# EFFECTS of ORIENTED ICE CRYSTALS on CALIPSO/CALIOP EXTINCTION COEFFICIENTS : COMPARISONS with AIRBORNE OBSERVATIONS in MID-LATITUDE CIRRUS CLOUDS during CIRCLE-2 EXPERIMENT


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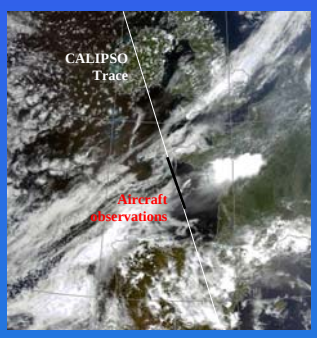
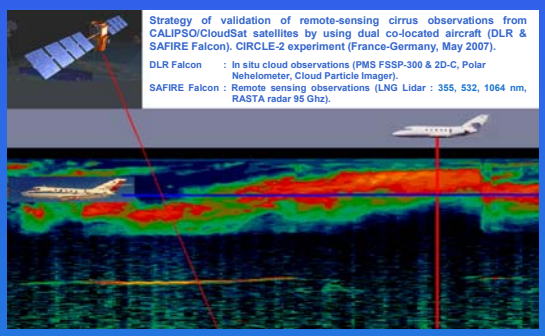
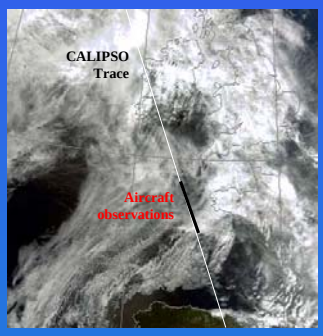



25 May 2007 (13:26 UT)

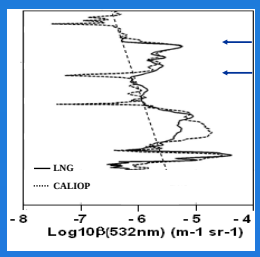


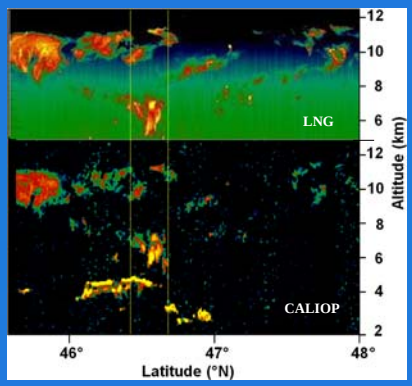



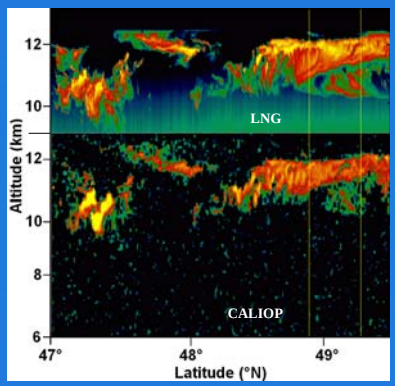

16 May 2007 (13:33 UT)

## Comparisons between CALIOP and LNG attenuated backscatter coefficients

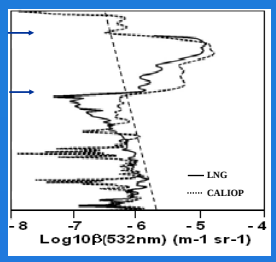
CALIOP and LNG attenuated backscatter profiles averaged over the region of interest identified on the side figure. At cirrus levels the two measurements fit well.



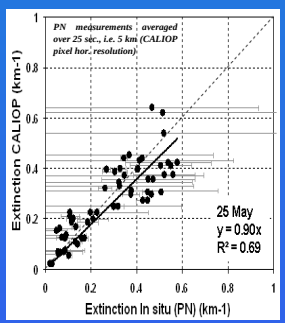



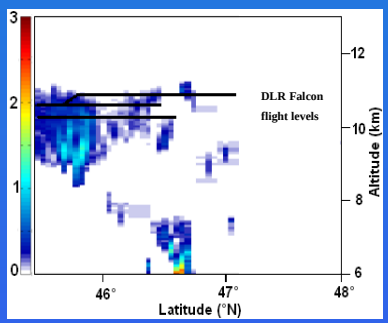



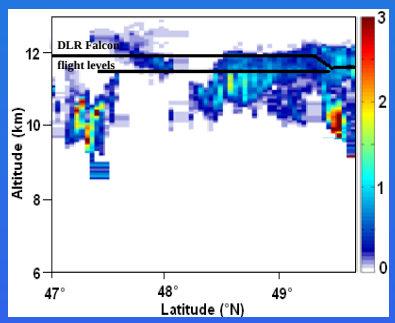

CALIOP and LNG attenuated backscatter profiles averaged over the region of interest identified on the side figure. At the cirrus levels β CALIOP is significantly larger than β LNG.

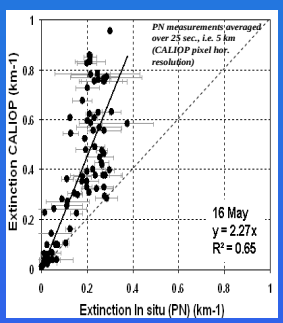


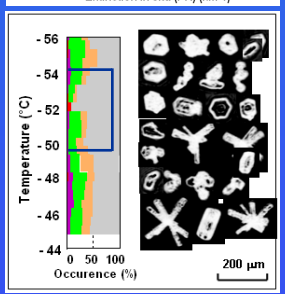

## Comparisons between CALIOP (level 2.01) and in situ (Polar Nephelometer) extinction coefficients



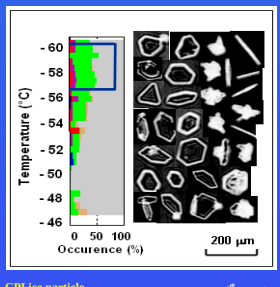




CPI ice particle images and shape classification

- For the 25 May situation (-50°C < T < -54°C and $\tau_{vis}$ ~ 0.5) comparisons between CALIOP attenuated backscatter coefficients and airborne LNG lidar observations are in a good agreement. CALIOP and in situ extinction coefficients fit also very well. These results highlight that level 2.01 CALIOP products (particle phase, extinction and subsequent optical depth) are well retrieved with considering a lidar ratio value of 25. Irregular shaped ice crystals are observed.

- For the 16 May situation (-56°C < T < -60°C and $\tau_{vis}$ ~ 0.4) specular effects due to oriented pristine ice crystals are hypothesized to explain large CALIOP backscattering values (nadir pointing) compared to LNG observations (3° tilted ahead pointing). This feature is nicely confirmed by systematic overestimated CALIOP extinctions with regards to in situ observations. Pristine-plate ice crystals with sizes up to 300 µm that could be horizontally-oriented are evidenced from the images of the CPI instrument and may therefore explain this particular feature.

- Further detailed explanations can be found in Mioche et al. (*J. Geophys. Res. CALIPSO special issue*, 2009).




CPI ice particle images and shape classification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