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Chlorine Activation on Cirrus Clouds in the tropical UTLS

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Chlorine monoxide (ClO) is one of the main ozone killers in the polar stratosphere in late winter/early spring, where it is formed from hydrogen chloride (HCl) and chlorine nitrate ($ClONO_2$) on nitric acid trihydrate (NAT) and ice particles inside polar stratospheric clouds. It has been suggested that ClO might play a similar though less important role for ozone loss at lower altitudes (Keim et al., 1996; Logan, 1999; Solomon et al., 1997), with chlorine activation allegedly proceeding on ice particles inside cirrus clouds and to some extent also on background aerosol. In high and mid-latitudes, ClO activation on ice clouds and background aerosol near the tropopause has indeed been observed (Borrmann et al., 1997; Borrmann et al., 1996; Thornton et al., 2003). The question remains, whether this process also takes place in the tropics.

Very few observations of ClO in the tropics exist, and mixing ratios are near the lower limit of current detectability. Here we present airborne in-situ observations made during the TROCCINOX campaign in Aracatuba, Brazil, in Jan./Feb. 2005 and during the SCOUT-O_3 campaign in Darwin, Australia, in Nov./Dec. 2005. While during most flights significant amounts of ClO were present only in stratospheric air well above the tropopause, some observations of enhanced ClO in the UTLS are clearly linked to Cirrus activation. However, we find that the presence of Cirrus clouds does not always lead to production of ClO, which is logically limited by the available inorganic chlorine (Cl_y).

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