Supplementary Information

for

Speeding up in the stratospheric O$_3$ recovery of the Southern Hemisphere contrasting with the O$_3$ decline of the Northern Hemisphere as seen by IASI over 2008-2017

C. Wespes$^1$, D. Hurtmans$^1$, S. Chabrillat$^2$, G. Ronsmans$^1$, C. Clerbaux$^{1,3}$ and P.-F. Coheur$^1$

$^1$ Chimie Quantique et Photophysique, Université Libre de Bruxelles, Brussels, Belgium
$^2$ Belgian Institute for Space Aeronomy, Brussels, Belgium
$^3$ LATMOS/IPSL, Sorbonne Université, UVSQ, CNRS, Paris, France

Contents of this file

1 Figure S1

Figure S1 displays the latitudinal distribution of MUSt O$_3$ columns as a function of time observed from IASI in comparison with that simulated by the BASCOE CTM with its standard chemical mechanism (smoothed by the IASI averaging kernels), as well as the IASI-BASCOE differences for the MUSt and the LSt O$_3$ columns (Fig. S1 a et b, respectively). Note that the BASCOE simulations are driven by offline meteorological fields from ERA-Interim and performed after a 1 year spin-up with a horizontal resolution of 2.0°×2.5° and 60 levels in the vertical. Details on chemical mechanisms and parameterizations can be found in Huijnen et al., (2016) and Chabrillat et al. (2018). The purpose of this comparison is not to perform a proper validation/comparison exercise but to highlight and to estimate the “Jump” amplitude that affects the IASI MUSt O$_3$ time series and for which the exact reasons are still unknown. The “jump” in the IASI time series is clearly visible in the IASI-BASCOE difference panel on 15th September 2010 in the MUSt (see black narrow in Fig. S1a), while not in the LSt, as previously reported in the validation paper of Boynard et al. (2018). Based on that IASI-BASCOE comparison, the jump is estimated as reaching ~1-2 DU in the 55°S–55°N band and ~3-4 DU in the 55°–90° bands. These values are considered when analyzing trends in the MUSt O$_3$ time series in Sections 4.1 to 4.3 of the paper.
**Figure caption**

Fig.S1: Latitudinal distribution of (a) MUSt and (b) LSt O3 columns as a function of time observed from IASI (in DU; top panels), simulated by BASCOE (in DU; middle panels) and of the IASI-BASCOE differences (in %; bottom panels). The black narrow in the difference panel for the MUSt highlights a jump on 15\textsuperscript{th} September 2010.