A New Algorithm for Detecting Cloud Height using OMPS/LP Measurements (2)

Zhong Chen, PK Bhartia, Matt DeLand

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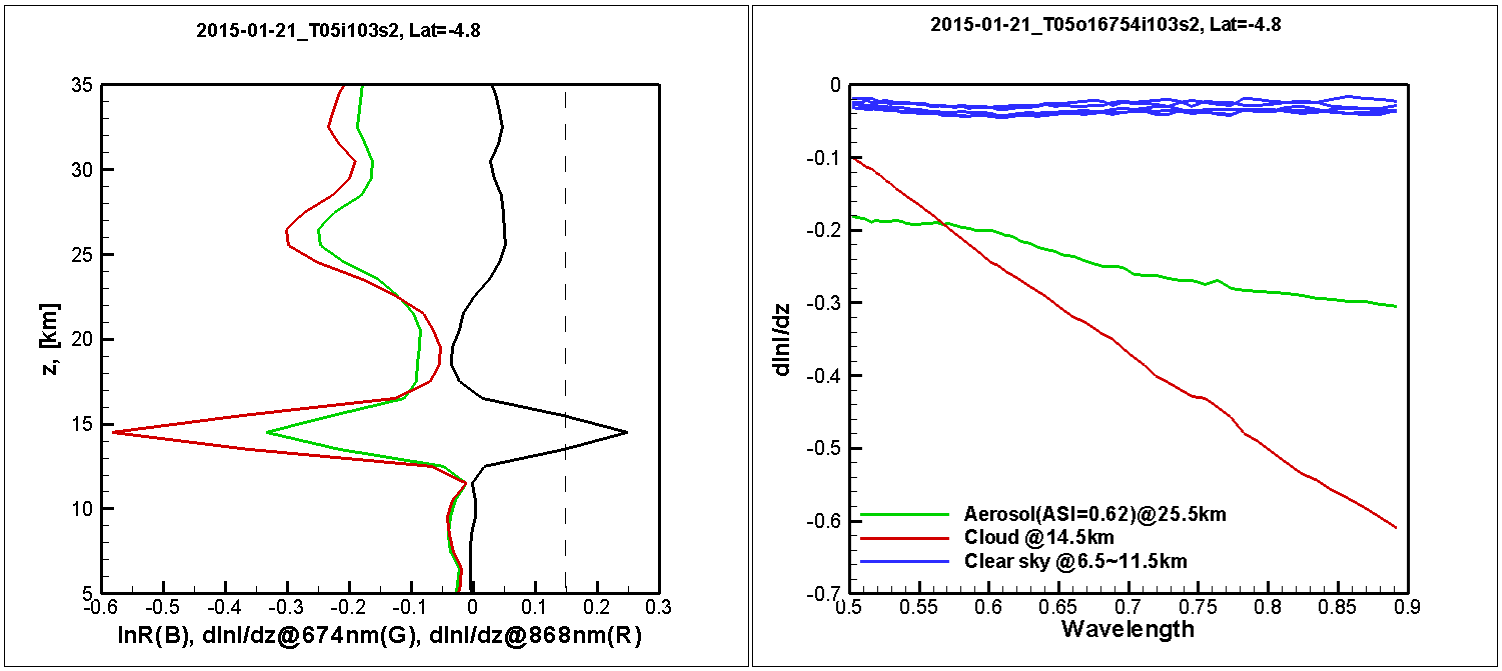
The Algorithm Description

We use a differential edge detection algorithm. The algorithm assumes that clouds produce a sharper vertical gradient in radiances than aerosols, and that the spectral dependence of radiance gradient is larger for clouds due to their larger particle size.

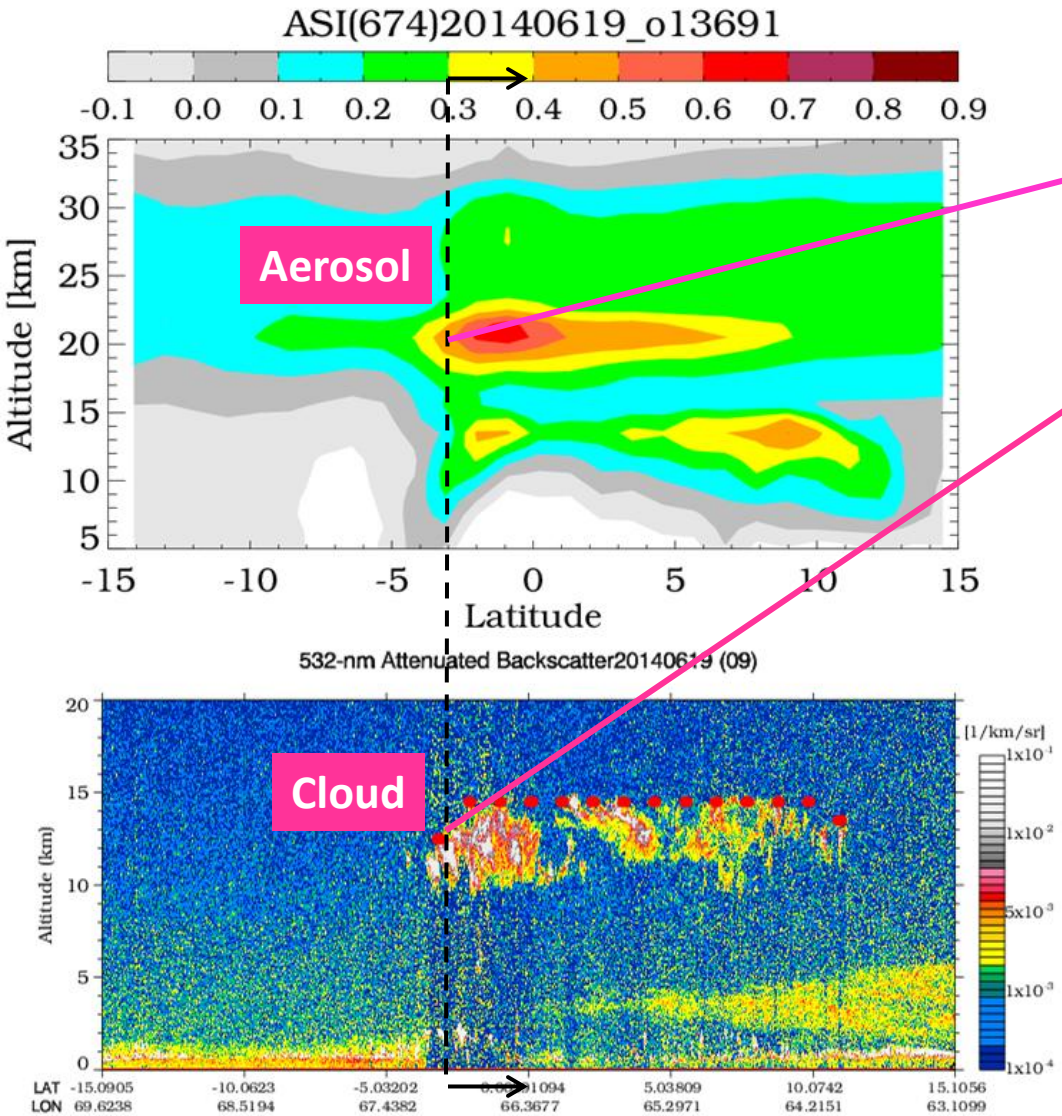
Cloud Index is defined as:

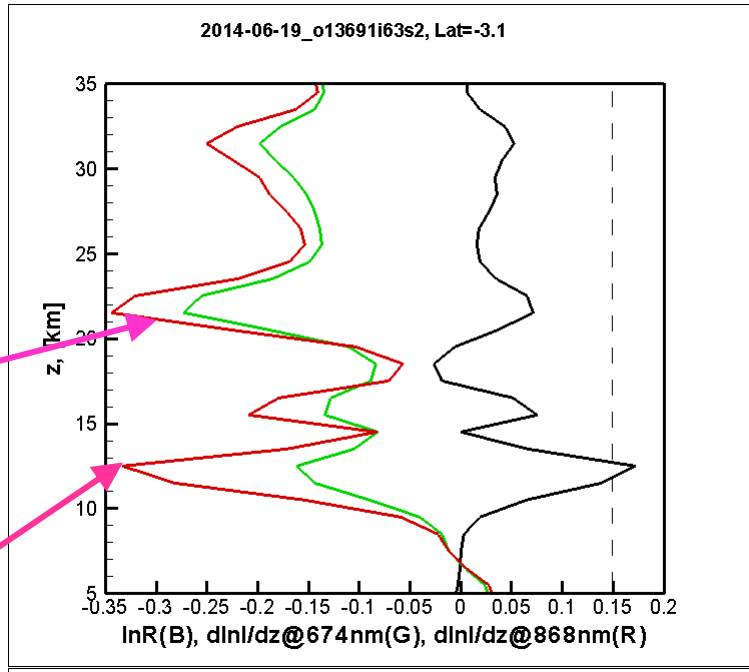
lnR = dlnIm(674nm,z)/dz - dlnIm(868nm,z)/dz

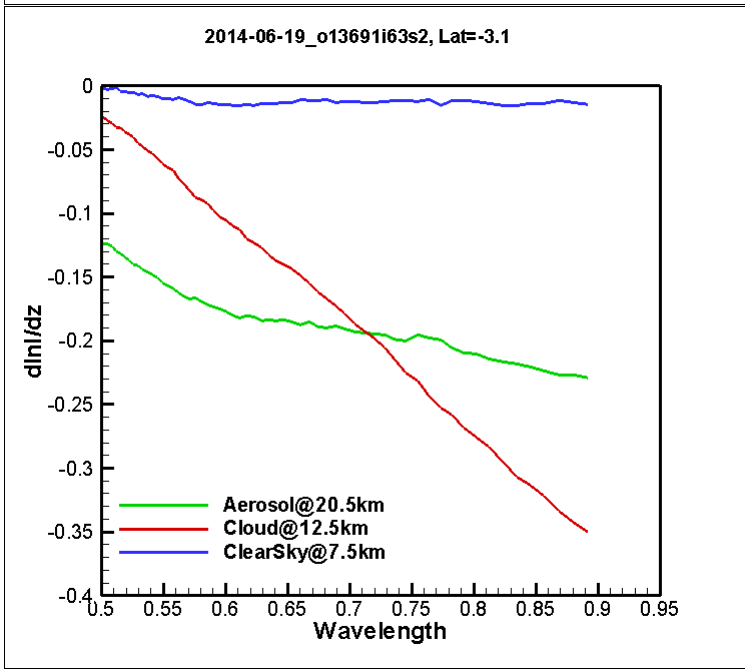


Advantages: (1) distinction between clouds and aerosols, and (2) PSC detection

An example of the distinction between Clouds and Aerosols

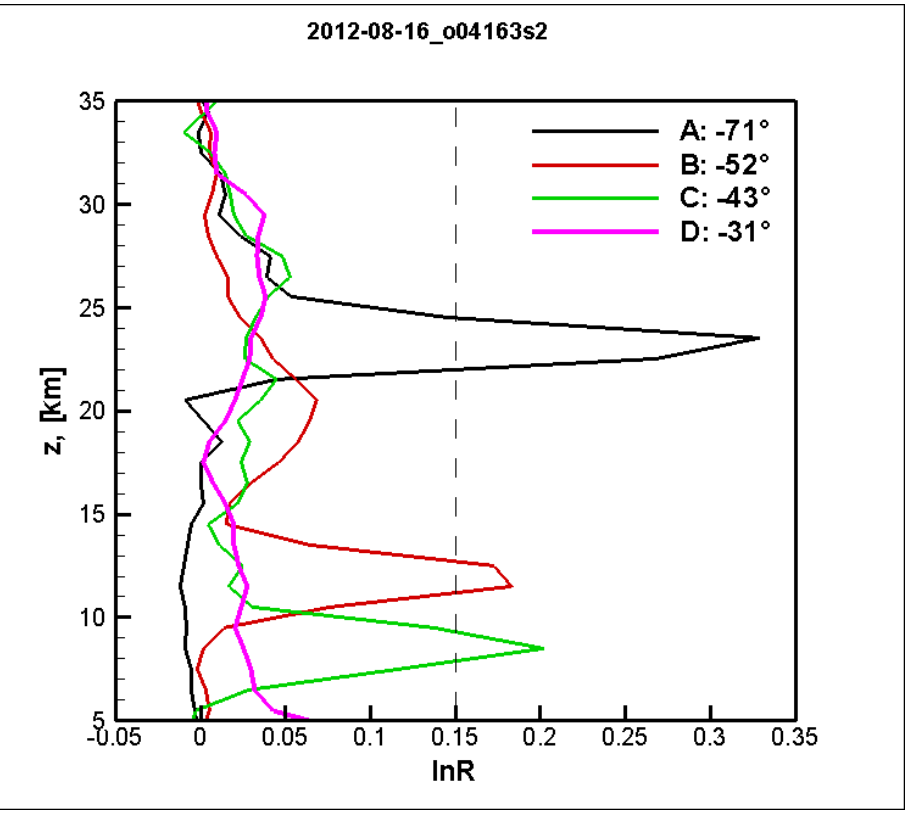


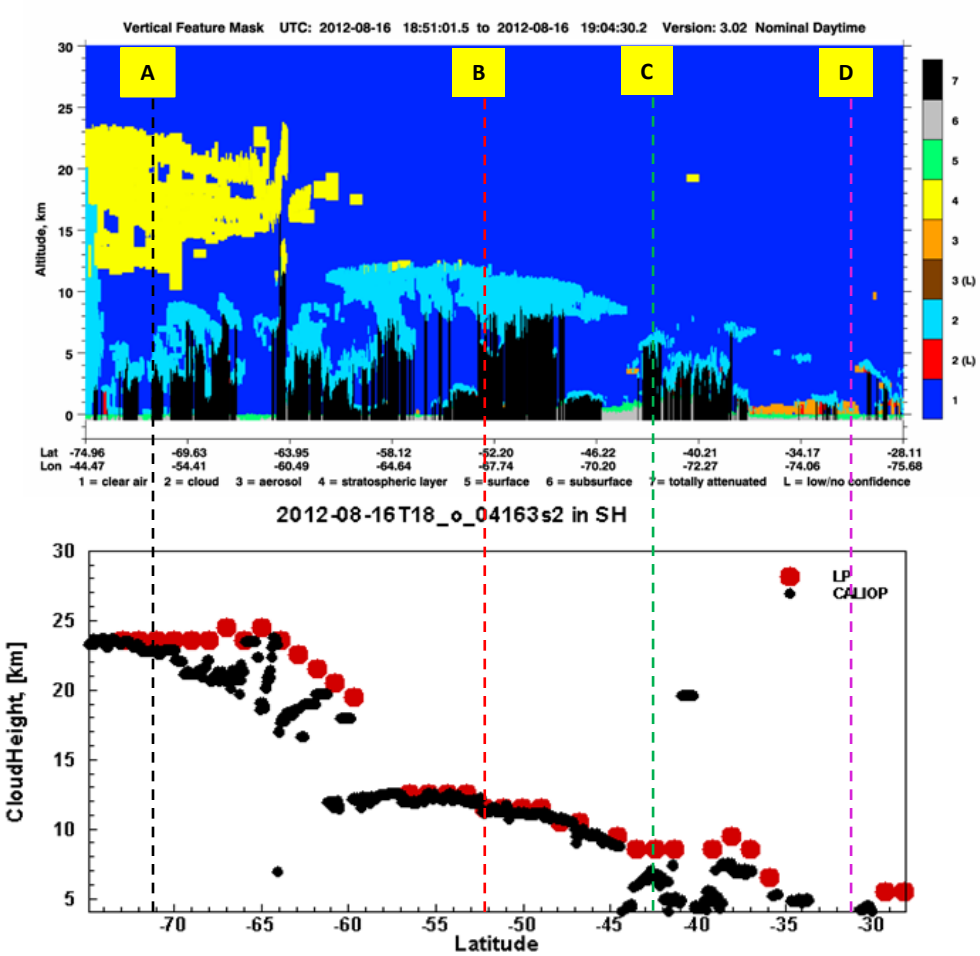




An example of the threshold determination

Case study for orbit 04163 on Aug 16,2012





Statistical Comparison between LP and CALIPSO data

to address the question:

How well does the LP estimates cloud height?

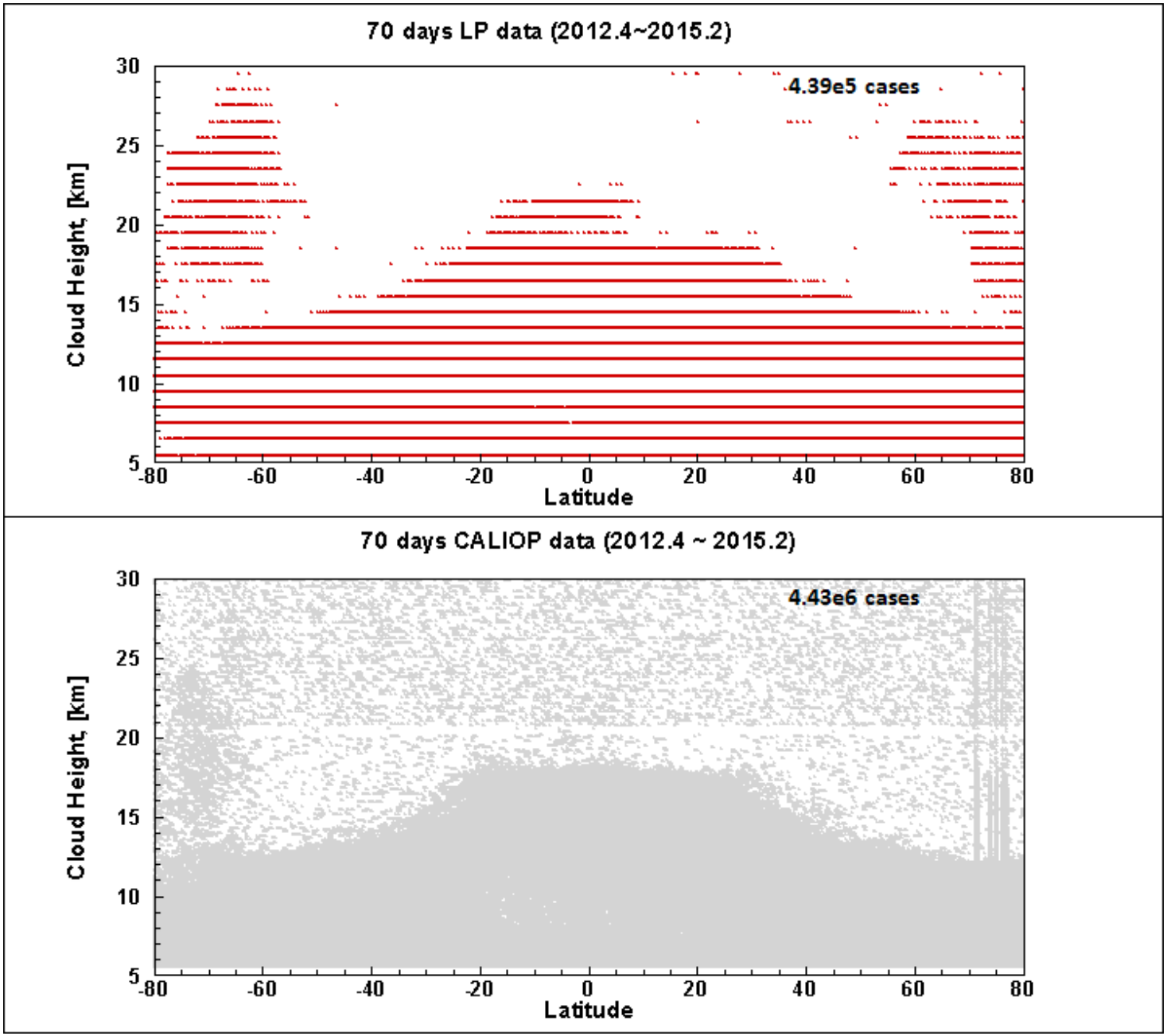
Cloud heights from LP were matched with daytime CALIPSO VFM data along OMPS's orbital track:

latitude separation < +/- 0.15°

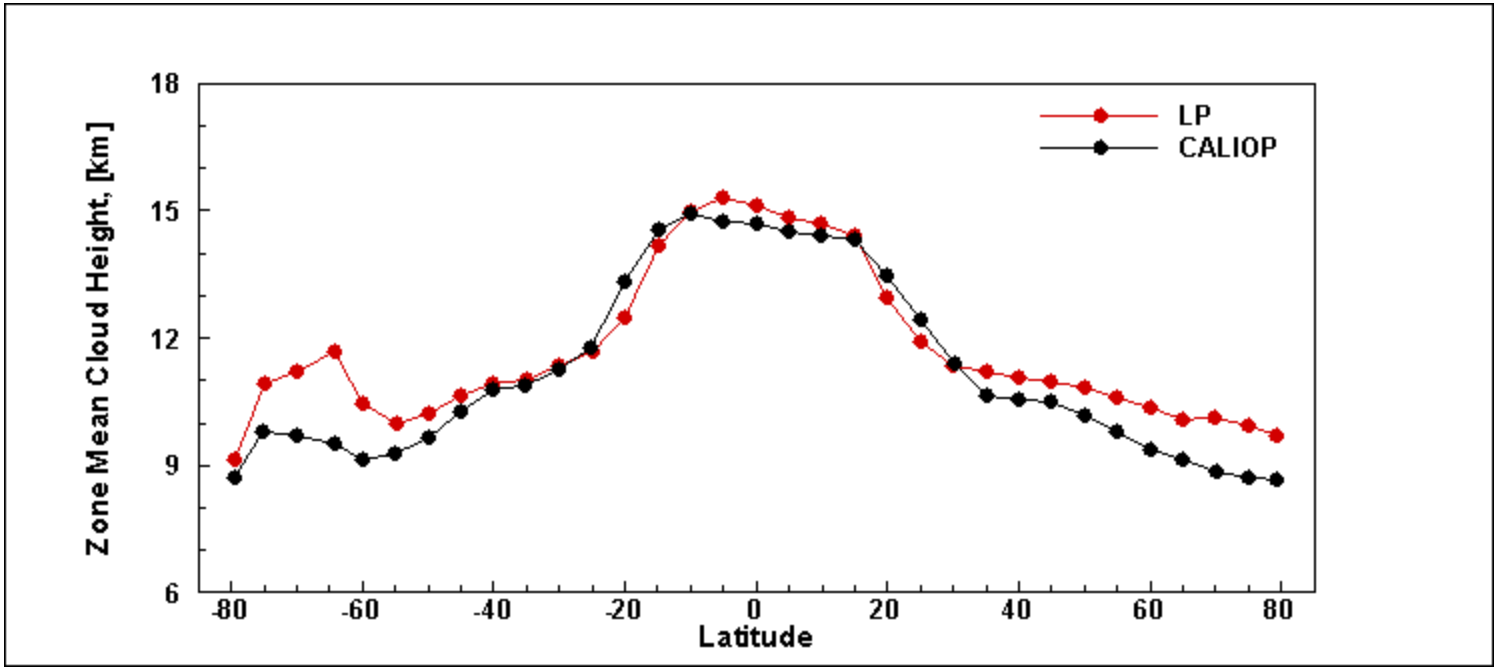
longitude separation < +/- 3.25°

Overpass time separation < 1 hour.

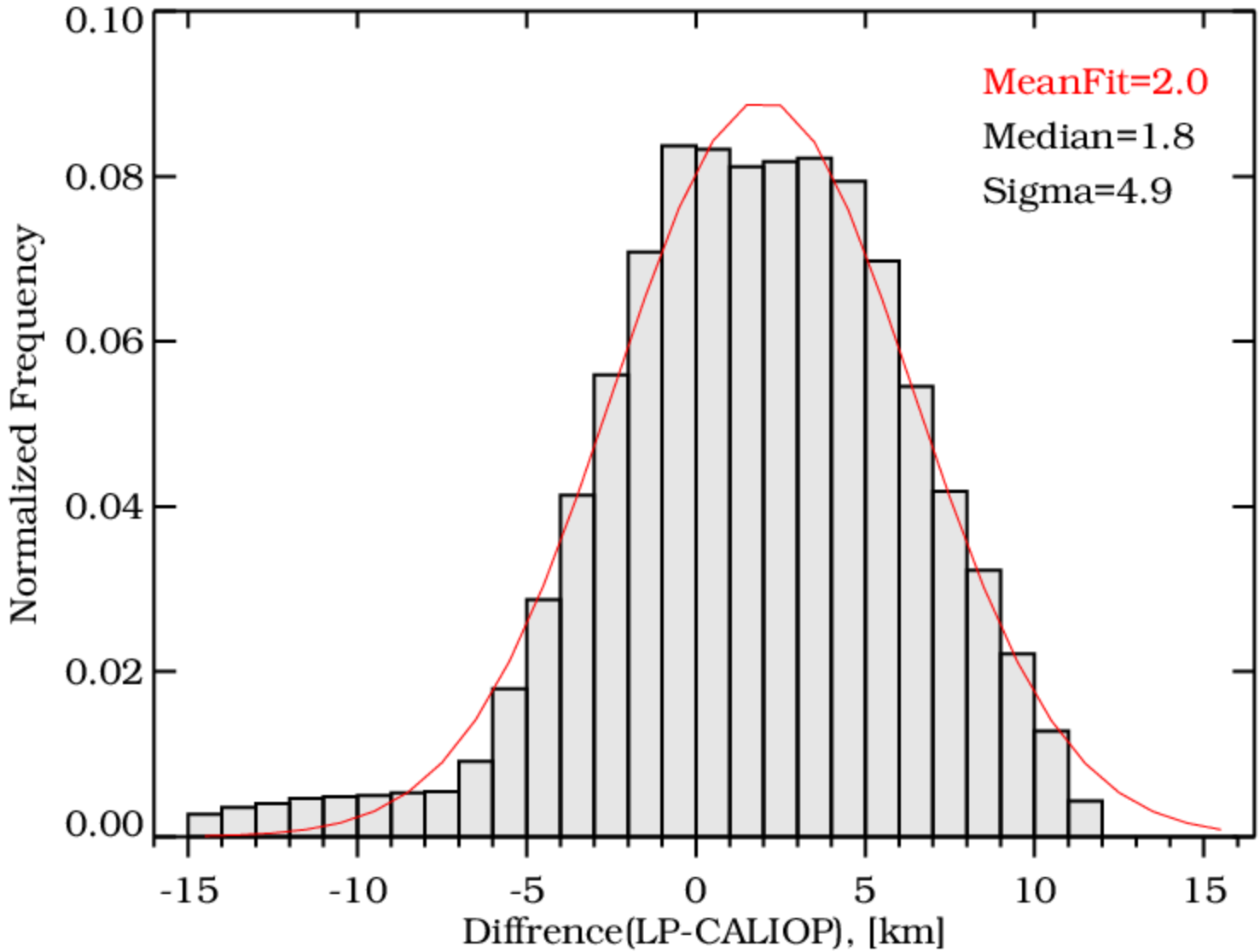
Cloud-top Height as a Function of Latitude for 70 days covering 2012-15



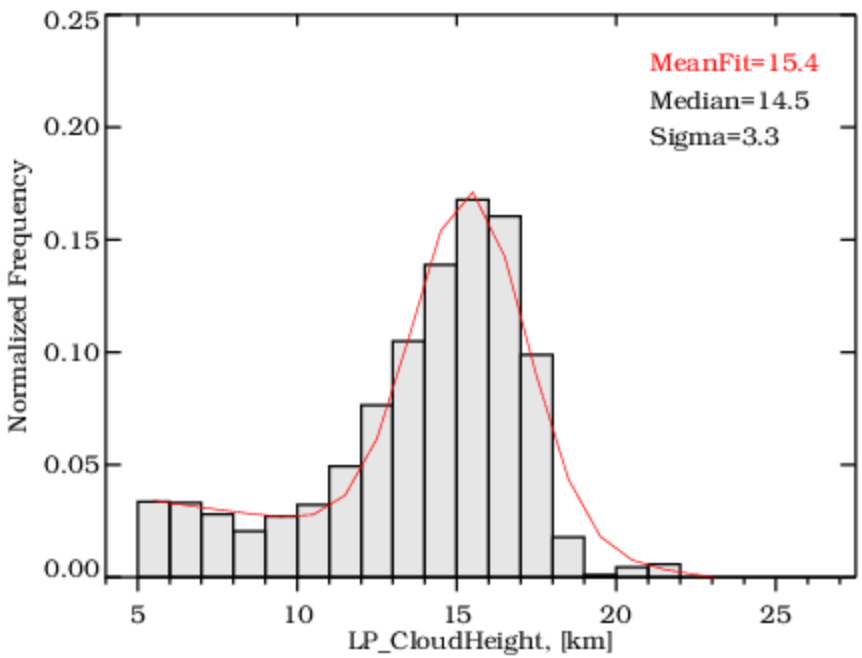
Zone Mean Cloud-top Height for clouds between 5 and 30 km from LP and CALIOP

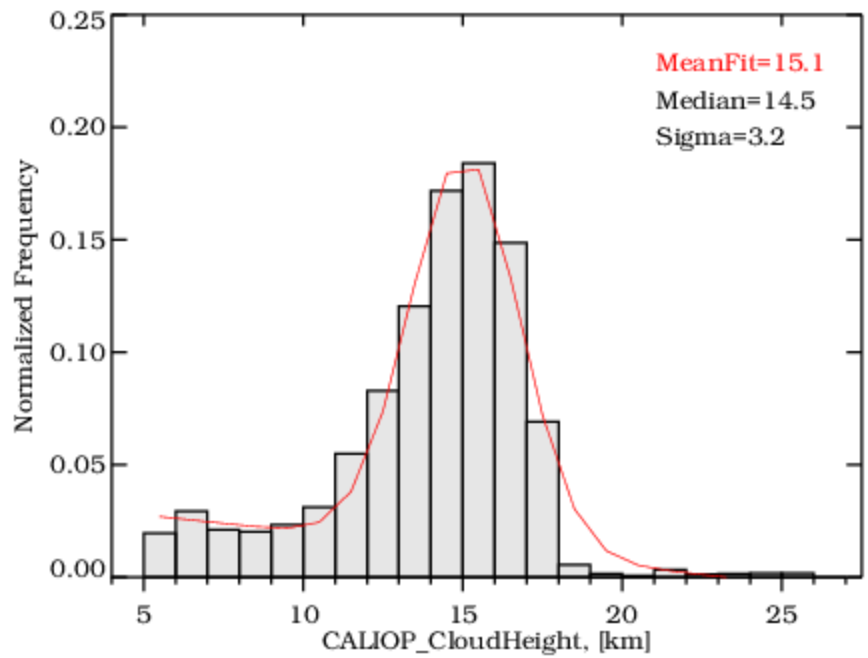


Histogram of cloud height differences between the two instruments

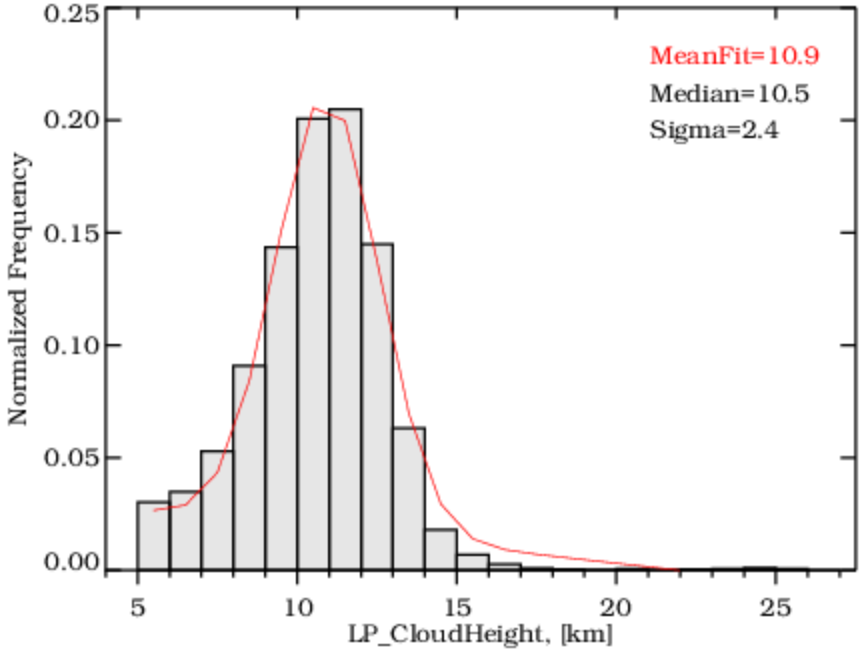


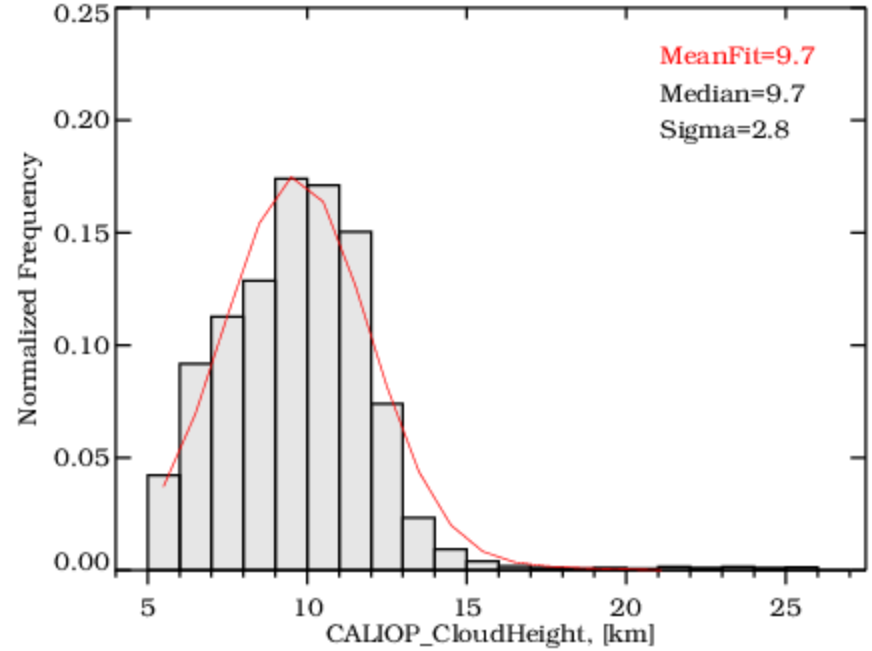
Cloud-top Height Distribution for the Tropic Areas (-30~30°)



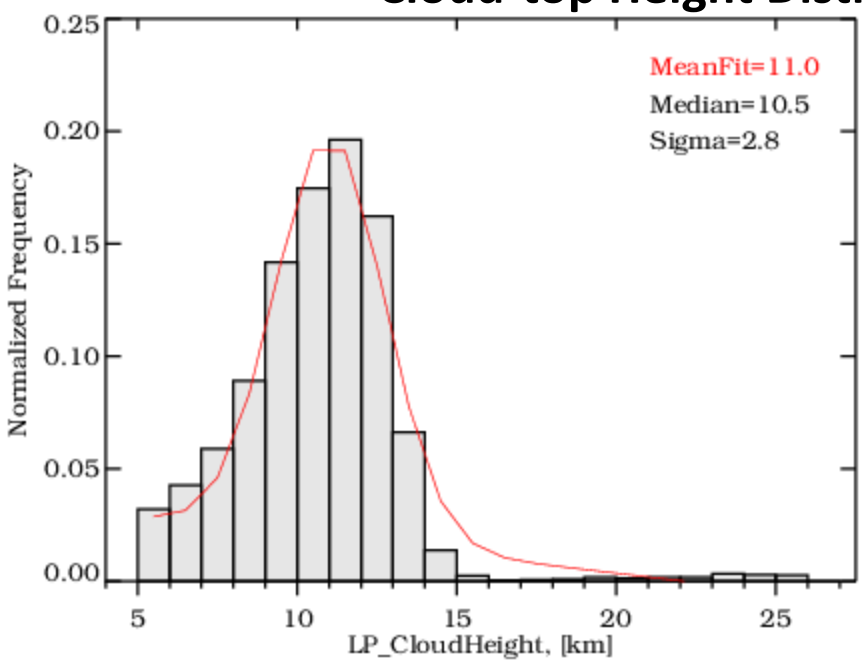


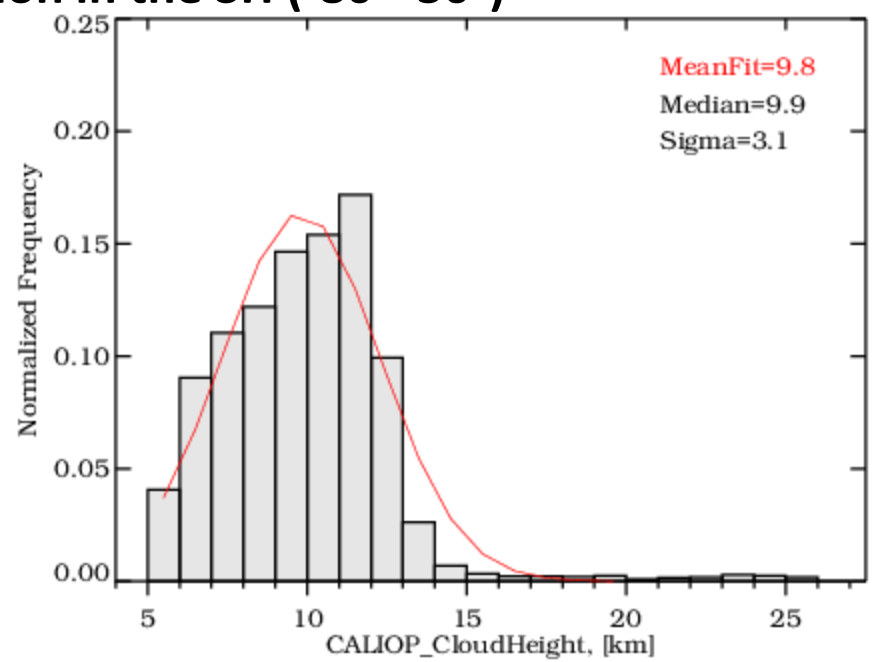
Cloud-top Height Distribution in the NH (30~80°)





Cloud-top Height Distribution in the SH (-80~-30°)





Summary

We have developed a new algorithm which uses differential edge detection technique for detecting cloud-top height from LP measurements. The statistics comparison showed agreement between LP and CALIOP, especially for the tropics.

The algorithm does have the limitations:

- it is difficult to detect cloud below 4.5km, and
- it may misidentify thick aerosols with large particles, e.g., fresh volcanic aerosol, as clouds.