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Developing a BrO product for S5P

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The TROPOMI instrument on the Sentinel 5 precursor (S5P) instrument is mainly aimed at measurements of stratospheric ozone and air quality. However, due to its good spectral coverage and resolution, there are additional products which can be derived from the measured radiances using the Differential Optical Absorption Spectroscopy (DOAS) method, including bromine monoxide (BrO).

BrO is present in both stratosphere and troposphere. Its importance comes mainly from its ability to destroy ozone catalytically, which contributes to the stratospheric ozone hole and in polar spring can lead to ozone depletion events in the boundary layer. Strongly enhanced tropospheric BrO levels are not only found in the polar boundary layer in spring but also over salt lakes and marches and in some volcanic emission plumes. In particular for the latter sources the high spatial resolution of S5P (3.5×7 km^2) has the potential to much improve detection of localised events and also to reduce the detection limit. Such data would be useful for both the investigation of halogen release mechanisms and for validation of model calculations.

The retrieval of BrO columns from S5P radiances can build on experience gained with earlier UV/visible nadir satellite instruments such as GOME, SCIAMACHY, OMI and GOME2. The main challenges are to adapt the spectral retrieval to the instrument and to adapt the a priori data to the much higher spatial resolution.

In this presentation, the IUP Bremen BrO algorithm as developed for S5P is presented, and very first results from tests on preliminary S5P data are reported. Data obtained so far indicate that BrO retrievals on S5P data are possible and have relatively low noise, but also some problems including stripes and sensitivity to scene brightness are found which need to be solved.