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Spatial and temporal variability of stratospheric HNO_3 from IASI global measurements

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Nitric acid (HNO_3) is one of the main constituents impacting ozone loss in the stratosphere. Through different chemical reactions occuring in the stratosphere, HNO_3 transforms into nitrogen oxides (NO_2, NO_3), which in turn, lead to ozone destruction through catalytic cycles.
Until now, no in-depth analysis of HNO_3 concentrations in the stratosphere has been carried out. It is now possible, thanks to the satellite IASI (Eumetsat), to have concentrations data since 2006. The satellite uses infrared radiation coming from the surface of the Earth and calculates the amount of radiation passing through the atmosphere and actually reaching the satellite. Through an inversion algorithm developed at Université Libre de Bruxelles (ULB), HNO_3 total columns can be retrieved. Satellite measurements of HNO_3 allow us to have a global coverage of the concentrations over the planet, with a good time and spatial resolution. Our work thus allows a global analysis, but also focuses on the polar regions, where nitric acid plays a particularly important role, since it allows the formation of polar stratospheric clouds (PSCs) which are surfaces enhancing ozone destruction even more.
After validation of the satellite data through comparison with ground-based measurements, our purpose is thus to analyse the variability of nitric acid through the years. We use a simple regression model taking into account parameters known to influence the concentrations variability. This model considers mainly atmospheric processes and natural parameters such as the solar flux or the quasi-biennal oscillation. The model will be improved and completed with other parameters later on, but our approach is first to ensure the ability of a simple model to represent HNO_3 variability through latitudes and time.