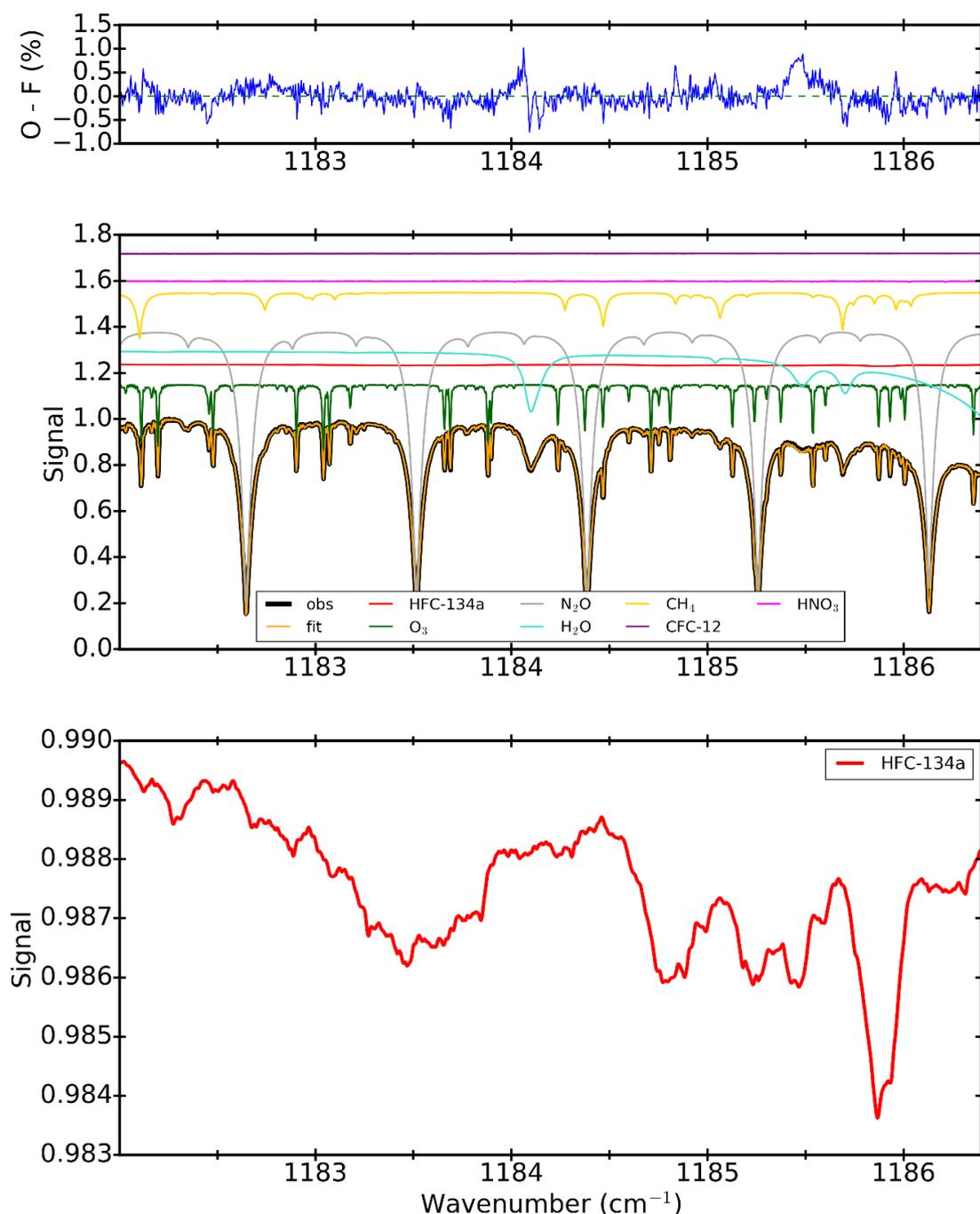
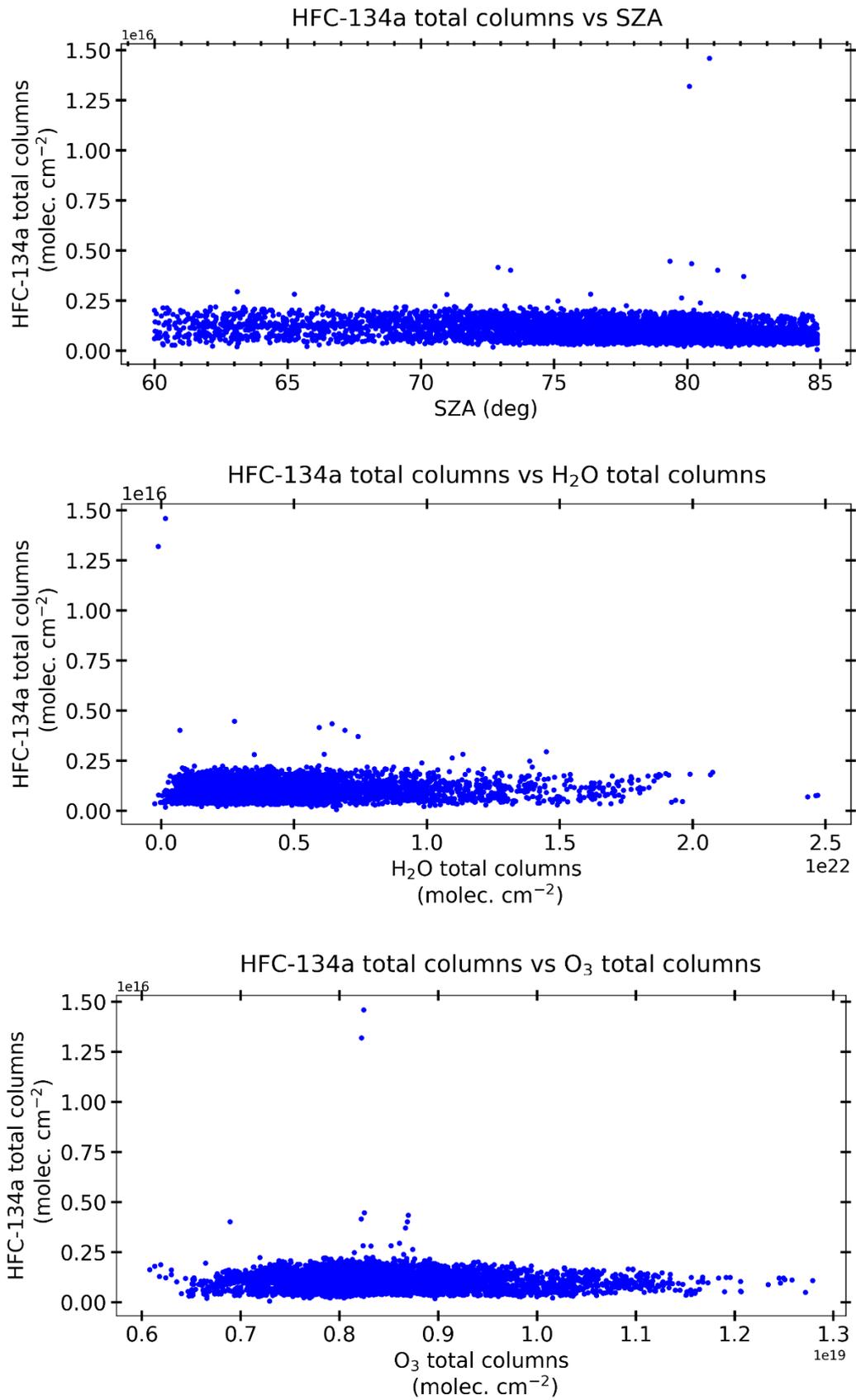


## Supplementary materials



**Figure 1.** Second spectral window test for HFC-134a. Panel A displays the observed – calculated residuals, in %, from the simulation to the same spectrum as the one shown in Figure 1 in the main text (recorded on May 25, 2016). The root-mean-square of the fitting residuals is 0.23%. Panel B shows the simulation of the 1182.0 – 1186.4  $\text{cm}^{-1}$  spectral window from spectra recorded by the Bruker IFS-120HR FTIR instrument at the Jungfraujoch station at an apparent solar zenith angle of 77.2°, and a maximum optical path difference of 82 cm. The signal-to-noise ratio for this spectrum is 952. The main interfering species ( $\text{O}_3$ ,  $\text{N}_2\text{O}$ ,  $\text{H}_2\text{O}$ ,  $\text{CH}_4$ , CFC-12, and  $\text{HNO}_3$ ) are shifted vertically for clarity. Be aware of the scale of the vertical axis in Panel C, where the HFC-134a absorption is magnified. Attention, the water vapor absorption present between about 1185.0  $\text{cm}^{-1}$  and 1186.4  $\text{cm}^{-1}$  becomes stronger for more humid days, masking the main absorption of HFC-134a in this spectral window.



**Figure 2.** HFC-134a total columns retrieved from the ground-based FTIR solar spectra at the Jungfraujoch station versus the solar zenith angles (SZA) on the top, versus the H<sub>2</sub>O total columns on the middle, and versus the ozone total columns on the bottom figures.