

Observing iodine monoxide from satellite:

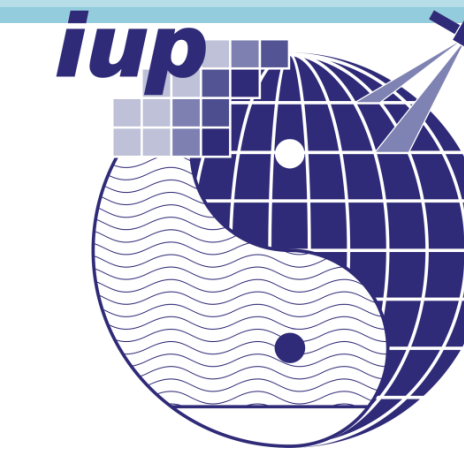
Comparison between Antarctic IO and BrO

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COSPAR 2010
A11-0157-10

IO and BrO maps over the Antarctic

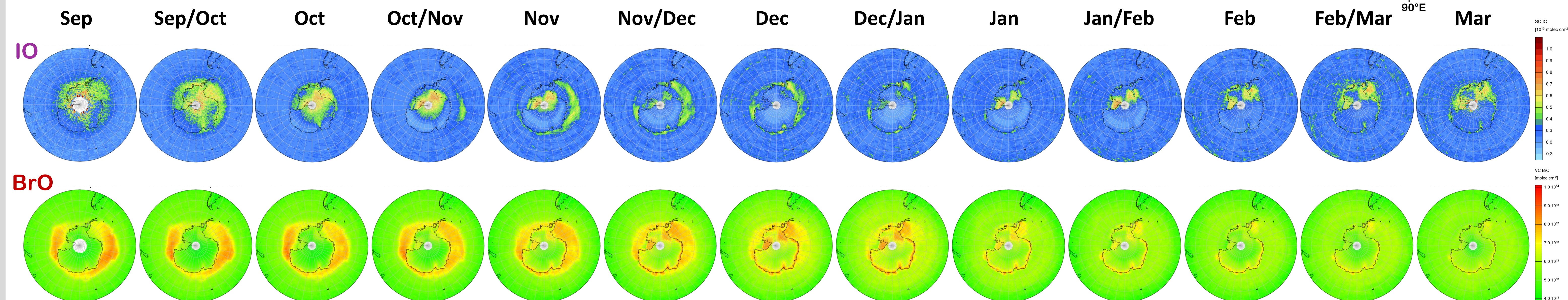
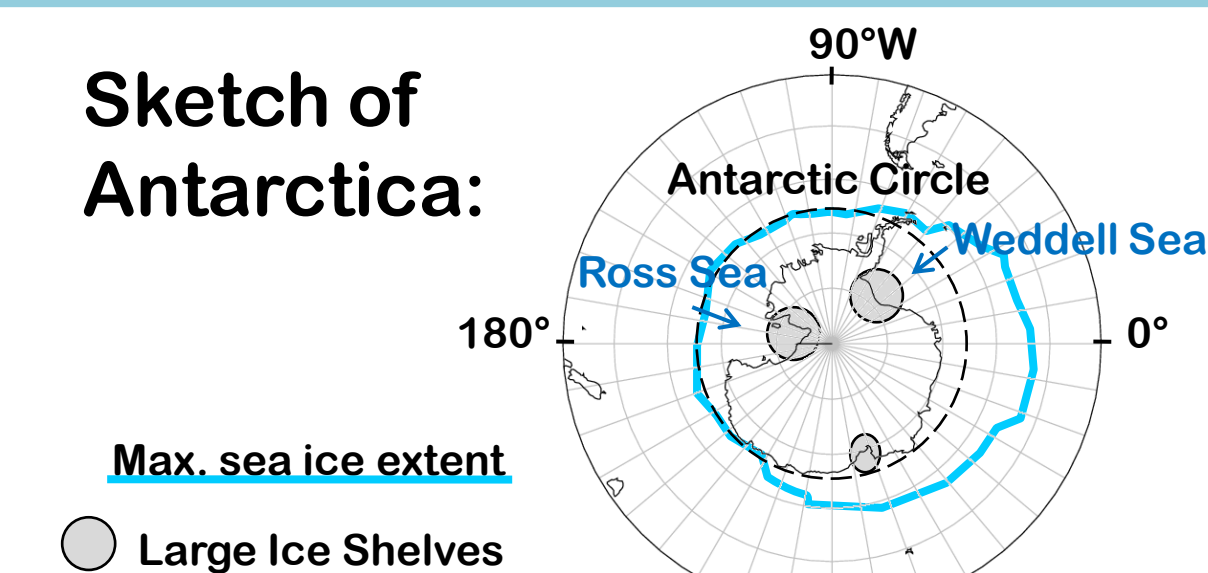
The maps below show the time series of simultaneous observations of IO and BrO from SCIAMACHY

IO amounts are slant columns, BrO amounts are vertical columns using a stratospheric AMF. Therefore patterns remain comparable.

Averaging procedure: Monthly means are averaged over six years of data. Each following map is shifted by a period of half a month.

Time period covered: 2004 – 2009

Sketch of Antarctica:



Comparison of IO and BrO distributions

Similarities:

- Both species appear in Antarctic Spring above sea ice and coastal regions
- Occurrence on the shelf ice regions - transport/recycling in both cases?
→ aerosols/particulate iodine might permit transport and later re-emission

Differences:

- Spatial and temporal distributions differ quite strongly
- IO above sea ice much later in the year than BrO
- Occurrence of IO and BrO above ice shelves during different times
- IO amounts above the continent during some periods, but no BrO
- BrO equivalent on both Hemispheres, IO not wide spread in Arctic (not shown)

→ Different release pathways for both molecules

→ Do these observations argue for mainly organic pathways for IO release?

Discussion of sources and open questions

Arguments for biogenic sources of iodine

... might explain the observations

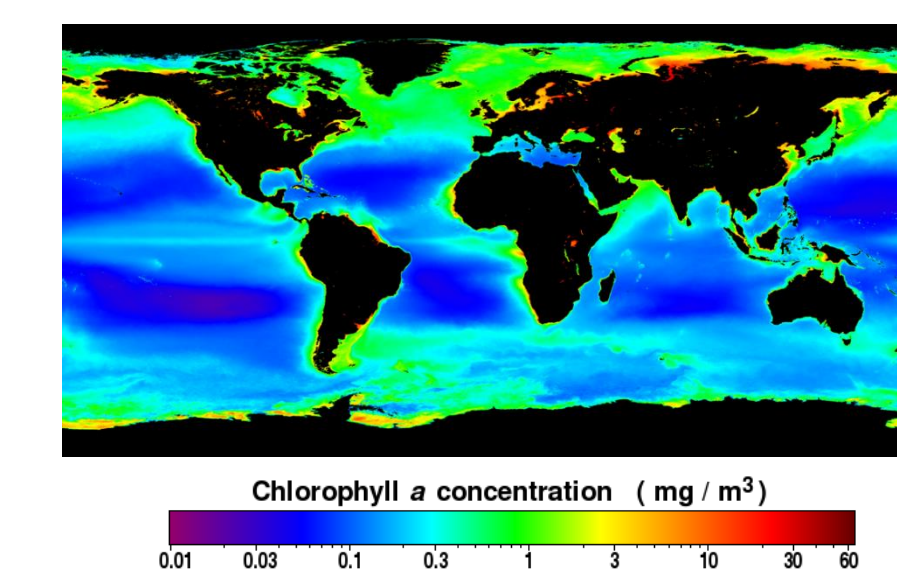
- Antarctic waters show high biological productivity
- Cold water diatoms produce organic iodine species

(e.g. sea ice becomes more porous towards late spring: iodine release from phytoplankton might be facilitated)

- Different biospheres in Arctic/Antarctic might produce different amounts and/or different species of organic iodine compounds

Conclusion

Although IO and BrO are basically similar molecules, spatial and temporal distributions differ significantly. → Different underlying release pathways must exist. BrO release is mainly inorganic ("bromine explosion"). Supported by results above, IO may be mainly biogenic.



Chlorophyll-a concentrations from the SeaWiFS mission composite; kindly provided by NASA. High biological productivity is detected, e.g. in the Weddell Sea.