



Tropical high-altitude thin cirrus clouds observed with an airborne lidar on M55-Geophysica during the transfer flights in TROCCINOX and SCOUT-O3

V. Mitev (1), G. Martucci (1), R. Matthey(1), V. Makarov (2)

(1) Observatory of Neuchâtel, rue de l'Observatoire 58, CH-2000 Neuchâtel, Switzerland,
e-mail valentin.mitev@ne.ch / tel.: +41-32-889 8813 / fax: +41-32-722 0420

We report the observation of high altitude optically and geometrically thin cirrus clouds. The observations were performed by a backscatter lidar installed on the stratospheric research aircraft Geophysica M55, during the transfer flights from Europe to Brazil for the campaign TROCCINOX (Araçatuba, Brazil, January-February 2005), as well as during the transfer flights to Darwin (Australia) for the campaign SCOUT-O3 (November - December 2005). The Lidar MAL2 (Miniature Aerosol Lidar Mark 2) is a backscatter-depolarisation lidar, developed at the Observatory of Neuchâtel (Mitev V, R. Matthey and V. Makarov "Miniature backscatter lidar for cloud and aerosol observation from high altitude aircraft", Recent Res. Devel. Geophysics, 4, 207-223 (2002). ISBN:81-7736-076-0, Research Signpost., 2002). The direction of probing is downwards and the operational wavelength of the lidar is 532nm. The lidar is compact (32 kg total mass) and operates automatically. The intrinsic altitude and time resolution for signal detection and acquisitions are respectively 10 m and 12 s, but in order to increase the signal-to-noise ratio, these values are degraded in the signal processing. The following cases will be presented: 23rd January 2005: Ultra-thin cloud structure was observed above the Atlantic Ocean, between 0° - 3° N and around 30° W, having a horizontal expansion of about 560 km at an altitude of 17 km asl. The main cloud layer had geometrical thickness between 200 and 400m. Thin clouds with much shorter horizontal expansion were detected above and below it as well. The Aerosol Scattering Ratio (ASR) varied between 3 and 5, while the Aerosol Depolarisation Ratio (ADR) varied from 10% to 24%. 27th February 2005: Ultra-thin cloud structure was observed also above the Atlantic Ocean, at a place with approximately the same coordinates, similar horizontal expansion, altitude, ASR and ADR. 12th November

2005: An ultra-thin cloud was observed above the sea north of Darwin, Australia, approx 8° - 11° S and 124° - 127° E, at altitude of 16.8-17.3km. The ASR and the ADR were respectively around 2 and around 16%-20% and the geometrical thickness was approximately 150-200 m. In this case, the ultra-thin cloud appears above a thick cirrus layer between 10 and 16 km. The presented observations were performed as part of the EU projects TROCCINOX and SCOUT-O3, and with the support of the Swiss State Secretariat for Education and Research.