

Balloon observations of stratospheric bromine and aerosols in the 2009 summer polar stratosphere

Gwenaël BERTHET⁽¹⁾, Jean-Baptiste RENARD⁽¹⁾, Colette BROGNIEZ⁽²⁾, Michel CHARTIER⁽¹⁾, Bertrand GAUBICHER⁽¹⁾, Frédérique AURIOL⁽²⁾, Jean-Yves BALOIS⁽²⁾, Philippe FRANÇOIS⁽²⁾, and Christian VERWAERDE⁽²⁾

⁽¹⁾LPC2E/CNRS and University of Orleans, France

⁽²⁾LOA/CNRS and University of Lille, France

In the frame of the International Polar Year STRAPOLETE project, a balloon campaign operated by the French National Space Agency (CNES) was conducted in August 2009 from Kiruna (Sweden) to explore the rather poorly-documented summertime stratosphere. A set of various in situ and remote-sensing instruments was launched to derive the chemical and dynamical characteristics inherent in the summer 2009 arctic stratosphere through observations of long-lived and short-lived compounds and of aerosols.

Here we firstly focus on the study of stratospheric bromine from remote-sensing UV-visible spectrometry. The total inorganic bromine content computed by a 3-dimensional Chemistry-Transport Model is assessed using the total bromine content derived from the observations of BrO. These observations will be useful to continue the stratospheric bromine trend as shown in the last World Meteorological Organization assessment.

We also present observations of the stratospheric aerosol content which, to our knowledge, has not been reported yet in the summer arctic stratosphere. Aerosol counting/sizing data, photo-polarimetry observations and measurements of the aerosol extinction in the visible spectral domain are used jointly to try to distinguish between the various natures of aerosols and to determine the spatial variability of their size distributions. The most striking feature is the strong spatial variability of the stratospheric aerosol content in particular around an altitude of 30 km from the 8 flights of the aerosol counter/sizer. We will give an estimation of the liquid sulfate aerosol content which is of importance in chemistry models and will estimate the vertical distribution of solid particles.