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with version 2015/04/24 7.83 Copernicus papers of the LaTeX class copernicus.cls.
Date: 4 December 2015

Impact of different Asian source regions on the composition of the Asian monsoon anticyclone and of the extratropical lowermost stratosphere

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1 Supplementary material

1.1 MLS and CLaMS O_3 and CO

In the main part of the paper, pattern correlation coefficients between MLS measurements (Version 3.3) and CLaMS results for MLS(CO)/CLaMS(CO) and MLS(O_3)/CLaMS(O_3) are calculated between 360 and 400 K potential temperature for the entire monsoon season 2012 (see main part of the paper, Fig. 4). To illustrate the good correlations found between MLS and CLaMS, horizontal distributions of MLS(CO), CLaMS(CO) MLS(O_3), and CLaMS(O_3) are compared for individual days. For the comparison, the same horizontal cross-sections as in Figs. 2 and 3 of the main paper at 380 K potential temperature are shown in Fig. 1 for 1 July 2012, in Fig. 2 for 28 July 2012, in Fig. 3 for 2 August 2012, in Fig. 4 for 8 August 2012, in Fig. 5 for 12 September, and in Fig. 6 for 7 October 2012. In general, patterns in CLaMS O_3 and CO are similar to MLS measurement in the region of the Asian monsoon anticyclone and in addition in the entire Northern Hemisphere. Features like the filamentary structure on the western and eastern flank of the anticyclone on 1 July 2012, the elongated double peak structure on 28 July 2012, the symmetric structure with a westward eddy shedding on 2 August 2012, the split of the anticyclone into two smaller anticyclones on 8 August 2012, the anticyclone in the end phase on 12 September 2012, and the tracer distribution after the breakup of the anticyclone on 7 October 2012 are also evident in the MLS measurements. CLaMS CO shows a pattern similar to MLS CO; however, due to the coarse spatial resolution of MLS CO and possible deficiencies in MLS CO, the agreement is not quite as good as for O_3.

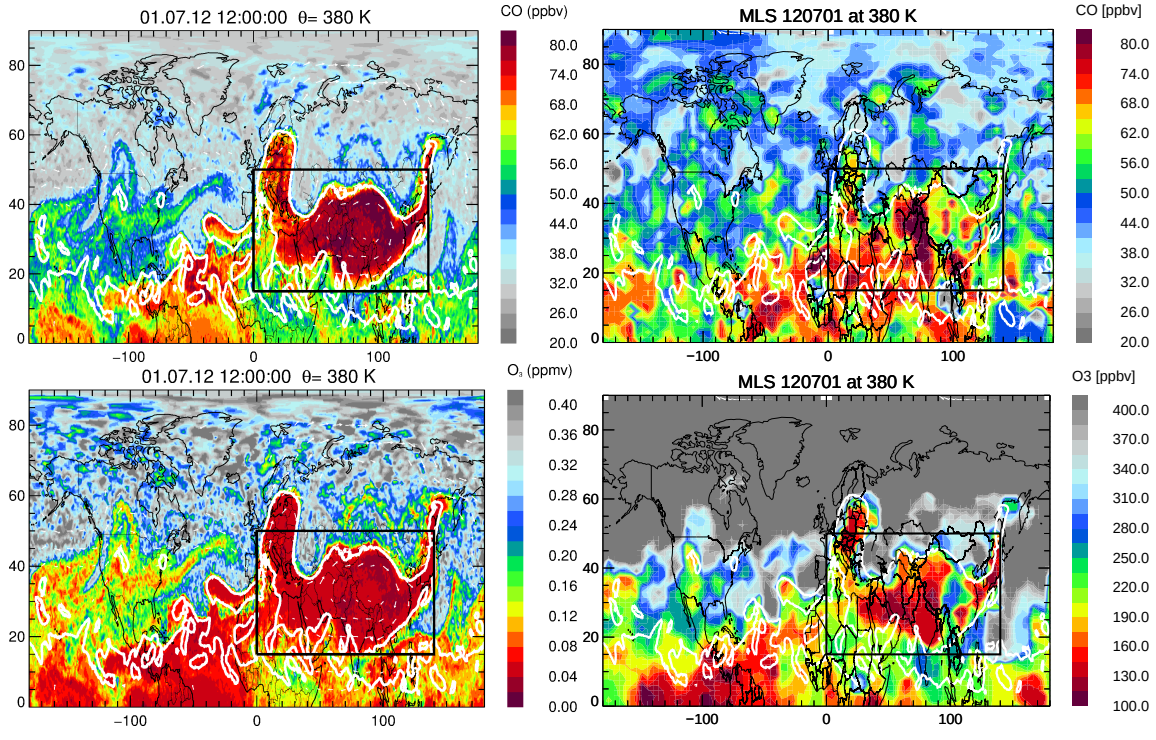


Figure 1. Horizontal cross-sections of simulated CLaMS (left) and measured MLS (right) CO (top) and O_3 (bottom) on 1 July 2012. Please note that the order of the colour scale for CO (top) and O_3 (bottom) is different, so that low ozone and high CO mixing ratios are marked in red. The black box (15°N–50°N, 0°E–140°E) highlights the region of the Asian monsoon anticyclone. The 4.5 PVU surface marks the edge of the anticyclone shown as a thick white line.

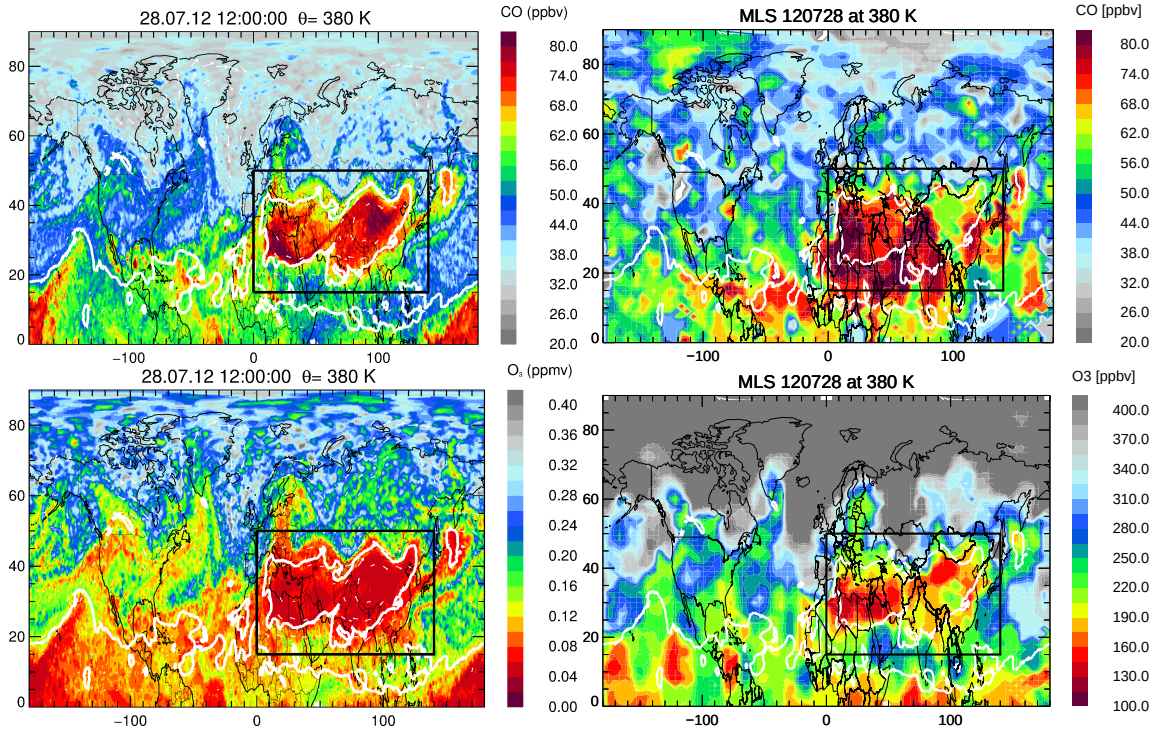


Figure 2. Same as Fig. 1, but for 28 July 2012.

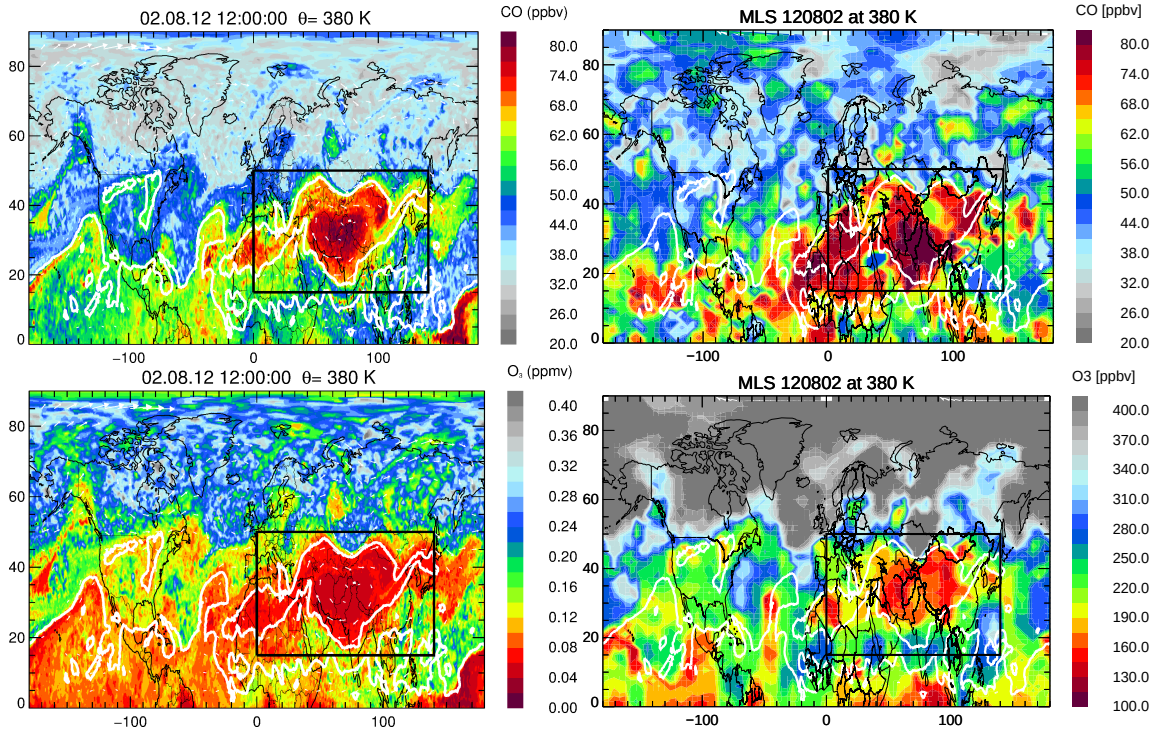


Figure 3. Same as Fig. 1, but for 2 August 2012.

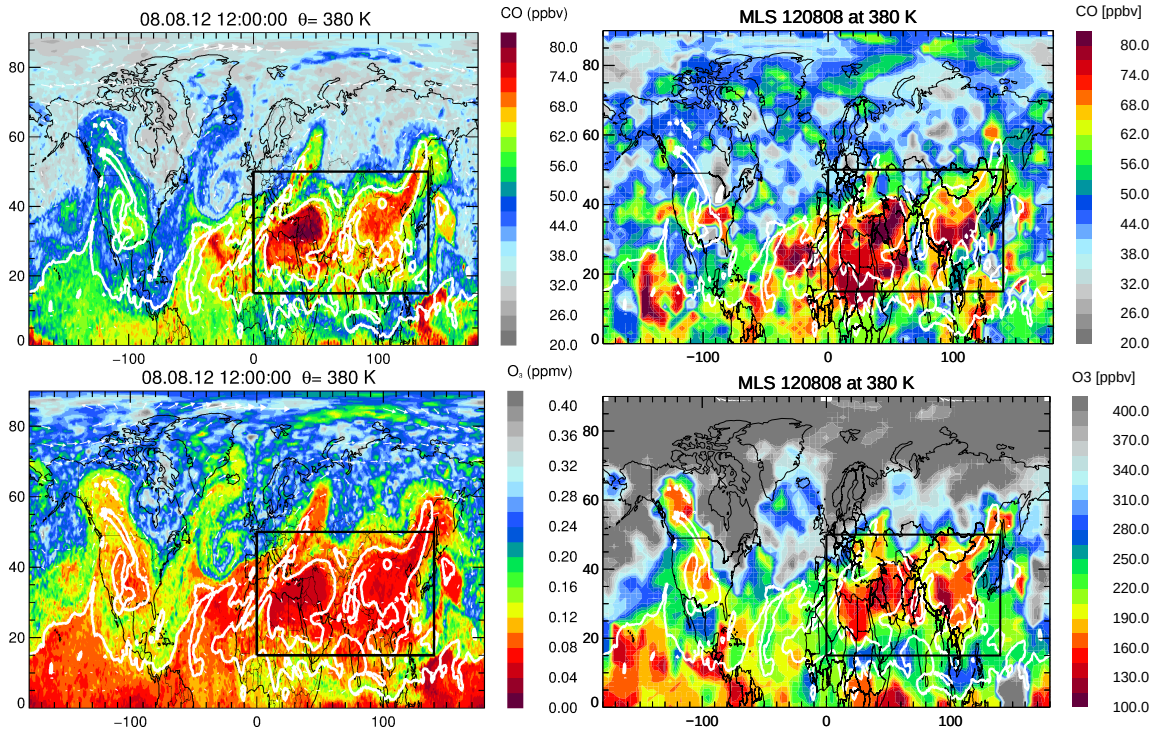


Figure 4. Same as Fig. 1, but for 8 August 2012.

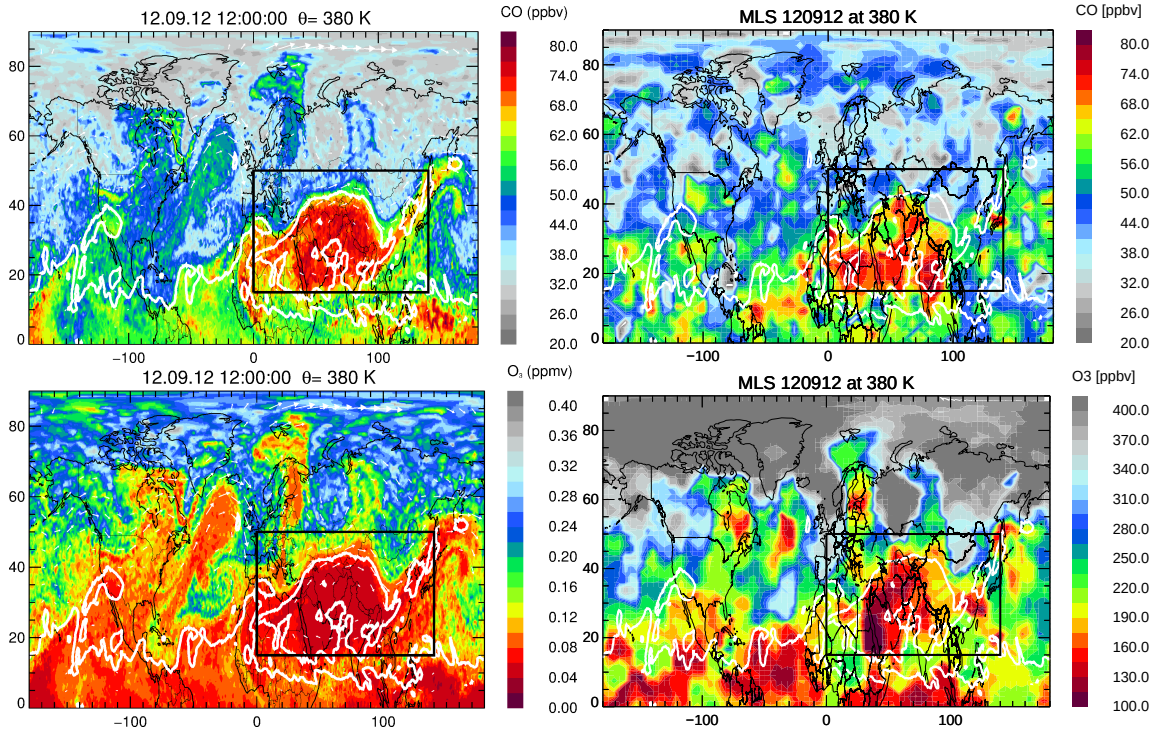


Figure 5. Same as Fig. 1, but for 12 September 2012.

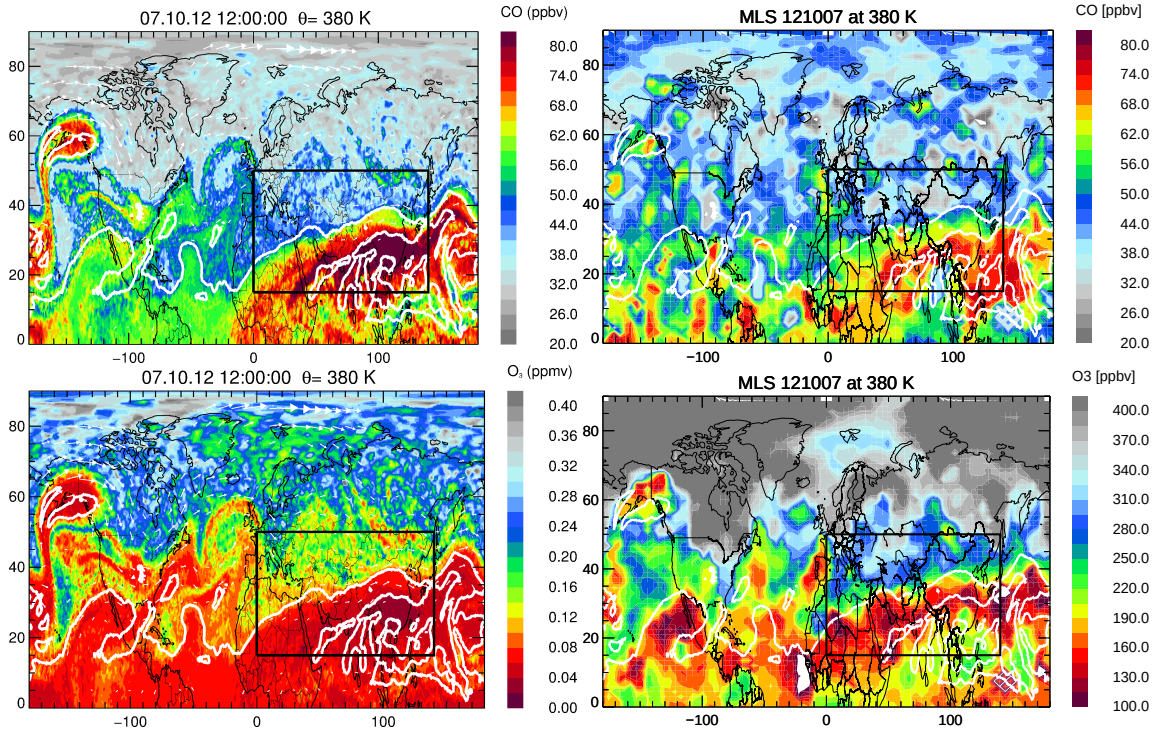


Figure 6. Same as Fig. 1, but for 7 October 2012.