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High resolved variability of OClO as observed by TROPOMI on Sentinel-5P

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The TROPOspheric Monitoring Instrument (TROPOMI) is an UV-VIS-NIR-SWIR instrument on board of Sentinel-5P satellite developed for monitoring of the Earth's atmosphere. It was launched on 13 October 2017 in a near polar orbit. It measures spectrally resolved earthshine radiances at an unprecedented spatial resolution of around 3.5x7 km^2 (near nadir) with a total swath width of $\sim$2600 km on the Earth's surface providing daily coverage. From the measured spectra high resolved trace gas distributions can be retrieved by means of differential optical absorption spectroscopy (DOAS).
Here we investigate the DOAS retrieval of slant column densities (SCDs) of chlorine dioxide (OClO) which is a by-product of halogen chemistry responsible for ozone depletion. Although being rapidly photolysed at low solar zenith angles (SZAs) it plays an important role as an indicator of the chlorine activation at polar regions during polar winter and spring at twilight conditions because of the nearly linear relation of its formation on ClO.
The TROPOMI results show OClO signal correlated with cold temperature occurrences within the polar vortex not only for Antarctica but also for the Arctic winter 2017/2018. Also the effect of an early stratospheric warming event at the end of December 2018 is well captured in the OClO signal.