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Subtropical stratospheric transport barriers seen in SCIAMACHY long term limb NO_2 dataset and comparison with the general circulation model EMAC

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We investigate the appearance of subtropical stratospheric transport barriers in the NO_2 dataset retrieved from SCanning Imaging Absorption spectroMeter for Atmospheric CHartographY (SCIAMACHY) measurements. SCIAMACHY on ENVISAT probed the atmosphere at the day side of Earth in alternating sequences of nadir and limb measurements from 2002 to April 2012. The retrieval of horizontally resolved vertical profiles of stratospheric trace gases was performed by Differential Optical Absorption Spectroscopy (DOAS) followed by a tomographic inversion approach which minimizes errors caused by the horizontal inhomogeneity especially around transport barriers.

We investigate the seasonal, multiannual (QBO), altitudinal and longitudinal variability of the location and strength of the barriers and compare them with the barriers determined from the atmospheric general circulation model EMAC data of NO_2 and long lived proxies (N_2O, CH_4, H_2O) often used for the transport barrier detection. Also a comparison with measurements performed by other satellite instruments is shown. Due to the correlation of the NO_2 concentration to those of the long lived species N_2O, the barriers can be well identified also from NO_2 distributions.