

Transport of tropospheric BrO by polar cyclones observed from satellite

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Intense, cyclone-like shaped plumes of tropospheric bromine monoxide (BrO) are regularly observed by GOME-2 over sea ice during polar spring. Further investigation using model data shows that the plumes are often transported by polar cyclones, sometimes over several days despite the short atmospheric lifetime of BrO. There is an ongoing debate in science on whether these plumes originate from the stratosphere or if they can be associated with tropospheric “bromine explosion events”. The latter are caused by an autocatalytic chemical cycle associated with tropospheric ozone depletion which initially requires the release of bromine from a condensed phase (such as young sea ice or salty blowing snow) to the gaseous phase.

Here, we investigate the role of high latitude cyclones for the development, duration and transport of bromine explosion events. Making combined use of satellite observations and numerical models, characteristics of tropospheric BrO cyclone transport events such as their frequency and spatial distribution as well as favorable weather conditions are discussed. Results from a case study and statistics from a new 3-year data set of these events will be presented.