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Reactive chlorine chemistry in the boundary layer of coastal Antarctica

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A unique feature of the polar troposphere is the strong impact of halogen photochemistry, in which reactive halogen species are responsible for ozone depletion as well as the oxidation of elemental mercury and dimethyl sulphide. The source, however, as well as release and recycling mechanisms of these halogen species - for some species even abundances - are far from being completely known, especially of chlorine and iodine compounds. Here we present active long-path differential optical absorption spectroscopy (LP-DOAS) measurements conducted during austral spring 2012 at Ross Island, Antarctica, observing several species (BrO, O_3, NO_2, IO, ClO, OBrO, OClO, OIO, I2, CHOCHO, HCHO, HONO). For the first time, ClO was detected and quantified in the marine boundary layer of coastal Antarctica, with typical mixing ratios around 20 pptv and maxima around 50 pptv. Meteorological controls on the mixing ratio of ClO as well as the interplay with other halogen compounds will be discussed, such as the lack of observed OClO (< 1 pptv). The results seem to reflect previously in chamber studies observed dependences on ozone levels and solar irradiance.