



## **Long-term Time-series of Arctic BrO Derived from Satellite Remote Sensing and its Relation to Driving Mechanisms under the Impact of Arctic Amplification**

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Over the last decades, air temperature in the Arctic has changed more rapidly than in other parts of the globe. The name of this phenomenon is Arctic Amplification and it has drastic impacts on all the sub-systems of the Arctic ecosystem.

Bromine Oxides play a key role in the atmospheric composition of the Arctic. During polar spring, bromine molecules are released from young sea ice covered regions. A rapid chemical chain reaction starts, the so called 'BrO explosion', which depletes ozone, alters the production of OH, and thereby eventually changes the oxidizing capacity of the troposphere. Furthermore, halogens oxidize elemental to gaseous mercury, which may then be deposited and harm the ecosystem. Based on current literature, there is considerable uncertainty on the impact of Arctic Amplification on halogen evolution; on one hand, the rapid long-term melting of sea ice should result in formation of more young sea ice, which favors bromine release. On the other hand, BrO explosion events are triggered by low temperatures, a condition which can be assumed to be less frequent due to Arctic Amplification. Moreover, changes of further meteorological drivers, such as cyclone frequency and wind speed may impact on BrO amounts in the Arctic troposphere.

The aim of this study is twofold; firstly, the development of a long-term time-series of BrO which constitutes a basis to investigate the impact of Arctic Amplification on BrO amounts in the Arctic troposphere is presented. For this purpose, we have used data from 4 UV-VIS instruments (GOME, SCIAMACHY, GOME-2A, GOME-2B) onboard different satellites, so that a long time span of 22 years is achieved. Despite of differences between the sensors (time of overpass, spatial resolution, etc), our long-term dataset shows remarkable agreement and consistency during times of overlapping measurements. This is to our knowledge the first merged data set of its kind. Secondly, work is being performed on investigating the impact of Arctic Amplification on the atmospheric halogen composition and the relation to changes in driving mechanisms and sources. For this purpose, the consistent long-term time-series of BrO which we developed acts as a basis.

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