Sampling error estimation in monthly mean SCIAMACHY datasets using a data assimilation system

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As part of the ozone CCI project, monthly average level-3 datasets have been produced from nadir measurements taken by GOME, GOME-2 (A and B), SCIAMACHY and OMI. Due to the different sampling of the instruments, level-3 datasets can exhibit significant differences. This is in particular the case for SCIAMACHY which has a relatively narrow swath as compared to the other sensors and which has data gaps along the orbit track due to the alternating nadir and limb observation modes.

Using a data assimilation system and an orbit simulator, we present a method to estimate (and remove) the sampling error of nadir instruments, with specific focus on SCIAMACHY and the year 2008. Using an orbit simulator,
we have simulated the geolocation of a "super" SCIAMACHY (SuperSCIA) instrument i.e. an instrument with the same orbit than SCIAMACHY but with a larger swath and without any gap due to the limb mode. Using the observation operator of the Belgian Assimilation System for Chemical ObsErvations (BASCOE), the state of the BASCOE model (no assimilation) is saved into the spaces of SCIAMACHY and SuperSCIA allowing one to estimate and remove the sampling error of SCIAMACHY. This allows to significantly reduce the differences between level-3 datasets from GOME-2A and SCIAMACHY.