EMS7/ECAM8 Abstracts,
Vol. 4, EMS2007-A-00144, 2007
7th EMS Annual Meeting / 8th ECAM

Monitoring the tropopause heights with lidar in the Southern Hemisphere: a local study from Buenos Aires

S. Lakkis (1,2), M. Lavorato (4), P. Canziani (2,3)

(1) Pontificia Universidad Católica Argentina (UCA). Facultad de Ciencias Agrarias, Argentina, (2) Equipo Interdisciplinario para el Estudio del Cambio Global (PEPACG), Argentina, (3) Consejo Nacional de investigaciones Científicas y Técnicas (CONICET), Argentina, (4) División Radar Laser, CEILAP (CITEFA - CONICET), Argentina (gabylakkis@uca.edu.ar)

The upper troposphere/lower stratosphere is a critical region for understanding the radiative balance, which is crucial in determining climate. Cirrus clouds play an important role in the Earth′s climate system due to their capability of trapping outgoing longwave (greenhouse effect) and reflecting solar radiation (albedo effect), as well as in the troposphere – stratosphere exchange. The greenhouse effect associated with this high, thin clouds is typically stronger than the albedo effect, because of their low radiative temperature and small optical thickness.

Many studies of radiative transfer show that these clouds have a net warming effect on the top of the atmosphere and within atmosphere, but a net cooling effect on the surface. These warming and cooling effect are uncertain yet, since the microphysical and radiative properties are not well characterized. Therefore, having being identified cirrus like an important regulator of the radiance balance of Earth – atmosphere system, study the cirrus clouds and their optical parameters become a fundamental issue to describe the evolution of climate. Furthermore the cirrus climatology is as yet not well determined, in particular over the Southern Hemisphere.

Determining the distribution of high thin clouds is a particular pressing and difficult issue, for this reason the measuring instruments must have a high vertical resolution to be able not only to detect them but also to characterize it′s behaviour and evolution. In this sense, the dynamics range of lidar backscattering signals allow to observe and improve our knowledge of cirrus clouds and therefore, atmospheric parameters of the

tropospheric layers. The lidar system measures in real time the evolution of the atmospheric boundary layer, stratospheric aerosols, tropopause height and cirrus clouds evolution.

The aim of this work is monitoring tropopause height and its evolution in time using a backscatter lidar system located in Buenos Aires (34.6˚S, 58.5˚W) which operate at 532 nm, with two different telescope receivers (Cassegrain ϕ = 8.2 cm and Newtonian ϕ = 50 cm) starting from 50 m above the ground into the lower stratosphere, below 27 km. We used cirrus clouds detection method to analyze a set of 20 night and diurnal events observed during 2000- 2001, with the purpose of estimate the tropopause height and evolution in time, using the top of cirrus clouds present on the upper troposphere as a tropopause tracer.

The results derived from lidar, with 500 meters of accuracy, show a very good agreement compared with high/low resolution radiosonde data, considering values of tropopause height with biases less or equal 300 meters, depending on the relation signal-noise of the measurements.