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Subvisible cirrus clouds at global scale from CALIPSO lidar observations

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Cirrus clouds are thin clouds located at high altitudes created by the freezing of water vapour meeting cold temperatures, which implies the creation of these thin ice clouds. Their effects on radiative budget are not well known up to now, and it is indeed hard to study them because of (1) their relative transparency to most passive remote sensing instruments and (2) their location at high altitude, especially above thick convective tower systems in the tropics, which limits ground-based observations. CALIOP is a lidar onboard CALIPSO (satellite launched in April 2006 and belonging to the Aqua-Train satellites constellation) providing available cloud top altitude with great accuracy. It is an active remote sensing instrument that allows to characterise cirrus clouds properties on a global basis and with long time series due to its sensitivity to optically thin clouds.

Subvisible cirrus clouds have an optical thickness below 0.03. The distributions of parameters of subvisible cirrus clouds retrieved by CALIOP will be presented, e.g. temperature, cloud top altitude, depolarisation, optical thickness... including their seasonal variabilities. Moreover the location of subvisible cirrus clouds will be correlated with water vapor mixing ratio fields at the tropopause level, in an effort to understand better the vertical transport of water vapour and the exchange of air masses at the Upper Troposphere / Lower Stratosphere (UTLS), and more specifically in the

Tropical Tropopause Level (TTL) where the vertical transport of water vapour due to deep convective events implies the dehydration of the uplifting air masses at this level and the creation of these thin clouds.