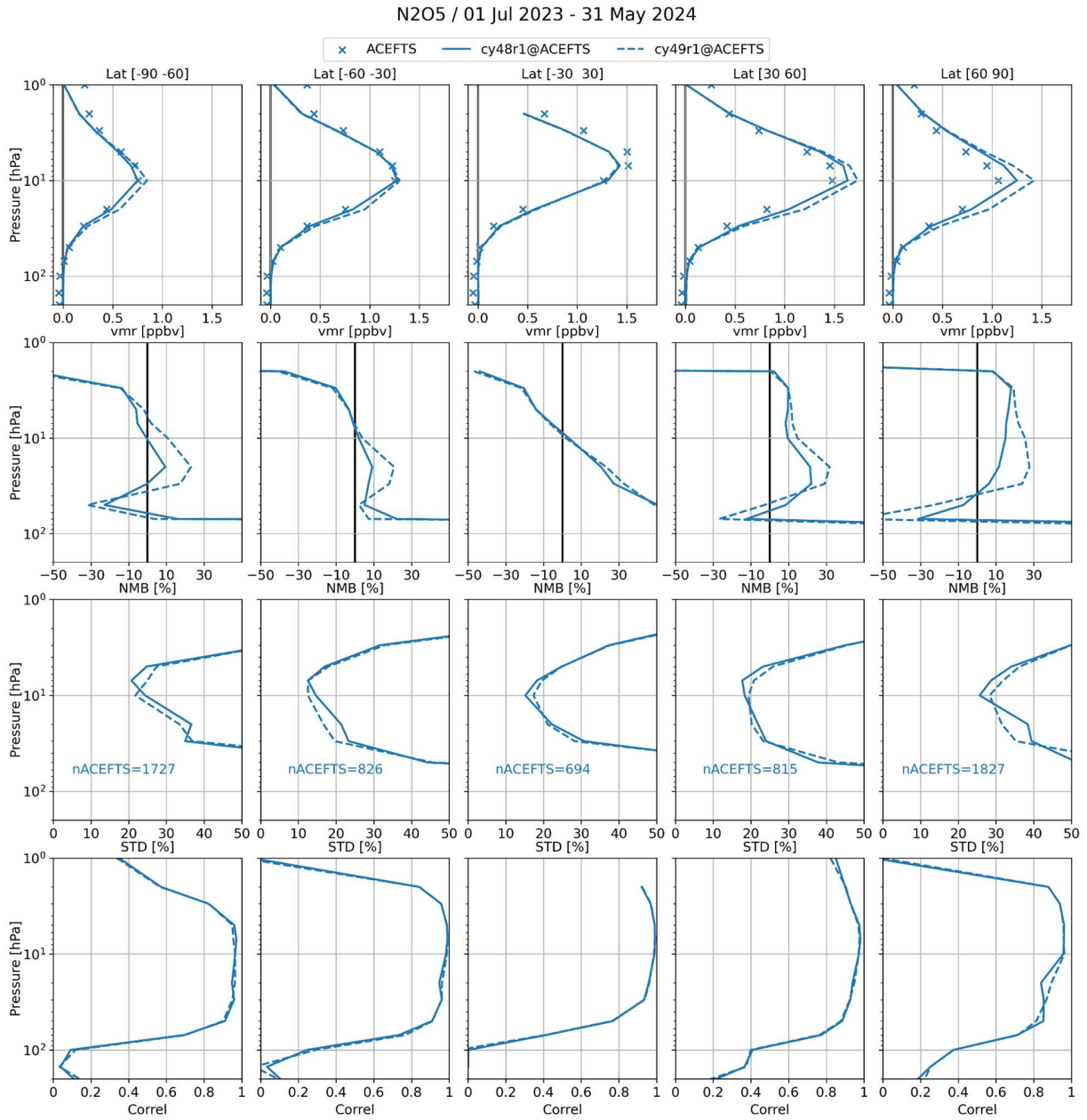


20 **Figure S3.** Same as Figure 4 but for HNO₃.

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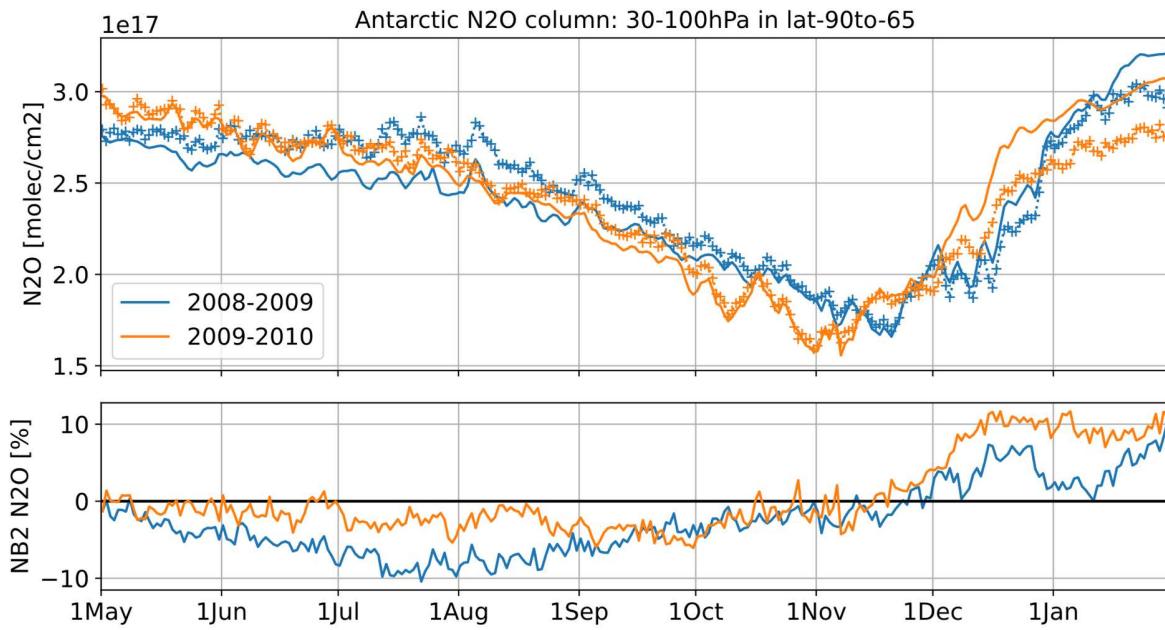
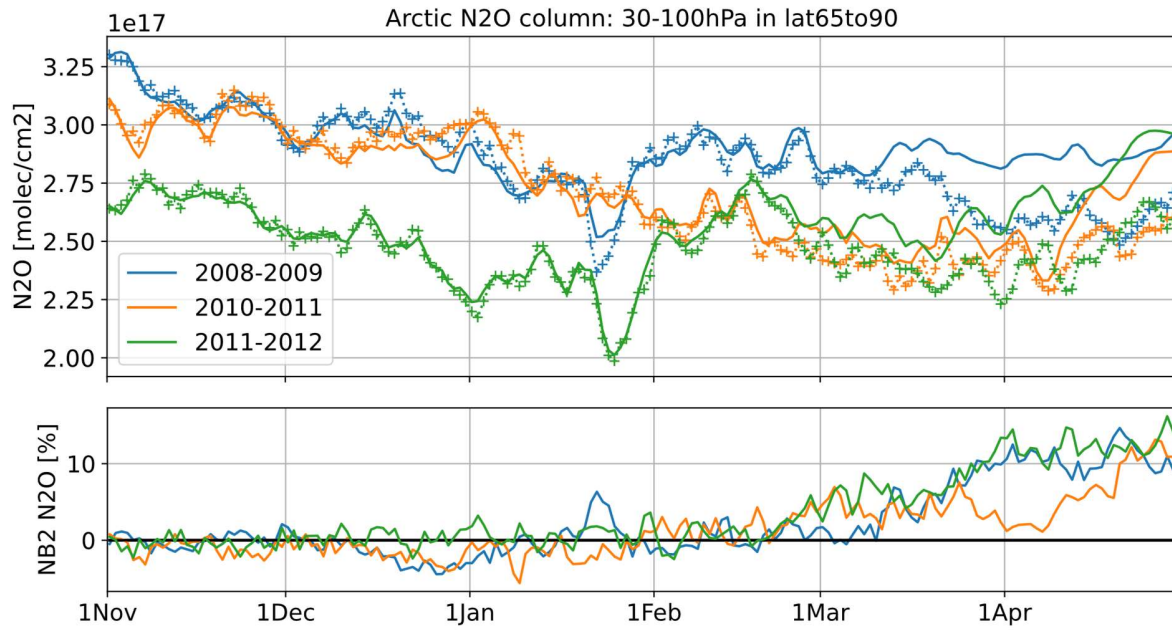


23 **Figure S4.** Same as Figure 4 but for CIONO₂, using only ACE-FTS observations.



25 **Figure S5.** Same as Figure 4 but for N₂O₅, using only ACE-FTS observations.

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27 **Figure S6.** Same as Figure 11 but for N₂O, using only the modelling experiments until 2012.

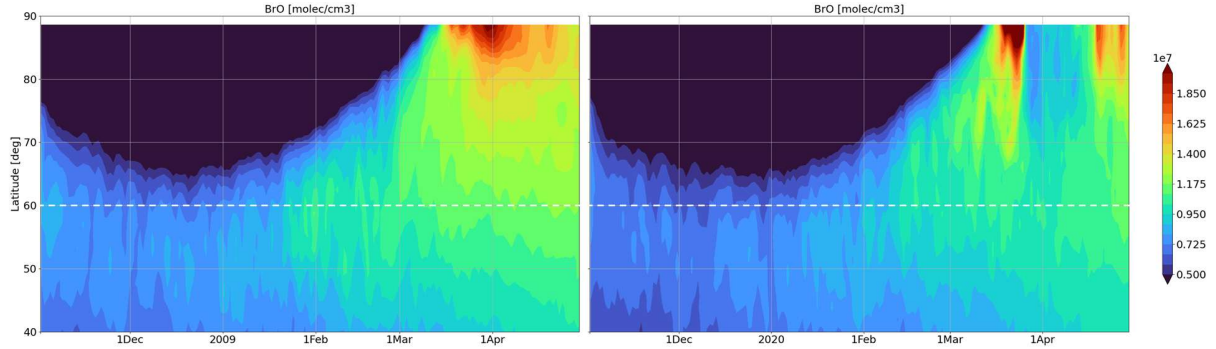


Figure S7. Daily zonal means of the BrO number density at 100 hPa, as a function of time and latitude, by IFS-COMPO Cy49R1 in winter-spring 2008-2009 (left) and 2019-2020 (right). The dashed white line indicates the latitude of Harestua.

Table S1. Criteria used to derive scores for each reference dataset, in five regions of the global stratosphere (see summary scorecard, Fig. 19) from the Normalized Mean Bias (NMB), Standard Deviations of differences between model and observations (STD), and corresponding correlations (Correl.).

$ MNB \leq 10\%$	and	$STD \leq 30\%$	and	$Correl. \geq 0.7$	$\rightarrow$ score = 2
$ MNB \leq 15\%$	and	$(STD \leq 30\% \text{ or } Correl. \geq 0.7)$			$\rightarrow$ score = 1
$ MNB \leq 30\%$	and	$(STD \leq 50\% \text{ or } Correl. \geq 0.4)$			$\rightarrow$ score = 0
$ MNB > 30\%$	or	$STD > 50\%$	or	$Correl < 0.4$	$\rightarrow$ score = -1
$ MNB > 30\%$	and	$STD > 50\%$	and	$Correl < 0.4$	$\rightarrow$ score = -2

Table S2. Ranges of total scores for performance assessment in section 7 (summary scorecard).

Total score	performance	symbol
4	very good	++
2 or 3	good	+
0 or 1	neutral	n
-1 or -2	poor	-
-3 or -4	very poor	--