

First satellite-based estimate of long-lived halogenated gases radiative forcing

S. Whitburn^{1,2,*}, L. Clarisse¹, H. De Longueville³, K.P. Shine⁴, P.F. Coheur¹, C. Clerbaux^{1,5}, and A.W. Delcloo^{2,6}

¹Université libre de Bruxelles (ULB), Brussels Laboratory of the Universe (BLU-ULB), Spectroscopy, Quantum chemistry and Atmospheric Remote Sensing (SQUARES), Brussels, Belgium

²Royal Meteorological Institute of Belgium (KMI-IRM), Atmospheric Composition, Measurements and Modelling division (ACM²), Brussels, Belgium

³University of Bristol, School of Chemistry, Bristol, United Kingdom

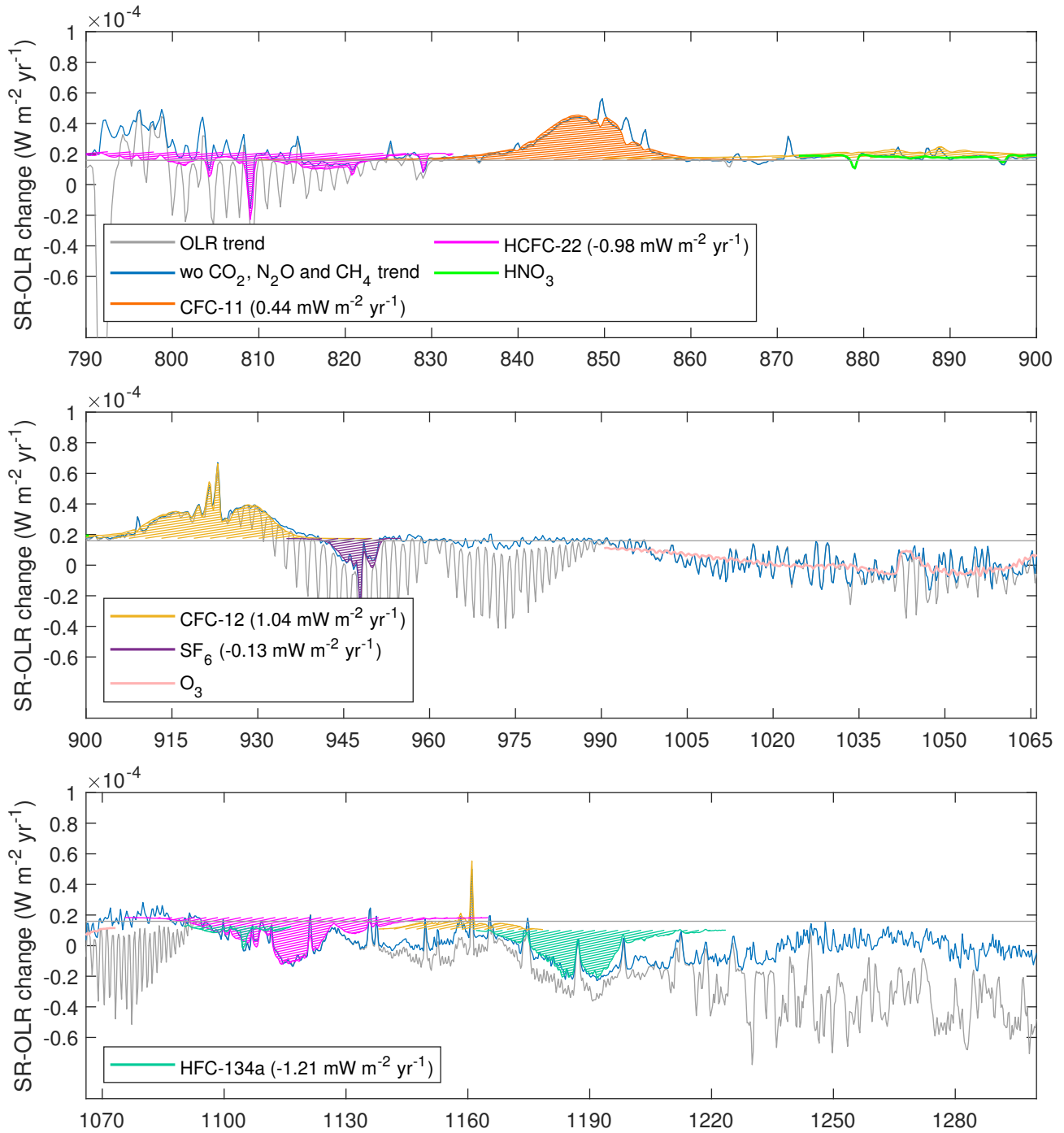
⁴Department of Meteorology, University of Reading, Reading, United Kingdom

⁵LATMOS/IPSL, Sorbonne Université, UVSQ, CNRS, Paris, France

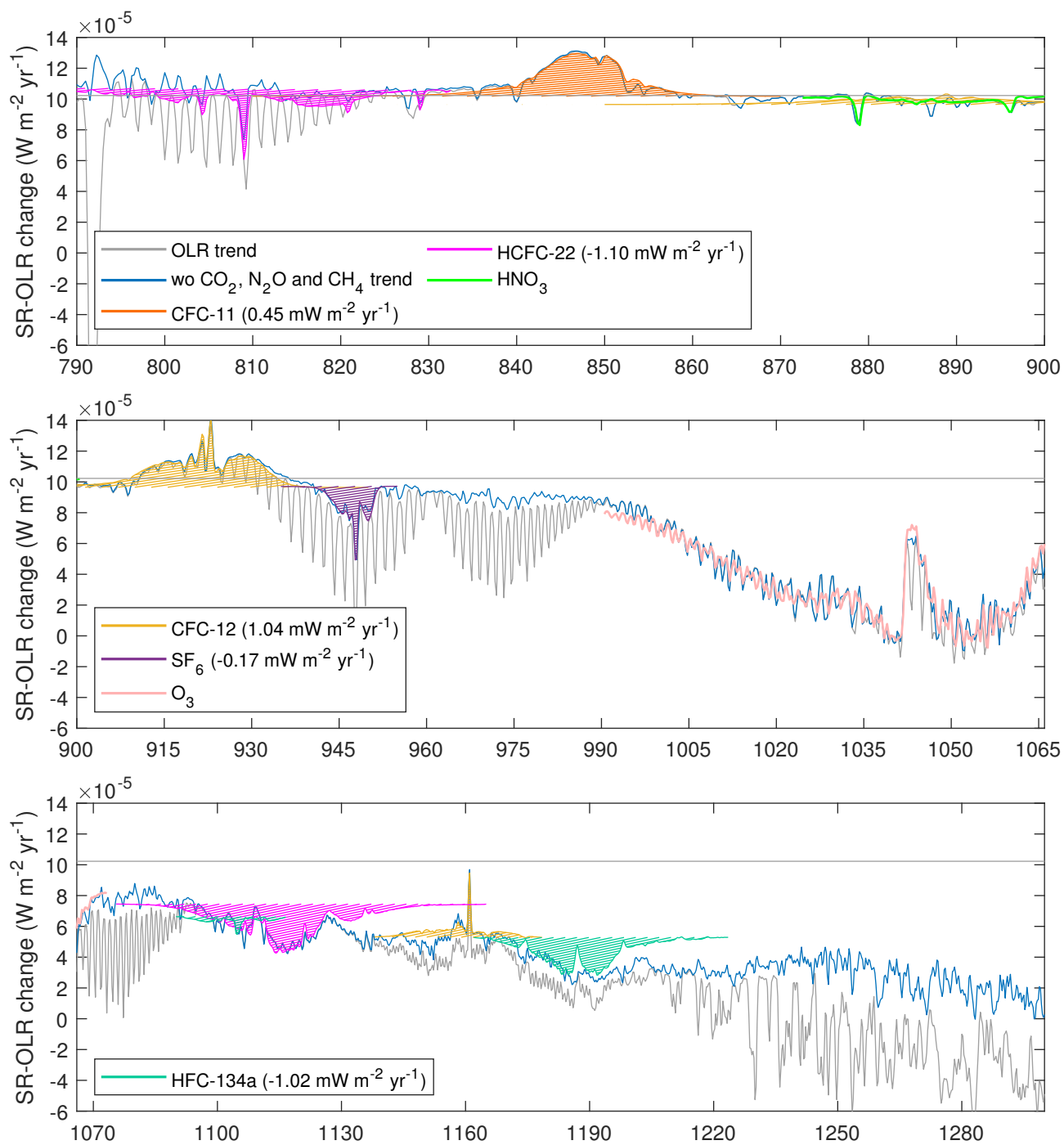
⁶Ghent University, Department of Physics and Astronomy, Ghent, Belgium

* Corresponding author: Simon Whitburn, simon.whitburn@ulb.be

Supplementary Information



Supplementary Fig.1: Difference between the globally averaged mean clear-sky SR-OLR of 2021 and 2008 (expressed in W m⁻² yr⁻¹). Hatched areas highlight the changes in the SR-OLR due to the change of the concentration of five long-lived halogenated species. The FRC values for the fitted Jacobians integrated over the entire 750–1400 cm⁻¹ spectral region are specified in the legend.



Supplementary Fig.2: Same as in Supplementary Fig.1 but for the difference between 2022 and 2008.