**Abstract:** Cloud top pressures derived in MOD06 collection 4 were transformed into cloud top heights (CTH) using the ECMWF operational analysis profiles and compared against MISR stereo heights, radar cloud top heights from ARM SGP and Chilbolton CFARR and SIRTA lidar cloud top heights. MODIS CTHs are derived with two alternative methods: CO₂-slicing technique for clouds above 3km and 1µm brightness temperature if clouds are below 3km. The SGP site is in Oklahoma (36.6°N-97.5°W), CFARR (UK) is at 51.2°N-1.4°W and SIRTA is situated near Paris at 48.7°N-2.2°E. SGP radar is a 35GHz Millimeter cloud radar, CFARR possesses a 94GHz MMCR and SIRTA uses a 532nm lidar to derive cloud boundaries and when possible cloud optical depth less than 0.3. Finally, some preliminary results are shown for comparison between MODIS and ICESAT-GLAS laser cloud top heights.

**Comparison between MODIS, radar and MISR cloud top heights at SGP and CFARR**

- March 2000 to September 2003
- When cloudy + no broken clouds + MISR overpass

**Results for MODIS**
- CO₂-slicing gives 85.4% of cases with Radar-
- MISR CTH=4.6±7.2km, BT11 gives 81% of cases with 0.4±1.5km
- Problem: cloud data for low clouds

**CFARR**
- CO₂-slicing gives 68% of cases with Radar-
- MISR CTH=0.8±1.26km, BT11 gives 94% of cases with -0.04 to 0.09km
- Problem: radar attenuated in 2001-2002, affects high clouds and multi-layer situations

**Discussion**
- SGP: best for high clouds
- MODIS in good agreement with CO₂-slicing, low bias of 1.34km and standard deviation of 0.98km with CO₂-slicing

**Comparison between MODIS and SIRTA lidar (LNA) cloud top heights**

- September 9, 2003
- High single cloud: LNA CTH=9.1km, CTH=12.2km
- MISR CTH=11.1km, MODIS CTH=10.4km, τ=0.4±0.1
- SGP CTH: high clouds more frequent than mid-level or low clouds,
- optically thin clouds frequent.
- 89% of cases remain after thresholds
- CFARR shows very small bias

**Conclusion**
- Problems when cloud too thin (optical depth less than 0.2) or if clouds are low
- MODIS CTH: problems when more than one cloud layer
- ARK for single cloud, no sensitivity to optical depth

**References**

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