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Can ozone assimilation constrain inorganic chlorine in the stratosphere?

Quentin Errera, Simon Chabrillat, and Sébastien Viscardy
Institut d'Aéronomie Spatial de Belgique, Brussels, Belgium (quentin@oma.be, 0032-2-374)

During the PROMOTE project (www.gse-promote.org), BIRA-IASB has assimilated UARS MLS chemical observations of O3, HNO3, H2O and ClO between 1992 and 1997 using the BASCOE 4D-Var system (Viscardy et al., accepted for publication in JSTARS). This system is based on a stratospheric chemistry transport model (CTM) where chemical reactions are calculated explicitly. Thus, the chemical module of the adjoint of the CTM allows the system to constrain not only the observed constituents but also those that are chemically coupled to the observed constituents.
In this contribution, we study how O3 MLS observations are able to constrain stratospheric inorganic chlorines. In the Upper Stratosphere-Lower Mesosphere, it is shown that O3 observations could correct modeled HCl and improve the comparison against independent HALOE observations. For example, BASCOE is able to reproduce the trend of HCl volume mixing ratio observed by HALOE between 1992 and 1995 at 0.5 hPa. From 1996, the HCl trend from BASCOE becomes negative, which is not observed by HALOE. The possible causes for this disagreement will be discussed as well as the potential use of chemical 4D-Var to derive trends of non-assimilated species.