

Toward in-situ observation to validate ATLID and CPR for oceanic aerosols and clouds

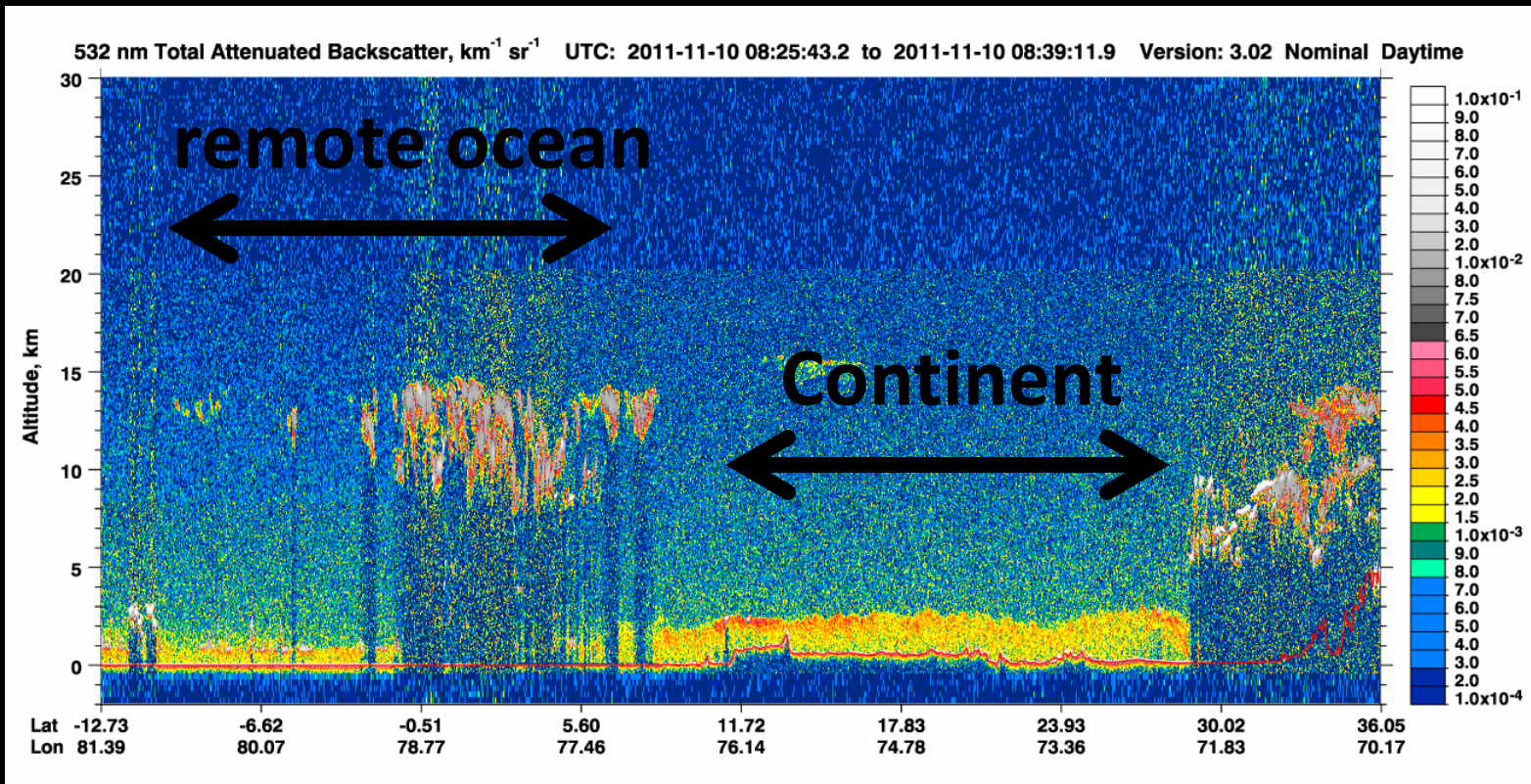
Members

Kazu. Yasunaga (JAMSTEC/U.Toyama),
Masaki Katsumata (JAMSTEC),
Tomoaki Nishizawa (NIES),
Toshiaki Takano (Chiba University), and
Kazuma Aoki (U.Toyama)

Purpose

Evaluation of EC products in the clean condition (over the oceanic regions)

remote ocean condition \longleftrightarrow Continental condition
significantly different (clouds and aerosols) !!



Issues

1. Facility

- Research vessel or Land station at a remote island?

2. For ship observation

- Survey for available vessels for the coming 2-3 years
- Strategy for the validation

Direct comparisons during an intensive campaign?
or Statistical comparisons ?

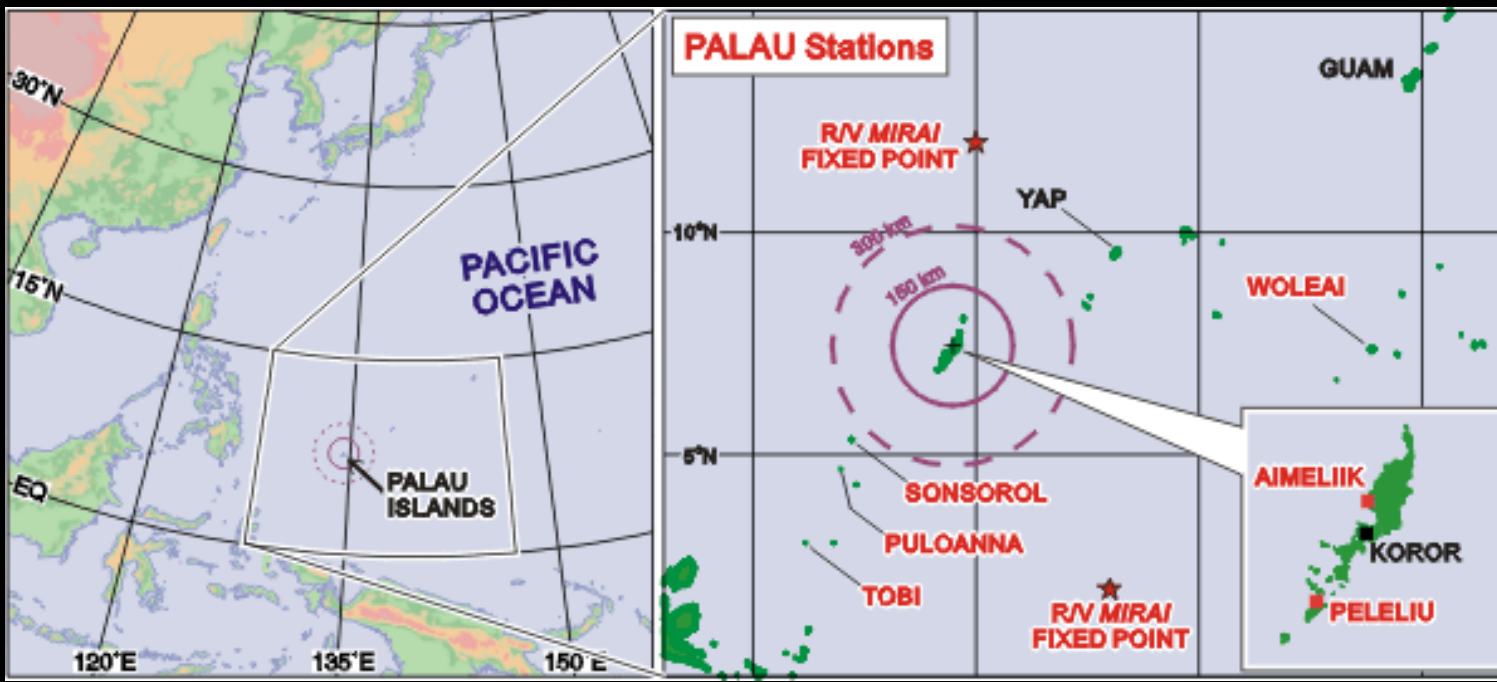
- Necessary improvement of our lidar and cloud-radar system for the installation

3. For island observation

- Survey for an island (e.g., infrastructure for continuous observation, access, etc.)
- Necessary improvement of our lidar and cloud-radar system for the deployment

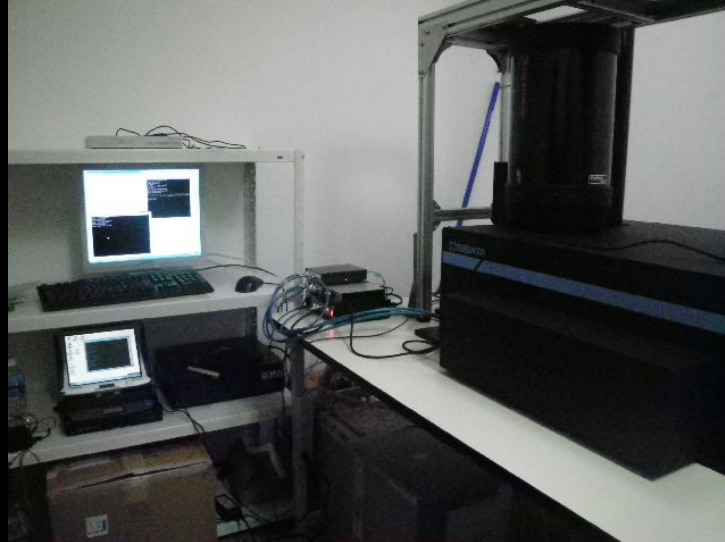
Palau Observational Site of JAMSTEC

- Observational station of JAMSTEC
- Remote island.
(oceanic condition)
- Easy Access
(regular direct flights)



Palau Lidar

- Mie Lidar
 - 532nm (2 channels), 1064 nm, and 660 nm (Raman)
- Installation : at the end of May 2014.
- Test operation
 - from JUN –July 2014 (about 1month)
 - Automatic observation is impossible.
 - Upgrade of the Lidar system to HSRL one is difficult.
 - There are frequent power failures...



Issues

1. Facility

- Research vessel or Land station at a remote island?

2. For ship observation

- Survey for available vessels for the coming 2-3 years

- Strategy for the validation

Direct comparisons during an intensive campaign?
or Statistical comparisons ?

- Necessary improvement of our lidar and cloud-radar system for the installation

3. For island observation

- Survey for an island (e.g., infrastructure for continuous observation, access, etc.)

- Necessary improvement of our lidar and cloud-radar system for the deployment

R/V Mirai MR15-04 Cruise (Provisional)

< Atmospheric Measurements >

- 1) C-band Polarimetric Doppler Radar
- 2) Radiosonde (3-hrly)
- 3) Videosonde (20-30 times)
- 4) Surface Meteorology
- 5) Skin SST (Radiometer, Seasnake)
- 6) GPS water vapor
- 7) Disdrometer
- 8) Ceilometer
- 9) Raman Lidar
- 10) Sky Radiometer
- 11) Solar Tracker & Telescope / Optical Spectrum Analyzer
- 12) MAX-DOAS (NO₂, AOD)
- 13) High Volume Air Sampler & Gas Analyzers

< Oceanographic Measurements >

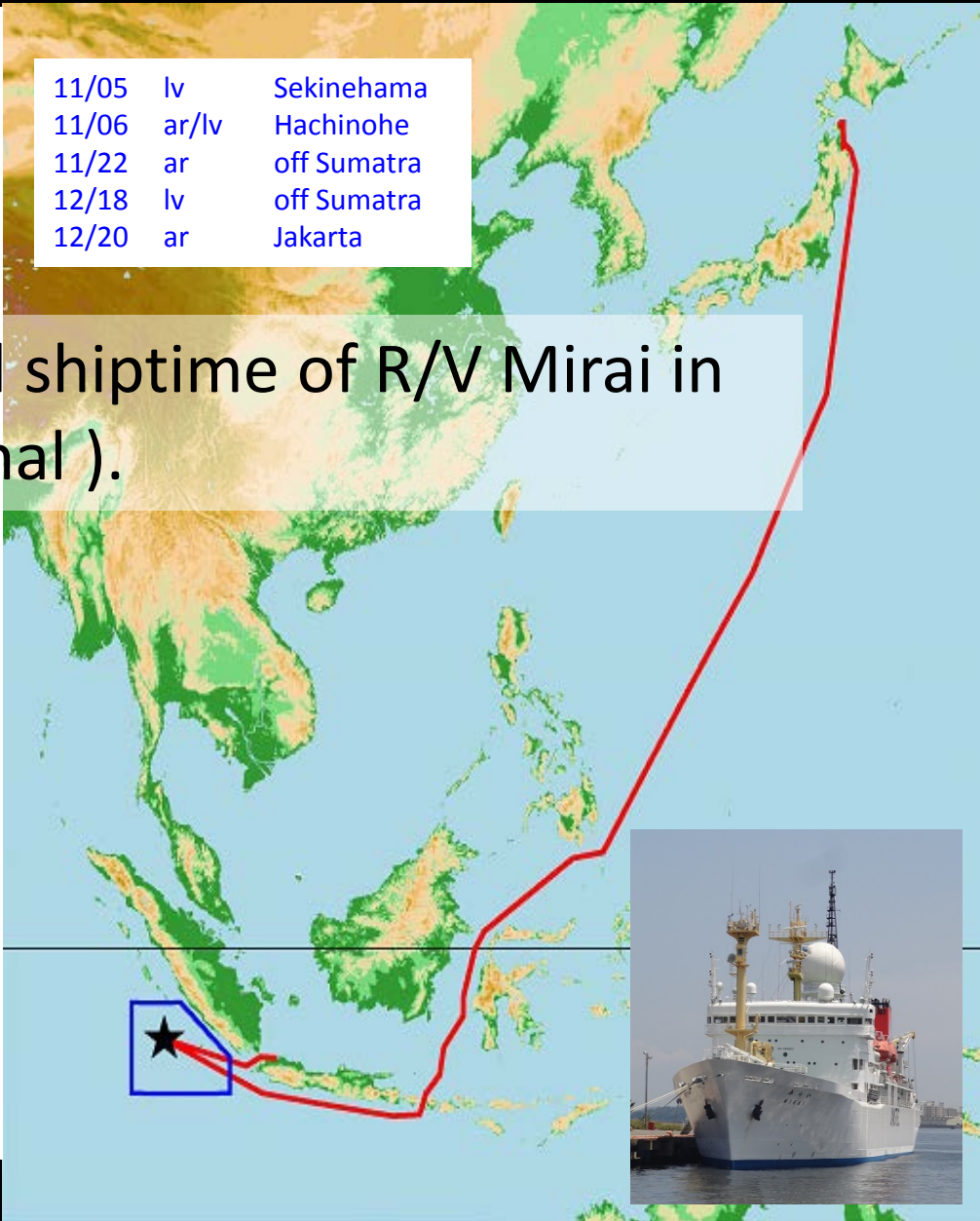
- 1) CTD (6-hrly)
 - + water sampling (Nutrients, DO, Chl-a)
 - + LADCP
- 2) Underway CTD (prior to on-station obs)
- 3) Ocean surface turbulence (6-hrly, TBD)
- 4) Shipboard ADCP
- 5) Sea Surface Monitoring (T, S, DO, Chl-a, etc.)

< Others >

- 1) Sea Skater Sampling (10 times)

On-board Personnel from

JAMSTEC, JAXA, Indonesia (BPPT and/or BMKG),
Univ. Tokyo, Univ. Toyama, Yamaguchi Univ., Kochi Univ.



11/05	lv	Sekinehama
11/06	ar/lv	Hachinohe
11/22	ar	off Sumatra
12/18	lv	off Sumatra
12/20	ar	Jakarta

We also secured shiptime of R/V Mirai in
2017 (Provisional).



CINDY2011 / DYNAMO Project (Oct.-Nov.2011)



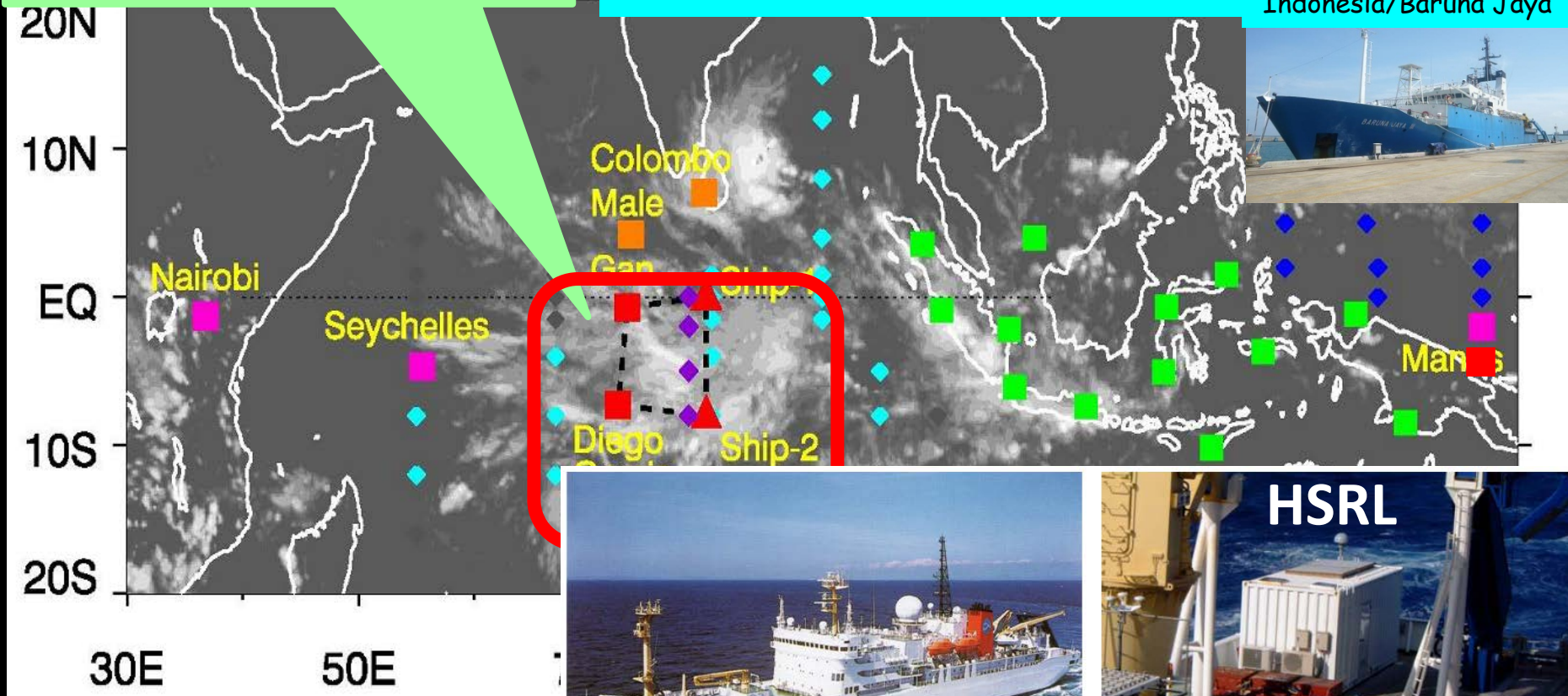
Gan ; Super site



Japan / Mirai

US / Roger Revelle

India / Sagar



Indonesia/Baruna Jaya

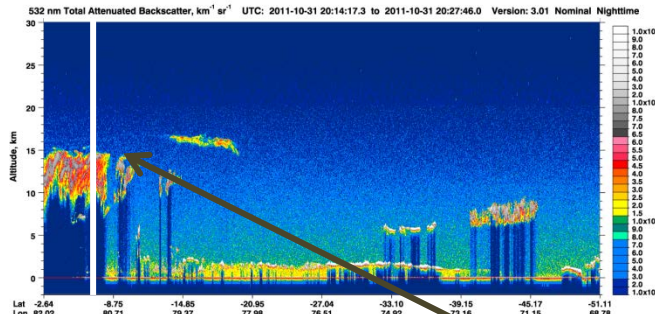
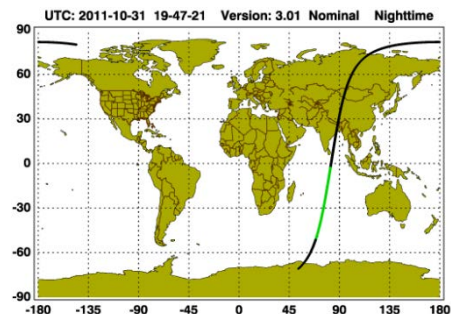
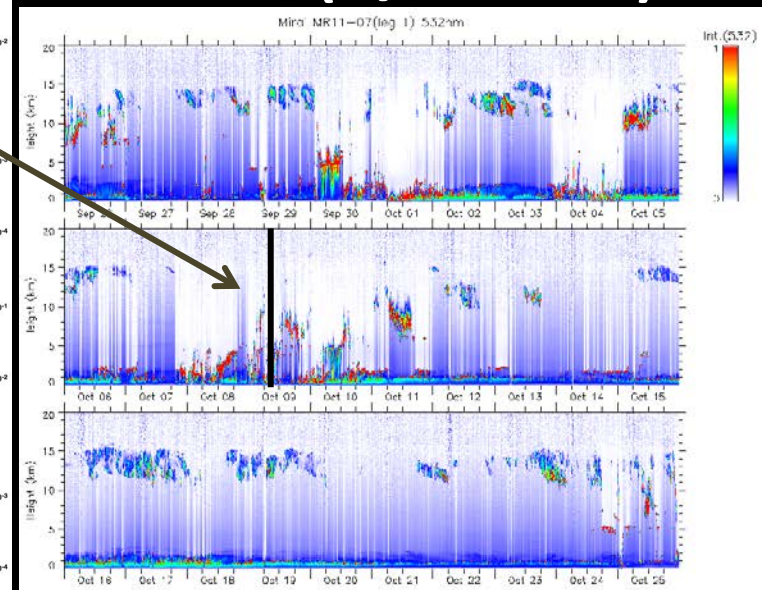
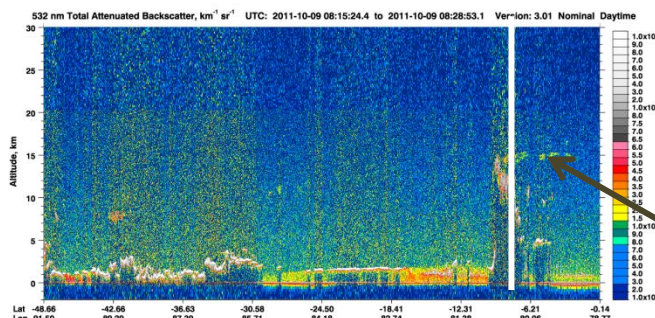
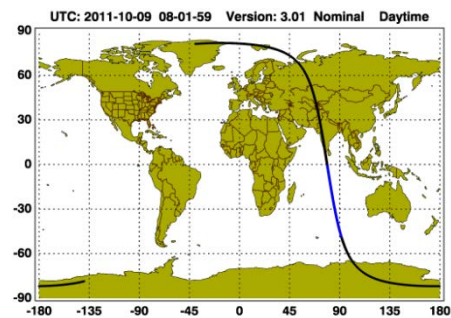


HSRL

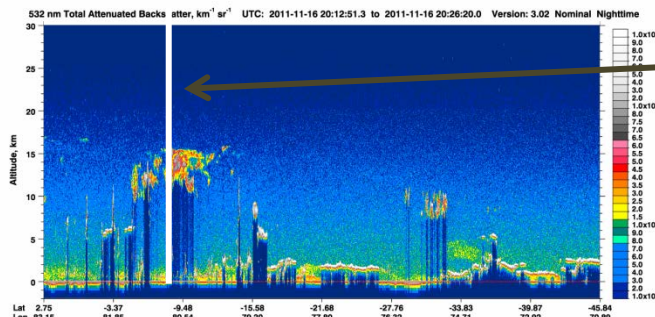
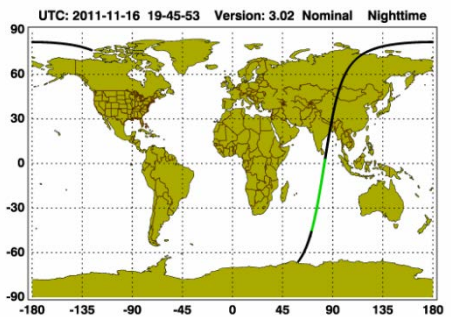
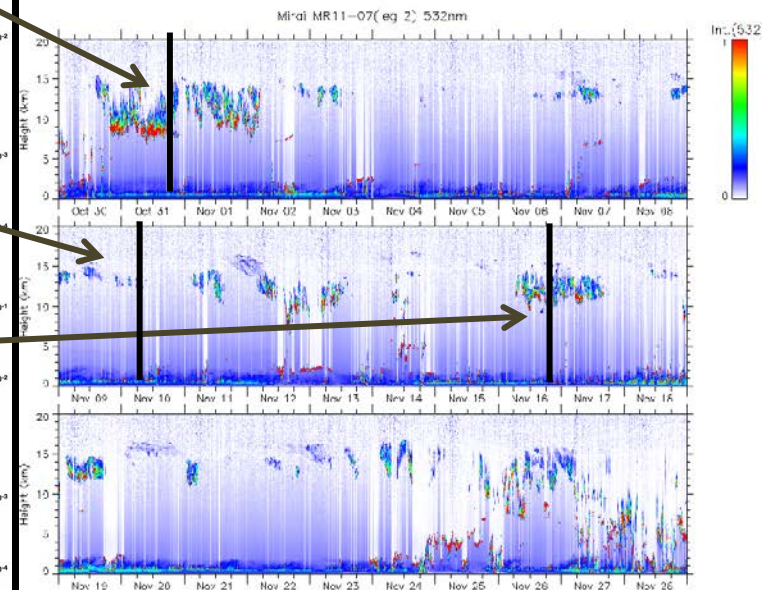
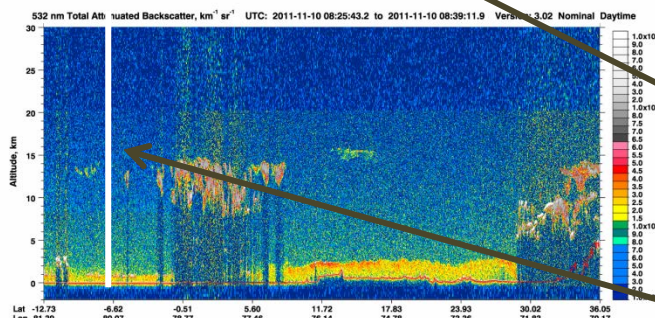
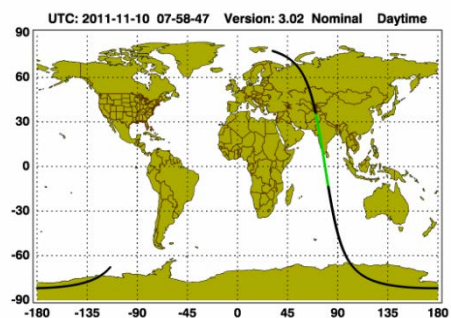
Cloud Radar

Overpass of CALIPSO during CINDY2011

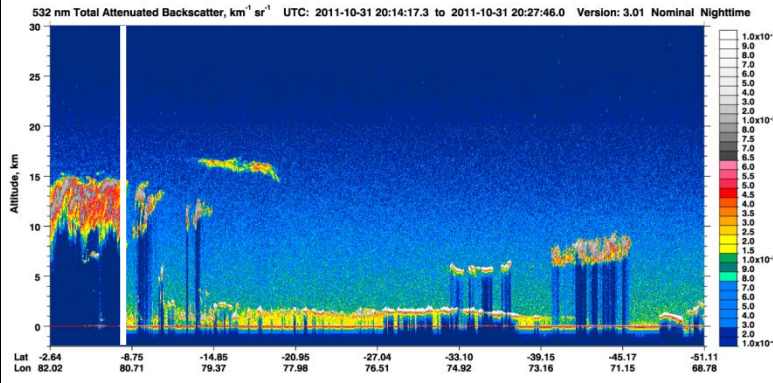
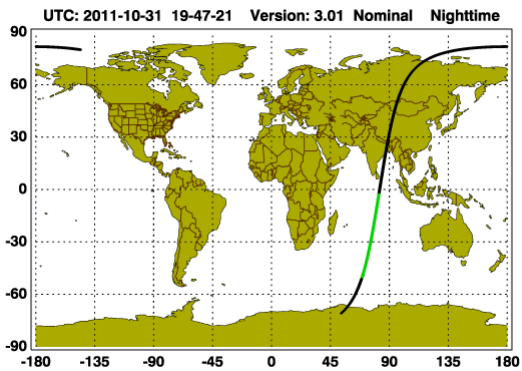
Lidar (R/V Mirai)



Light sections of backscatter intensity at 532nm from 26 September 2011 to



October 31

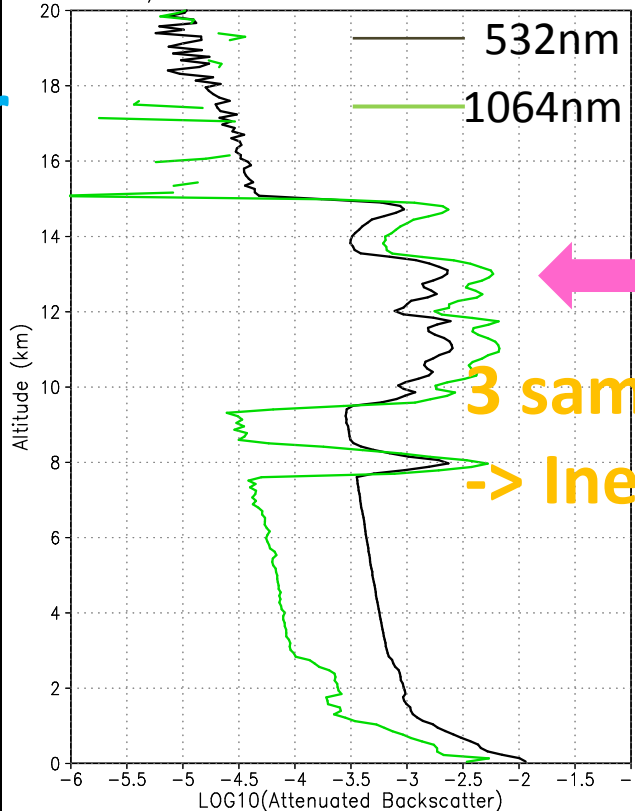
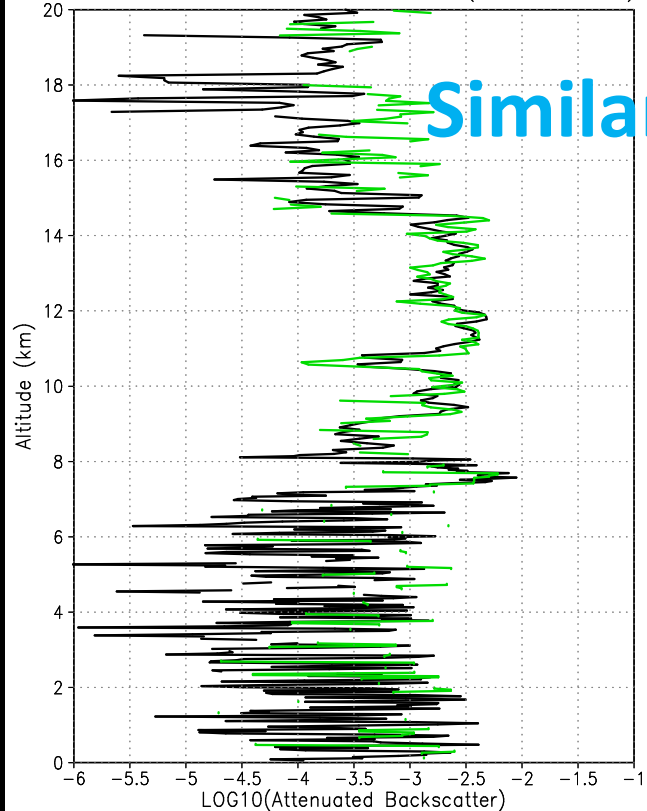


CALIPSO

HSRL (R/V Mirai)

Time=31OCT2011, dd=39.8km@(80.86,-8.06)

R/V Mirai Time=20:15Z 31OCT2011



Statistical comparisons

- Merits

- We can accumulate datasets for the validation in advance.
- We can make the most of Ship-times (about 1 month) in 2015 and 2017.
- The Mie-Lidar system recently installed into Mirai can be used (checking the performances now!).
(The system can be utilized in all Mirai cruises.)



Issues of statistical validation

1. Mie Lidar

- Installed: 532nm (2 channels), 1064 nm, and 660 nm (Raman)
- Improvements necessary for the validation (355 nm (2 channels) and 387nm (Raman))

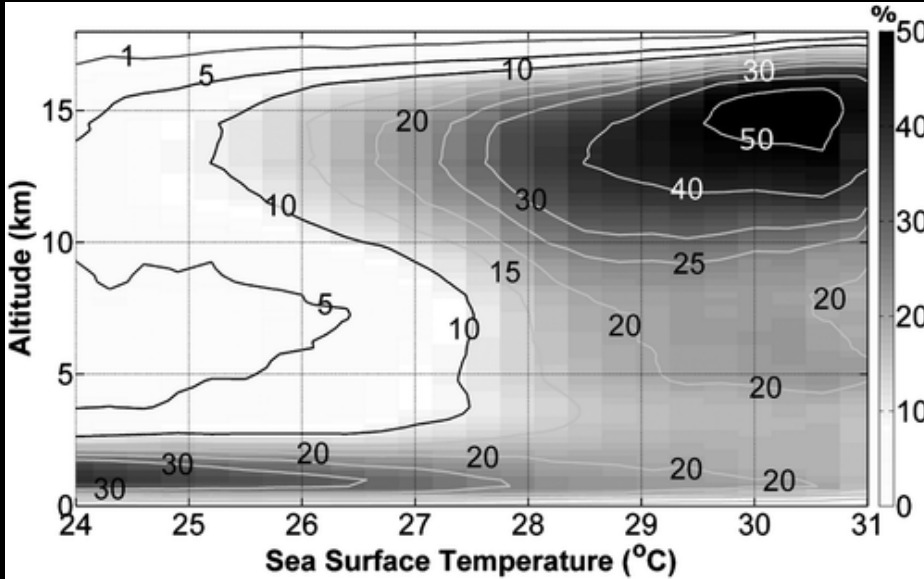
2. Cloud Radar

- We do not have the facility available for now...

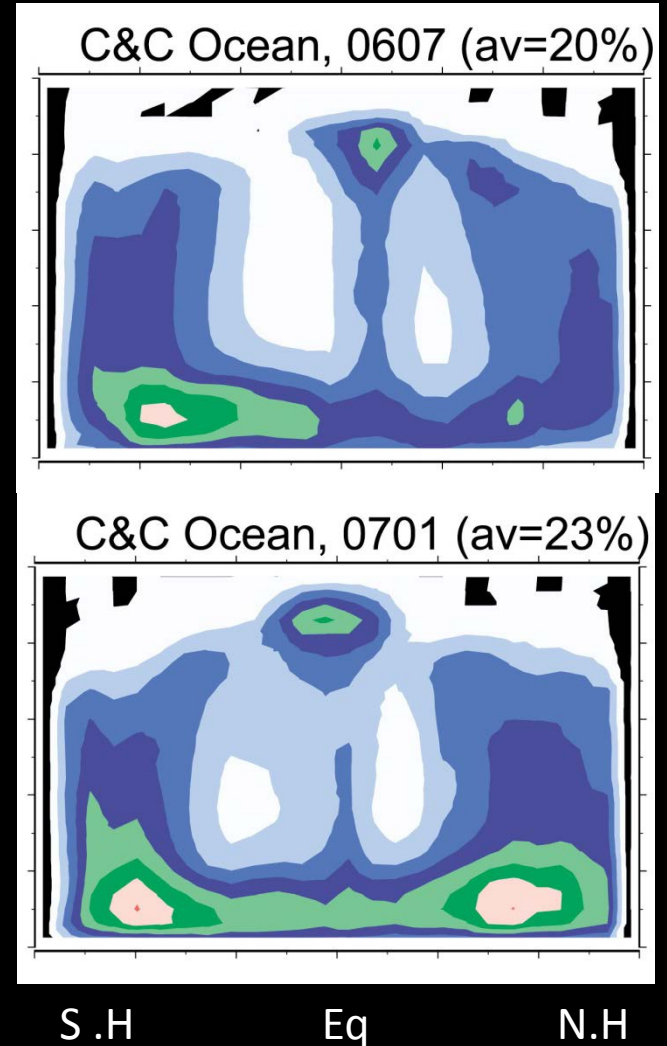


Issues of statistical validation

3. Strategy for efficient validation



Altitude distribution of the FOC (%) as a function of SST during 2006–11. [Kumar and Rajeev 2014 JC]



Pressure–latitude cross sections of the zonal monthly-mean cloud amounts (in %) for (a) July 2006 and (b) January 2007 [William and Zhang, 2010 JC]

Longer periods for the data accumulation are required.

Summary

1. Facility

- Research vessel or Land station at a remote island?

2. For ship observation

- Survey for available vessels for the coming 2-3 years
- Strategy for the validation

Direct comparisons during an intensive campaign?
or Statistical comparisons ?

- Necessary improvement of our lidar and cloud-radar system for the installation

3. For island observation

- Survey for an island (e.g., infrastructure for continuous observation, access, etc.)
- Necessary improvement of our lidar and cloud-radar system for the deployment