Notes:
Reporting Period is January 2012 – December 2012
Information will be used for: reporting, fundraising, networking, strategic development & outreach

1. Scientific highlights
Describe 1 or 2 published scientific highlights with a title, a text (max 200 words), a figure with legend and full references for each highlight.

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First detailed speciation of bromine chemistry in polar spring


Inorganic bromine plays a critical role in ozone and mercury depletions events (ODEs and MDEs) in the Arctic marine boundary layer. Direct observations of bromine species other than bromine oxide (BrO) during ODEs are very limited. The first direct measurements of hypobromous acid (HOBr) as well as observations of BrO and molecular bromine (Br₂) by chemical ionization mass spectrometry were performed at Barrow, Alaska in spring 2009 during the Ocean-Atmospheric-Sea Ice-Snowpack (OASIS) campaign.

Diurnal profiles of HOBr with maximum concentrations near local noon and no significant concentrations at night were observed. The measured average daytime HOBr mixing ratio was 10 pptv with a maximum value of 26 pptv. BrO levels were found to be higher at elevated wind speeds. Br₂ was observed in significant mixing ratios (maximum = 46 pptv; average = 13 pptv) at night and was strongly anti-correlated with ozone. The diurnal speciation of observed gas phase inorganic bromine species can be predicted by a time-dependent box model that includes efficient
heterogeneous recycling of HOBr, hydrogen bromide (HBr), and bromine nitrate (BrONO$_2$) back to more reactive forms of bromine.

**IO in open ocean**


![Image of map showing IO concentrations](image)

*Fig. 4.* The daily average IO DSCDs over the detection limit in the 1° viewing elevation angle after the data was filtered for clouds along with satellite estimated Chl $a$ distribution for April 2010 (NASA-GSFC, 2011). The empty white circles with crosses show days where measurements were not possible.

Ship-based Multi-Axis Differential Optical Absorption Spectroscopy measurements of iodine monoxide (IO) and atmospheric and seawater Gas Chromatography- Mass Spectrometer observations of methyl iodide (CH$_3$I) were made in the Eastern Pacific marine boundary layer during April 2010 as a part of the HaloCarbon Air Sea Transect- Pacific (HaloCAST-P) scientific cruise. The presence of IO in the open ocean environment was confirmed, corresponding to approximately 1 pptv measured in the oligotrophic region of the Southeastern Pacific. Such low IO mixing ratios and their observed geographical distribution are inconsistent with satellite estimates and with previous understanding of oceanic sources of iodine. A strong correlation was observed between reactive iodine (defined as IO + I) and CH$_3$I, suggesting common sources. In situ measurements of meteorological parameters and physical ocean variables, along with satellite-based observations of Chlorophyll a (Chl $a$) and Chromophoric Dissolved Organic Matter (CDOM) were used to gain insight into the possible sources of iodine in this remote environment. Surprisingly, reactive iodine showed a negative correlation (>99% confidence) to Chl $a$ and CDOM across the cruise transect. However, a significant positive correlation (>99% confidence) with sea surface temperature (SST) and salinity instead suggests a widespread abiotic source related to the availability of aqueous iodine and to temperature.
2. Activities/main accomplishments (research projects, cruises, special events, workshops, remote sensing used, model and data intercomparisons etc)

- Halogen sessions at EGU 2012, AGU 2012
- SOLAS/IGAC funded workshop on “Climate impact of chlorine” Dec 2012
- Field work element of US TORERO project (Jan/Feb 2012)
- Various field campaigns by individual research groups incl. field work at Mt Etna, Sicily (July/August 2012), Dead Sea (HALOPROC project)

3. Human dimensions (outreach, capacity building, public engagement etc)

Publication of 3 halogen-related review papers (Abbatt et al is mainly an AICI product):


About 7 (out of 22) participants of the HitT-Cl workshop were early career scientists, helping with capacity building in the next generation of scientists.

4. Top 10 publications in 2012 (Reports, ACCEPTED articles, models, datasets, products, website etc)


5. International interactions and collaborations (including contributions to international assessments such as the IPCC, links with observation communities etc)
   - Participation in international field campaigns
   - Conferences and workshops (see above)

6. Goals, priorities and plans for future activities/events
   - Web page update
   - Establish link with water purification community working on aqueous halogen processes
   - Continue momentum from HitT-Cl workshop

7. Other comments
   Web page: www.HitT-task.net