



# The NASA Micro-Pulse Lidar Network (MPLNET)

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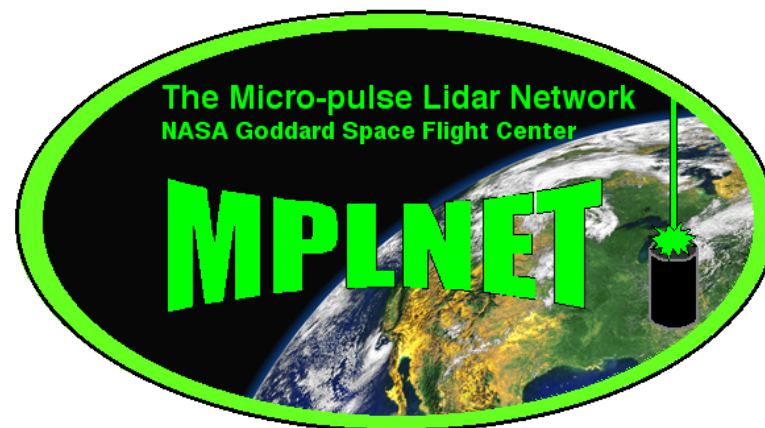
## NASA SMARTLABS Field Deployments:

Si-Chee Tsay, NASA GSFC Code 613

## Site Operations & Science Investigations

.... many network partners around the world

MPLNET is funded by the NASA Radiation Sciences Program and the Earth Observing System





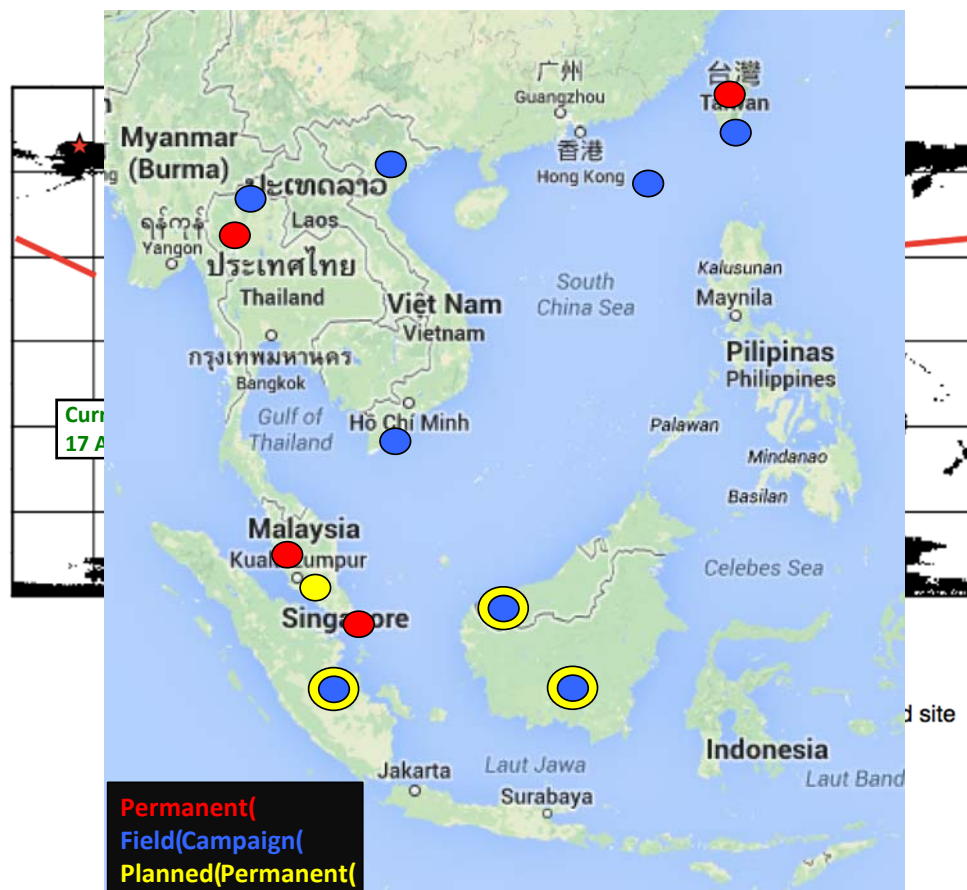
# The Micro Pulse Lidar Network (MPLNET)

<http://mplnet.gsfc.nasa.gov>



**MPLNET:** +10 Trillion Laser Shots and counting .....

- A federated network of micro pulse lidar sites around the world, coordinated and lead from Goddard Space Flight Center
- Co-location with related networks, including NASA AERONET
- Local, regional, and global scale contributions to atmospheric research, climate studies, satellite validation, and air quality applications
- Part of WMO GAW Lidar Network Project (GALION), Welton Co-Chair



## Micro Pulse Lidar (GSFC Patent)

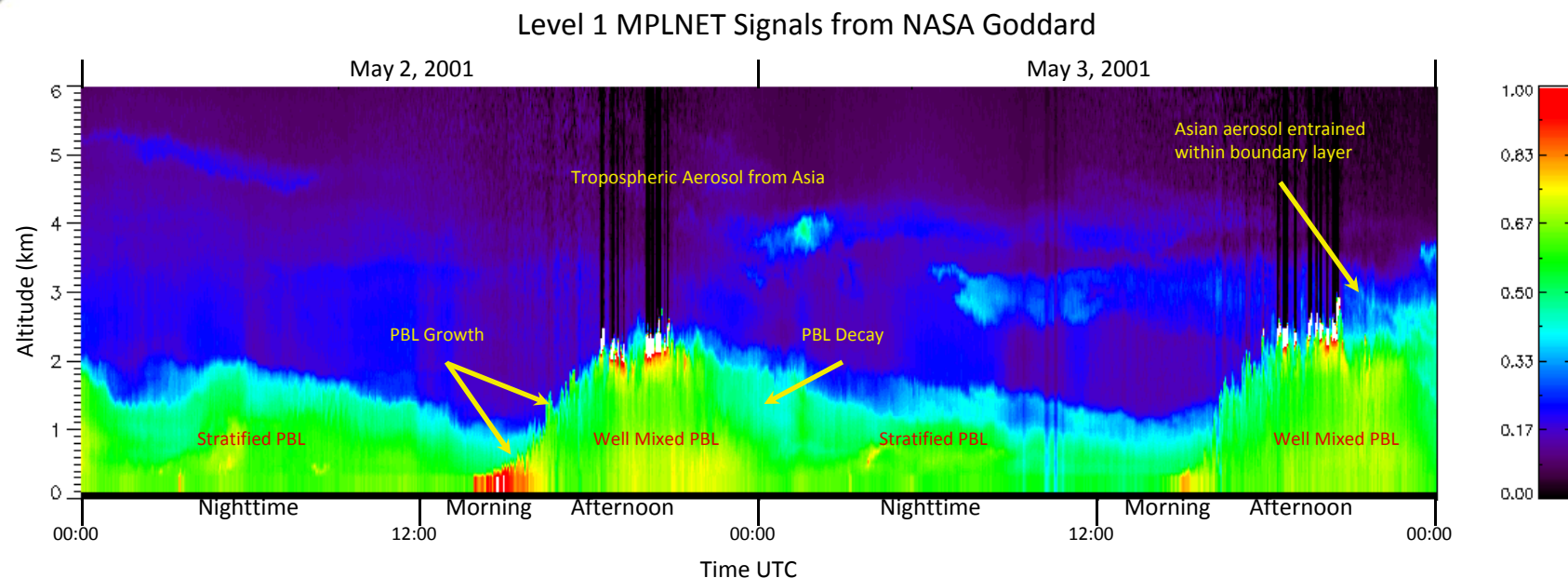


### What MPLNET can provide to YMC:

- 1 minute data rate, continuous (full diurnal cycle)
- 75 m vertical res, surface through TTL
- Aerosol & Cloud layer structure
- Mixed Layer Depth Diurnal Evolution
- Estimate cloud thermodynamic phase
- Ability to detect TTL cirrus
- Detect and profile light precipitation
- Aerosol extinction profiles & structure
- Identify Aerosol – Cloud interaction cases
- NRT data for flight planning support



## MPLNET Data Products: Data Products Overview



### MPLNET Data Products:

- |            |  |
|------------|--|
| Level 1    | Lidar Signals, Instrument Diagnostics<br><i>Volume Depolarization Ratio (particle shape)</i><br>Latency: < 1.5 hrs most sites, others next day. No Quality Screening   |
| Level 1.5  | Level 1.5b: Aerosol, Cloud, <b>PBL Heights</b> and Vertical Feature Mask<br>Level 1.5a: Aerosol Backscatter, Extinction, Optical Depth, and Lidar Ratio<br>(at AERONET times and 24/7 day-to-night)<br><i>Level 1.5c: Thin Cloud Extinction and Optical Depth</i><br>Latency: next day. No Quality Screening, but QC flags provided. |
| Level 1.5v | Same as L1.5 above<br>Latency: < 1.5 hours. No Quality Screening. Browse images available, data files only to registered users.  |
| Level 2    | Same as L1.5 above.<br>Latency: X weeks after Level 2 AERONET is available. Quality Screening: Yes   |

Data are publicly available in netcdf.  
Errors included for all data products.  
Data policy same as AERONET.  
**Red: new products coming soon.**

<http://mplnet.gsfc.nasa.gov>

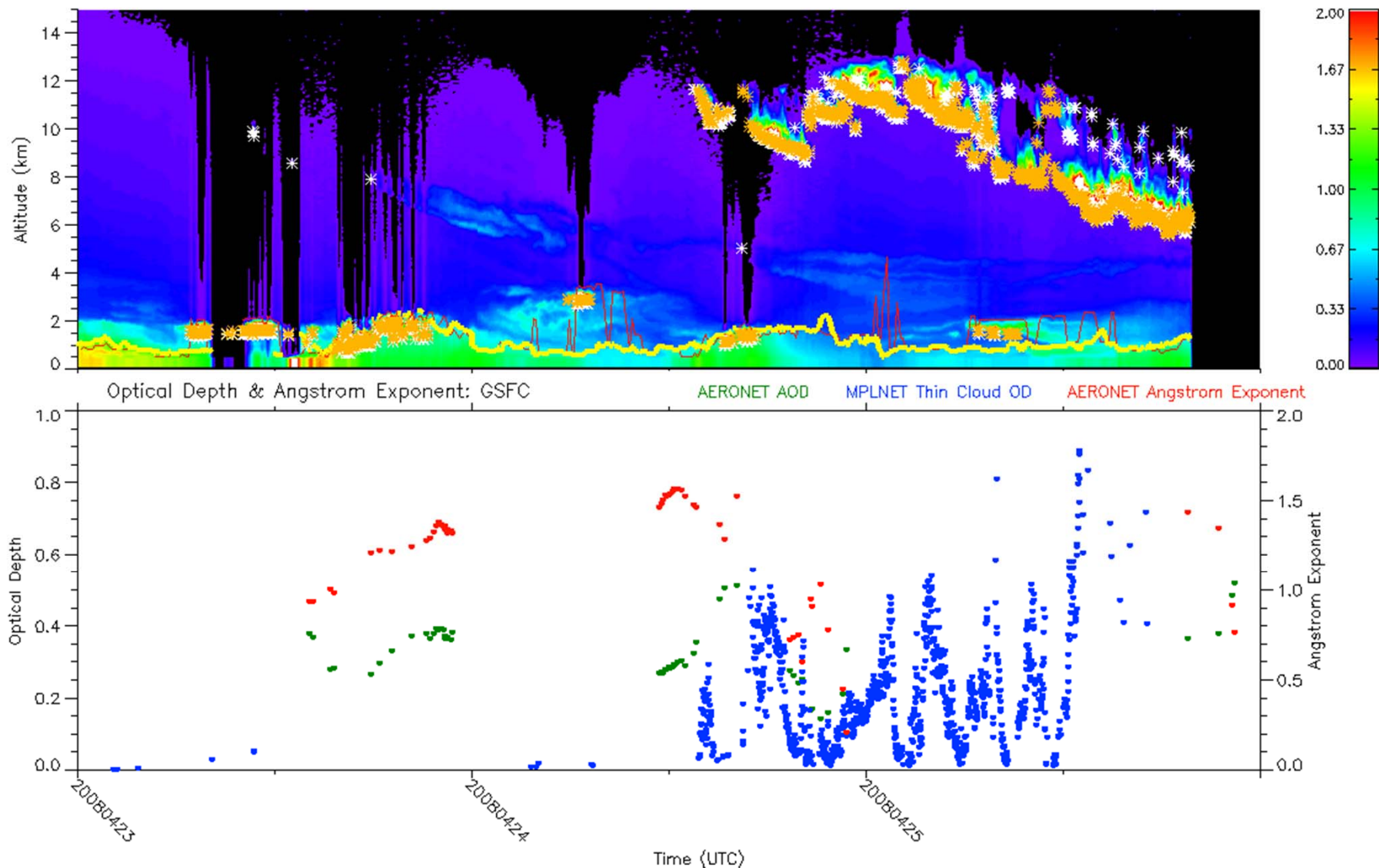


## MPLNET New Version 3 Data Products: Overview

New mixed layer depth/PBL (Lewis et al, 2013), New Cloud products (Lewis et al, in prep)

Cirrus typing/discrimination (Campbell et al, in prep)

MPLNET Level 1.0 NRB: GSFC

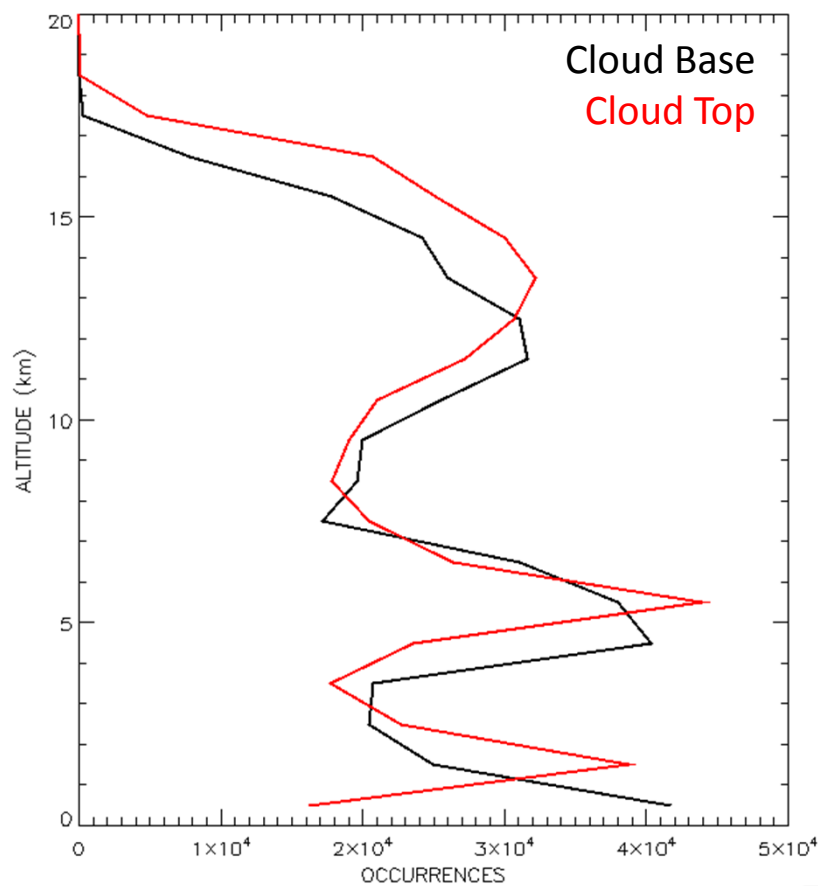




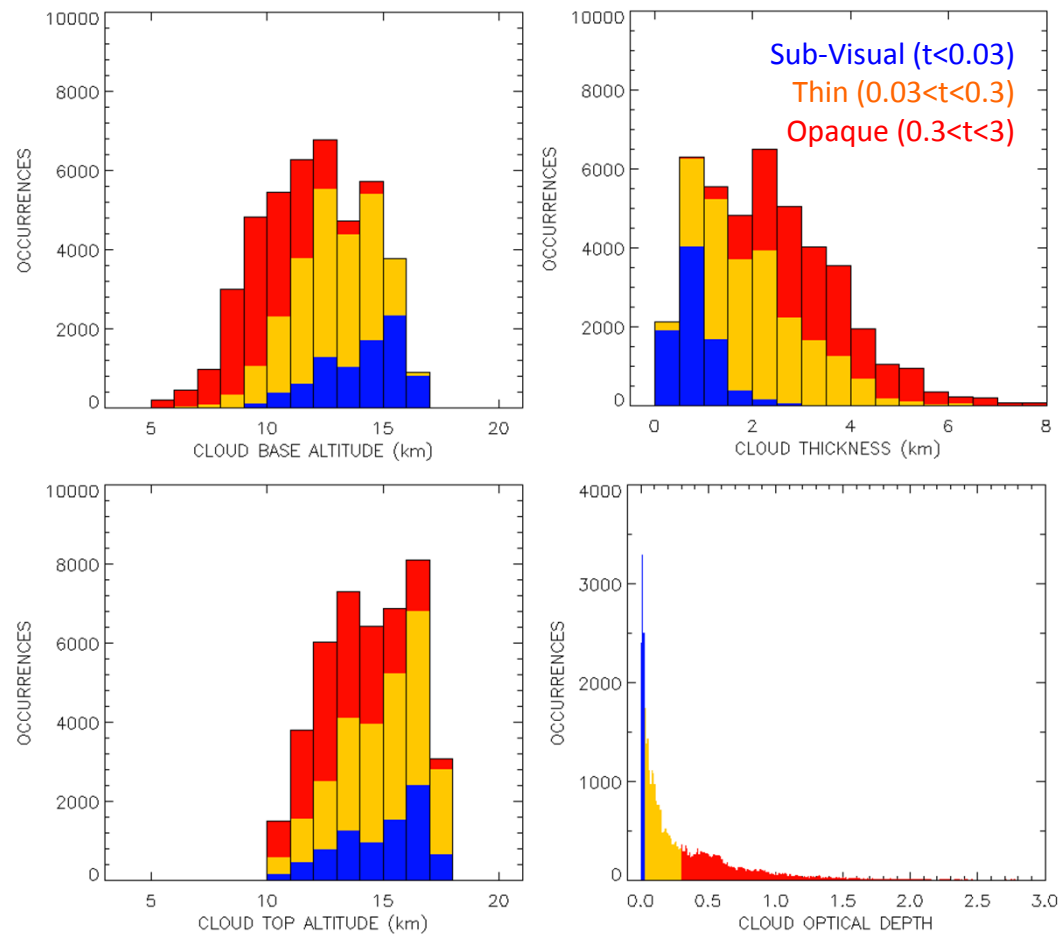


## Cloud Statistics for Singapore: 2012

All Clouds

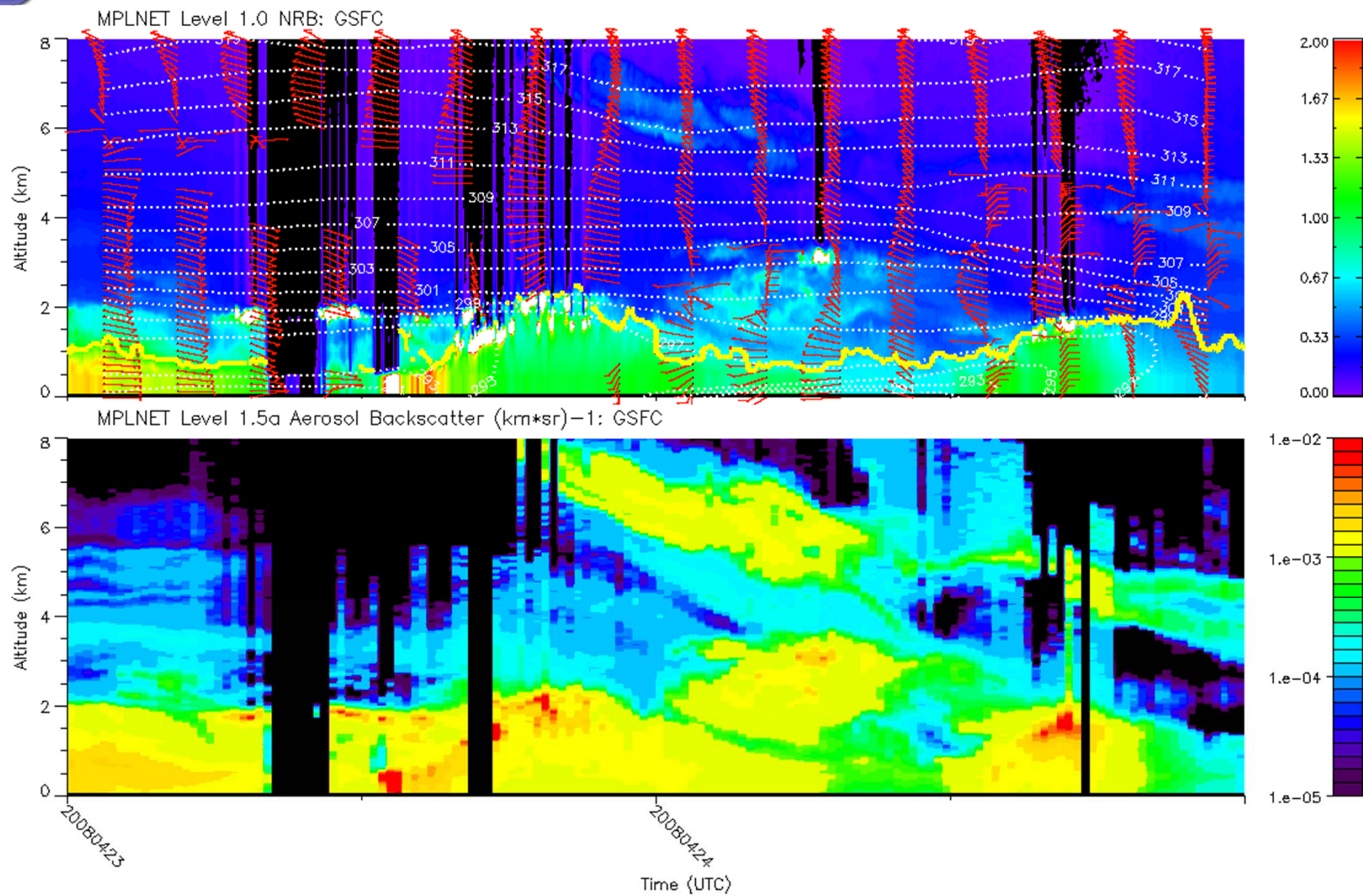


Cirrus Clouds





## MPLNET Data Products: GEOS-5 Met Profiles & Aerosol Example



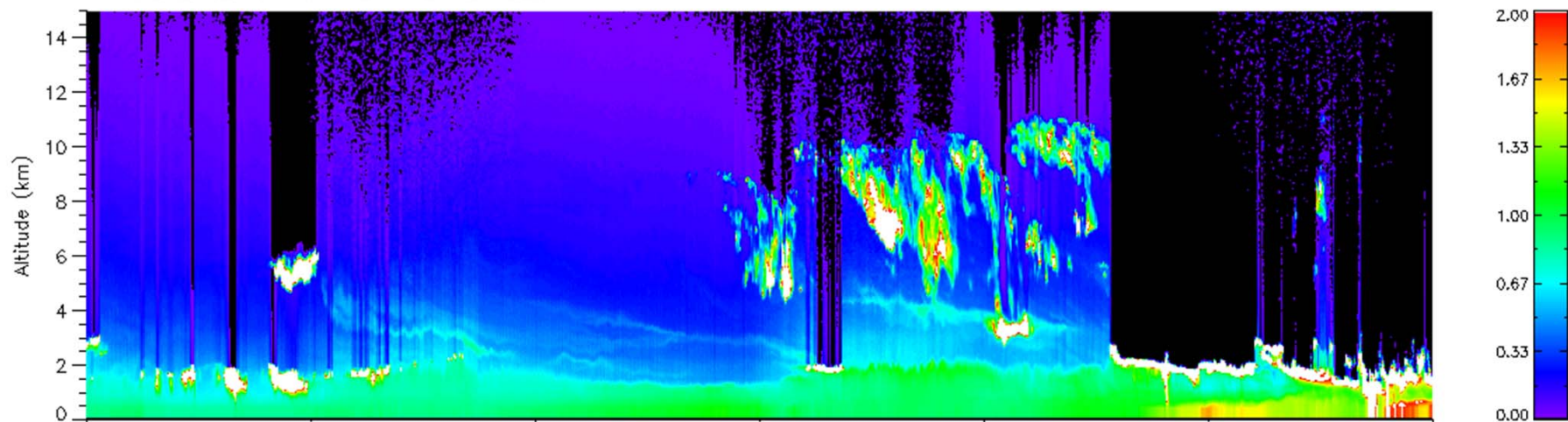




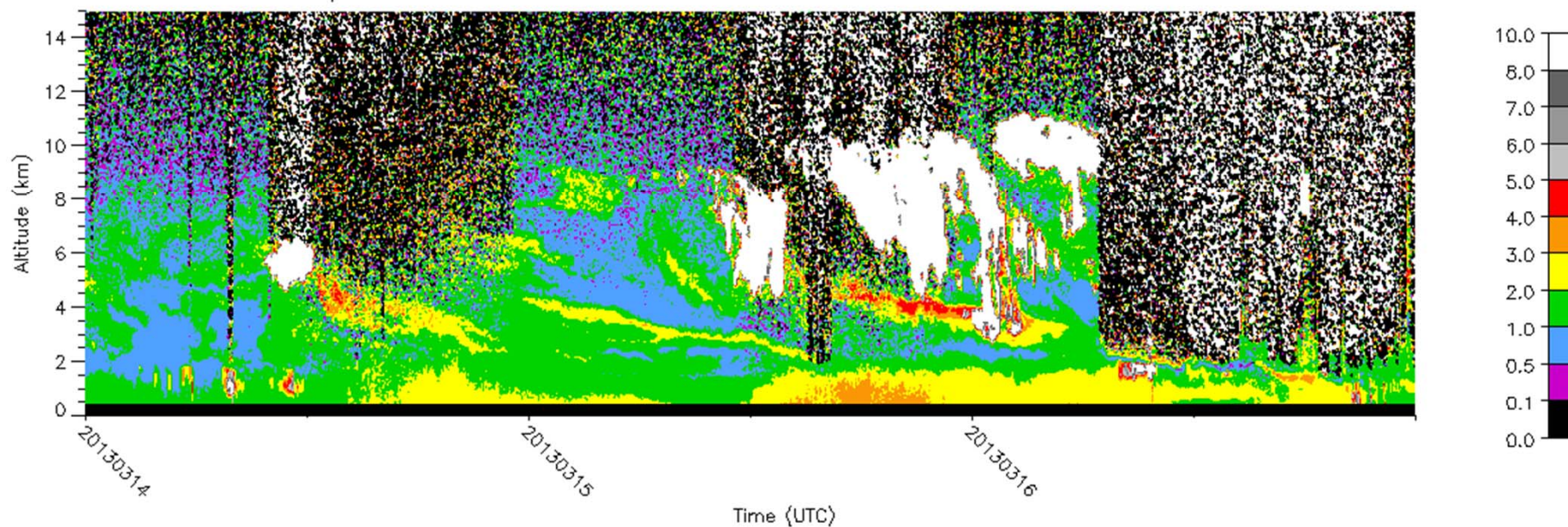
## MPLNET Data Products: Volume Depolarization Ratio Example

Higher volume depolarization ratios are associated with non-spherical particles. Detect even weak aerosol layers in FT.

MPLNET Level 1.0 NRB: MPL44217Lab



MPLNET Volume Depolarization Ratio: MPL44217Lab



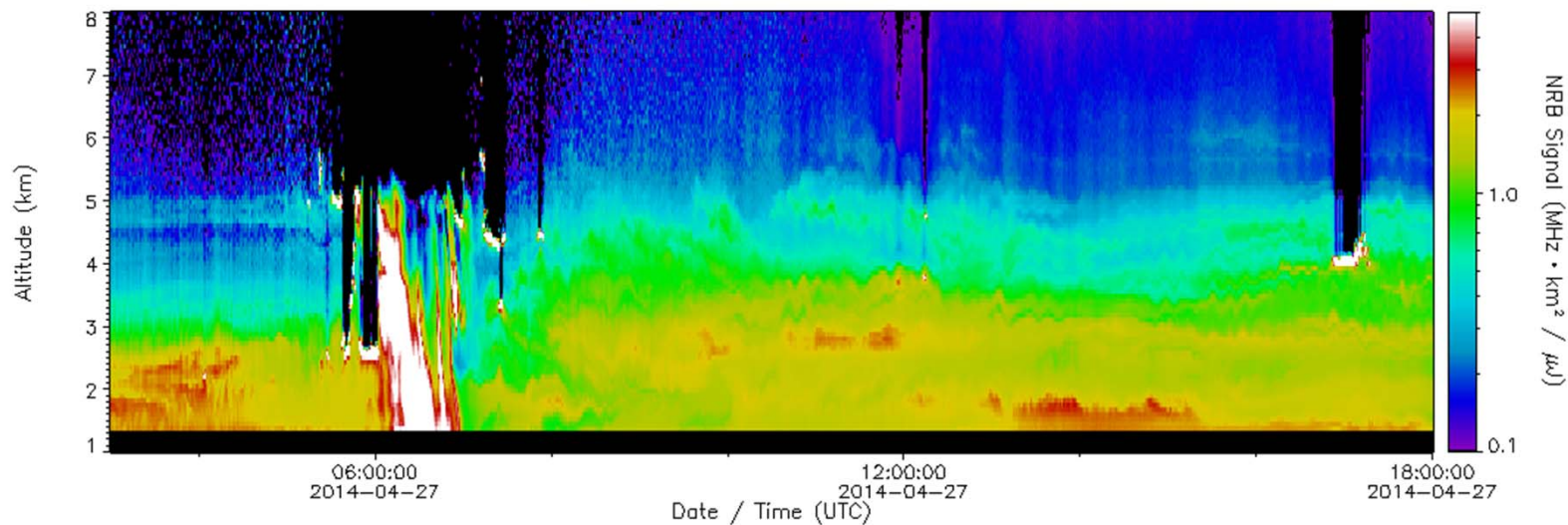




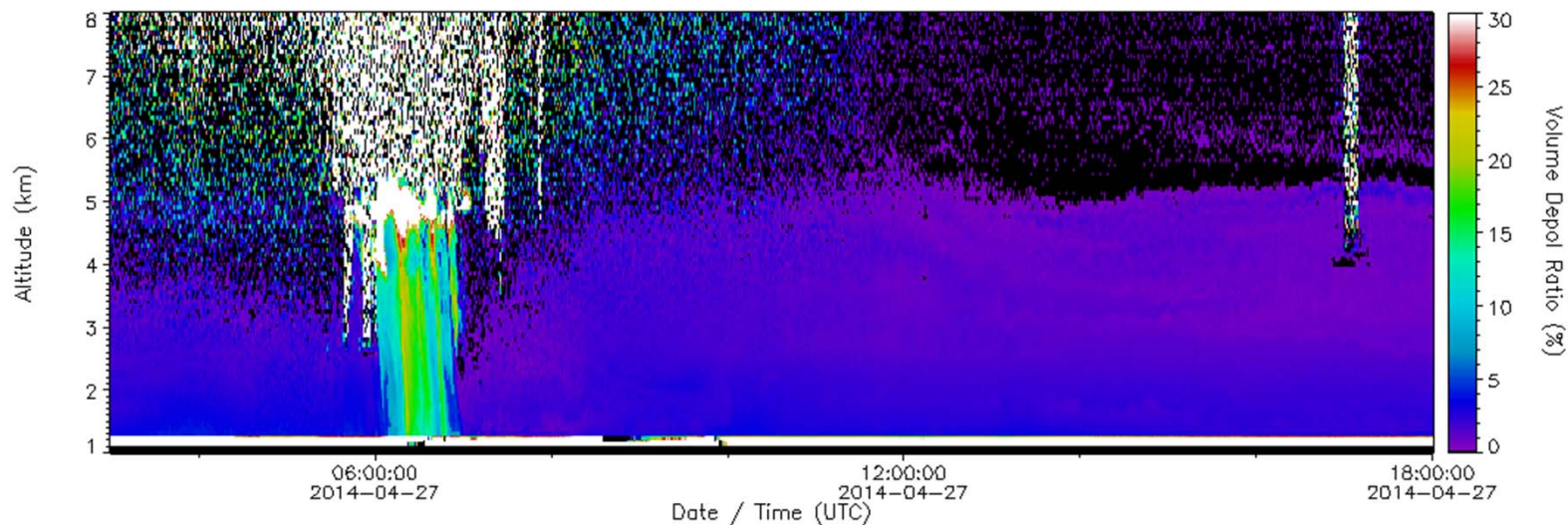
## MPLNET: Data from Om Koi 2014

### Smoke and Cloud Interactions, Precipitation

MPLNET RA L1\_NRB: Omkoi\_ra, 2014-04-27



MPLNET RA L1\_VDEPOL: Omkoi\_ra, 2014-04-27







## AERONET & MPLNET Site Plan: Open to Modifications for YMC

