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Halocarbon measurements in the tropical free troposphere during ACTIVE in 2005/2006

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A primary aim of the ACTIVE project in Darwin is to investigate processes which determine the composition of the tropical tropopause layer (TTL) and the relative influence of rapid convective uplift and slow large-scale transport. The TTL is broadly defined as the region between the lapse rate minimum and the cold point tropopause.

There are two ACTIVE campaign phases: a pre-monsoon phase characterised by relatively isolated convection and a monsoon phase in which there is more widespread convective activity. During both campaign phases, two aircraft are deployed with a broad range of instrumentation: a Dornier 228 aircraft sampling in the lower troposphere (below 5 km) and a Grob 520T Egrett sampling the entry level for the TTL at around 14 km. The science aim of the Dornier is to sample air at the low level entry to convective cells and also to survey the lower troposphere during background (convection free) periods. The science aim of the Egrett is to sample the high level outflow (anvil) from convective cells and to sample the background characteristics of the TTL in periods with no convection.

Here we will present halocarbon data from in situ gas chromatographs aboard the two aircraft during both phases of the campaign. These instruments each measure a range of halocarbons from short-lived compounds such as methyliodide and trichlorethene to long-lived tracers such as carbontetrachloride and CFC-113. We will focus here on case studies from individual flights to present preliminary observations and we will use back-trajectory studies to aid interpretation.