Geophysical Research Abstracts
Vol. 17, EGU2015-10652, 2015
EGU General Assembly 2015

Seasonal variation of bromine monoxide over the Rann of Kutch salt marsh seen from space

Christoph Hörmann (1), Steffen Beirle (1), Marloes Penning de Vries (1), Holger Sihler (1,2), Ulrich Platt (2), and Thomas Wagner (1)

(1) Max-Planck Institute for Chemistry, Mainz, Germany, (2) Institute for Environmental Physics, University of Heidelberg, Heidelberg, Germany

Bromine monoxide (BrO) is an important catalyst in the depletion of tropospheric and stratospheric ozone (O_3). In the troposphere, reactive bromine can be released from sea ice, volcanoes, sea-salt aerosol or salt lakes. For all of these natural sources enhanced BrO vertical column densities (VCDs) have been successfully observed from ground using Differential Optical Absorption Spectroscopy (DOAS). Until now, satellite observations were only reported for polar regions during springtime and volcanic emissions (mostly for major eruptions).

We present the first satellite observations of enhanced monthly mean BrO VCDs over a salt marsh, the Rann of Kutch (India/Pakistan), during 2004-2014 as seen by the Ozone Monitoring Instrument (OMI). The Rann of Kutch is a so-called 'seasonal' salt marsh. During India's summer monsoon (June/July – September/October), the flat desert of salty clay and mudflats, which average 15 meters above sea level, fills with standing rain and sea water. With more than 7500 km^2 it is the largest salt desert in the world and additionally one of the hottest areas of India with summer temperatures around 50 $^{\circ}$C and winter temperatures decreasing below 0 $^{\circ}$C. Probably due to these rather extreme conditions, the Rann of Kutch has not been yet investigated for atmospheric composition measurements by ground-based instruments. Satellite observations, however, provide the unique possibility to investigate the entire area remotely over a long-time period.

The OMI data reveals recurring maximum BrO VCDs during April/May, but no enhanced column densities during the monsoon season while the area is flooded. In the following months the signal only recovers slowly while the salty surface dries up. We discuss the possible effects of temperature, precipitation and relative humidity on the release of enhanced reactive bromine concentrations. In order to investigate a possible diurnal cycle of the BrO concentration, the OMI results (at a local overflight time around $\sim$13:30) are compared to corresponding results from the Global Ozone Monitoring Instrument (GOME-2, local overflight time at $\sim$9:30).