Toward Operational Calibration and Validation for HY-1 Series

Dr. **Junwu Tang**,
National Satellite Ocean Application Service (NSOAS)
WGCV28, 2008.2.26~29,Sanya,China

Contents

- Background & Requirements
  - Without onboard solar calibrator
  - To Derive continuous Cal/Val results
- Methodology
  - Vicarious Cal over ocean
  - Vicarious Cal over land
  - System Cal over ocean
  - Cross- or Inter-Calibration by other sensors
  - Natural Targets [Rayleigh, Dissert, Cloud]
- Data Set
  - In-Situ measured & Synchronous data
  - Other satellite data
  - Shared & open data from network
- Software System
- HY-1B Cal/Val

HY-1 Cal/Val Background & Requirements

- There is no onboard solar calibrator on:
  - HY-1B(2007.4)
  - HY-1C/D(2010 or 2011)
- HY-1E/F(2013) is going to has full aperture solar calibrator.
- Vicarious calibration based on earth targets becomes the one of the most important processes for China ocean satellites.

- Traditional vicarious calibrations
  - In-situ experiment: hard work and low efficient
  - 2~3 times at most per year
  - Not operational.
  - manual procedures of calculations

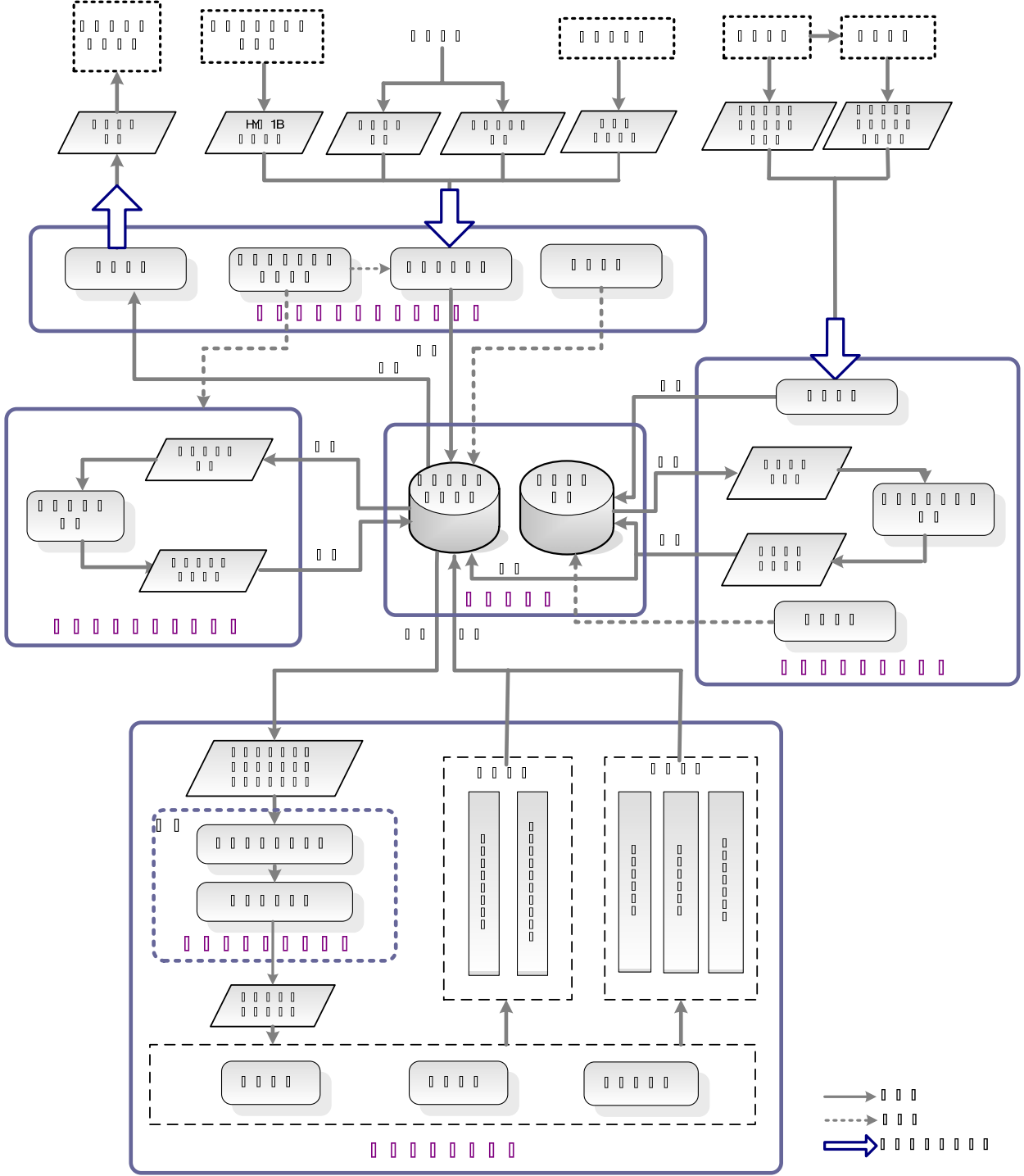
- From HY-1B, We proposed an operational Cal/Val scheme for ocean color sensors.

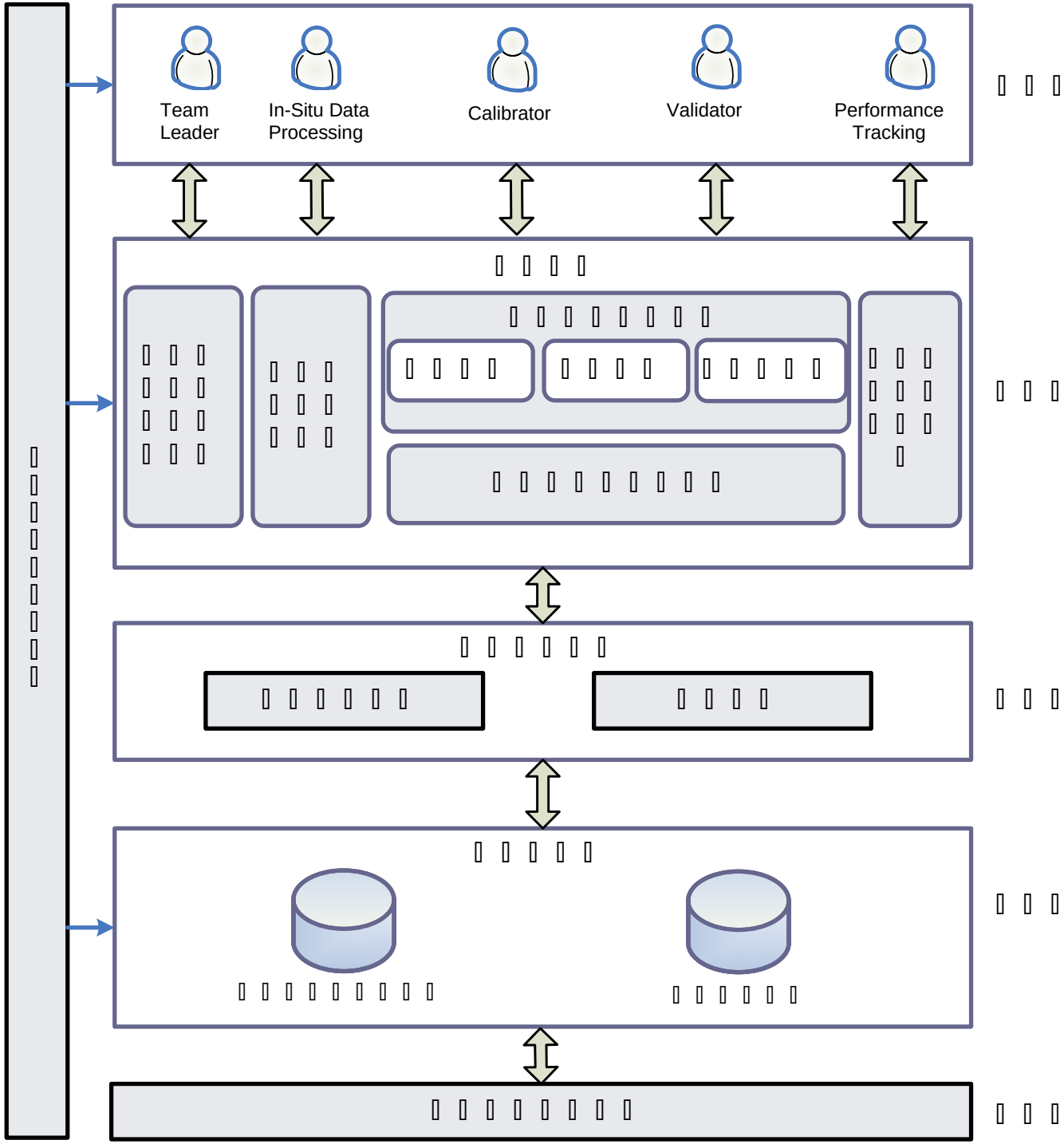
Methodology

- Combine following methods together:
  - Vicarious Cal over ocean
  - Vicarious Cal over land
  - System Cal over ocean
  - Cross- or Inter-Calibration with other sensors
  - Natural Targets
    - Rayleigh scattering: over open sea
    - Dissert: Dunhuang or other sites
    - Sun-glint
    - Cloud
  - To achieve 5% uncertainty goal without onboard solar and moon calibration.

Data Set

- In-Situ measured & Synchronous data
  - Cruise optical measurement
  - Buoy data [under construction]
  - Oil platform data [Just approved, 2008~2010]
  - Ferry Boat data [under investigating]
- Other satellite data for cross-Cal/Val
  - Ocean Color : SeaWiFS, MODIS, Meris
  - SST: AATSR, AVHRR, MODIS
- Shared & open data from network
  - GTS, TAO-Buoy, NDBC
  - NCEP, EMWCF
  - EP-TOMS Ozone




Team Leader
In-Situ Data Processing
Calibrator
Validator
Performance Tracking

Goals of Integrated Cal/Val Software System

- To choose “Good-data” manually
  - Clear sky over pre-defined calibration sites
- Initiate Cal/Val job;
- Well-trained operators do following works
  - Destrip DN image[relative Cal] & evaluate the results;
  - Check in-situ data,
  - Check other satellite data and initiate downloading task
  - Downloading NCEP and Ozone data
  - To start Cal/Val processing
  - To fill in Cal/Val job log everyday.
- To obtain a group of Cal/Val coefficients every month.

HY-1B Calibration & Validation

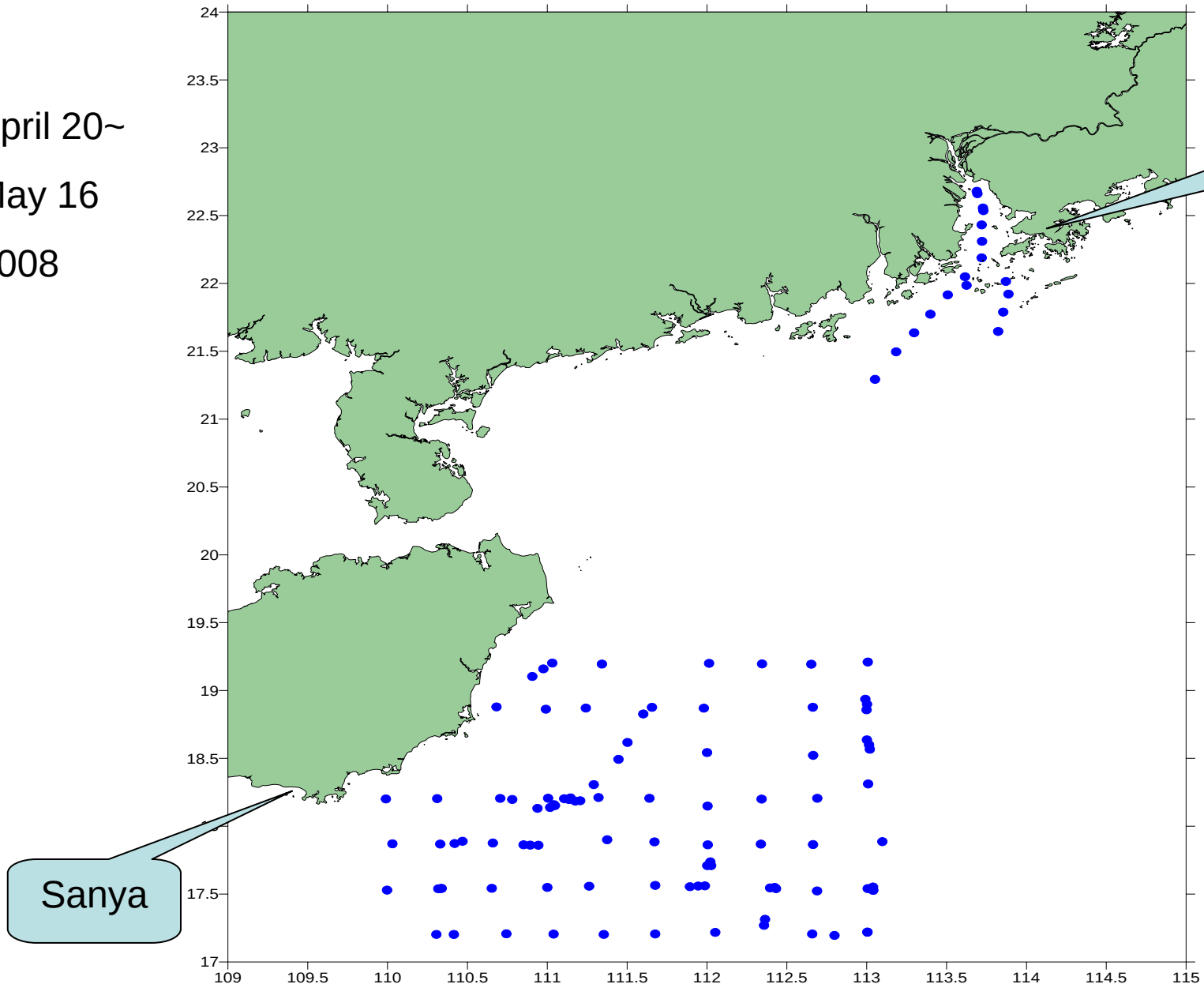
- HY-1B Calibrations:
  - Vicarious Cal with ocean synchronous data
  - Vicarious Cal with land synchronous data
  - Cross-cal with Aqua-MODIS & SeaWiFS

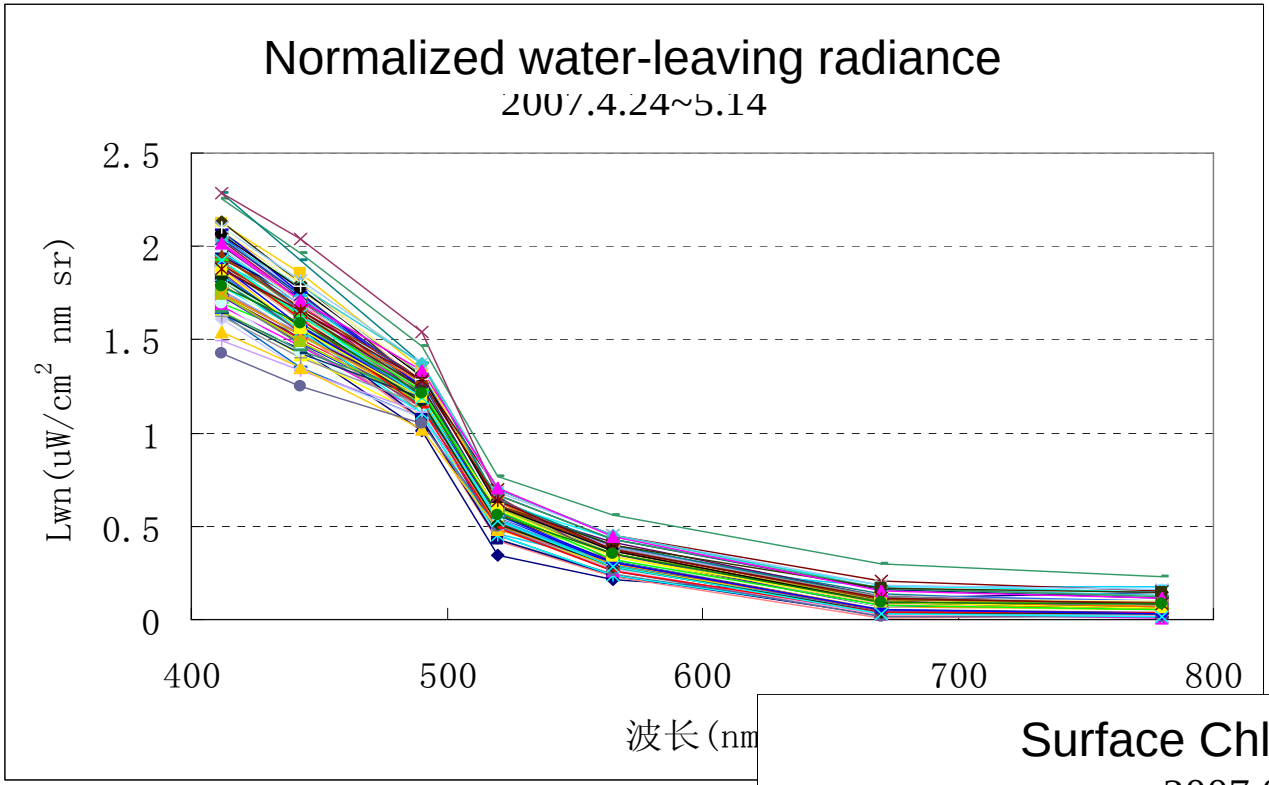
Southern China Sea Cruise

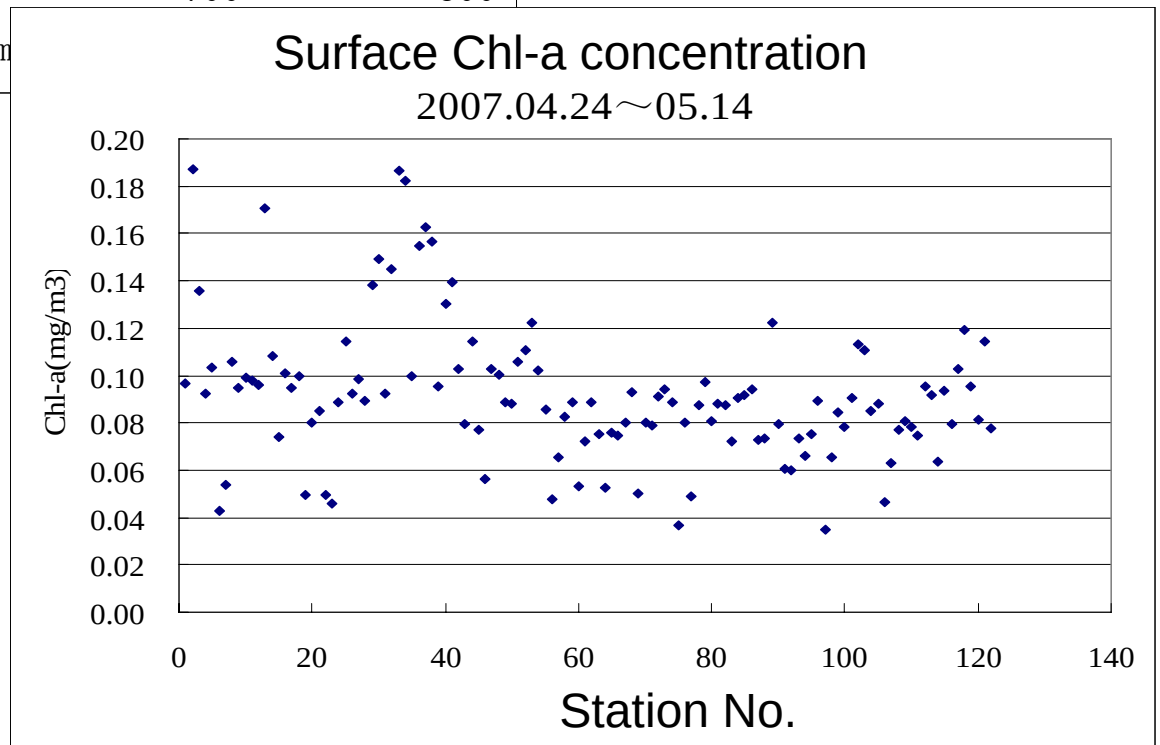
April 20~

May 16

2008




Normalized water-leaving radiance
2007.4.24~5.14
2.5
2
1.5
1
0.5
0
Lwn(uW/cm2 nm sr)
400
500
600
700
800
波长(nm


Surface Chl-a concentration
2007.04.24～05.14
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Chl-a(mg/m3)
0
20
40
60
80
100
120
140
Station No.

Test HY-1B Vicarious Calibration methods with Aqua/MODIS data

MODIS Bands	JD163 2008	JD164 2008	Average	Diff. with MODIS L1B	Relative Error of two Cals.
Ch8	0.953193	0.954787	0.953990	4.6%	0.17%
Ch9	0.958683	0.957510	0.958096	4.2%	0.12%
Ch10	0.955721	0.949798	0.952759	4.7%	0.62%
Ch11	0.962394	0.952856	0.957625	4.2%	1.00%
Ch12	0.964561	0.947657	0.956109	4.4%	1.77%
Ch13	1.088690	1.044089	1.066389	6.6%	4.18%
Ch15	0.975630	0.944168	0.959899	4.0%	3.28%
ch16	0.985969	0.939564	0.962766	3.7%	4.82%

Thanks !