2015/Mar/27 RIHN-CEReS連携WS @RIHN

# 気象衛星データアーカイブと大気分野の課題

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ほか多くの関連研究者

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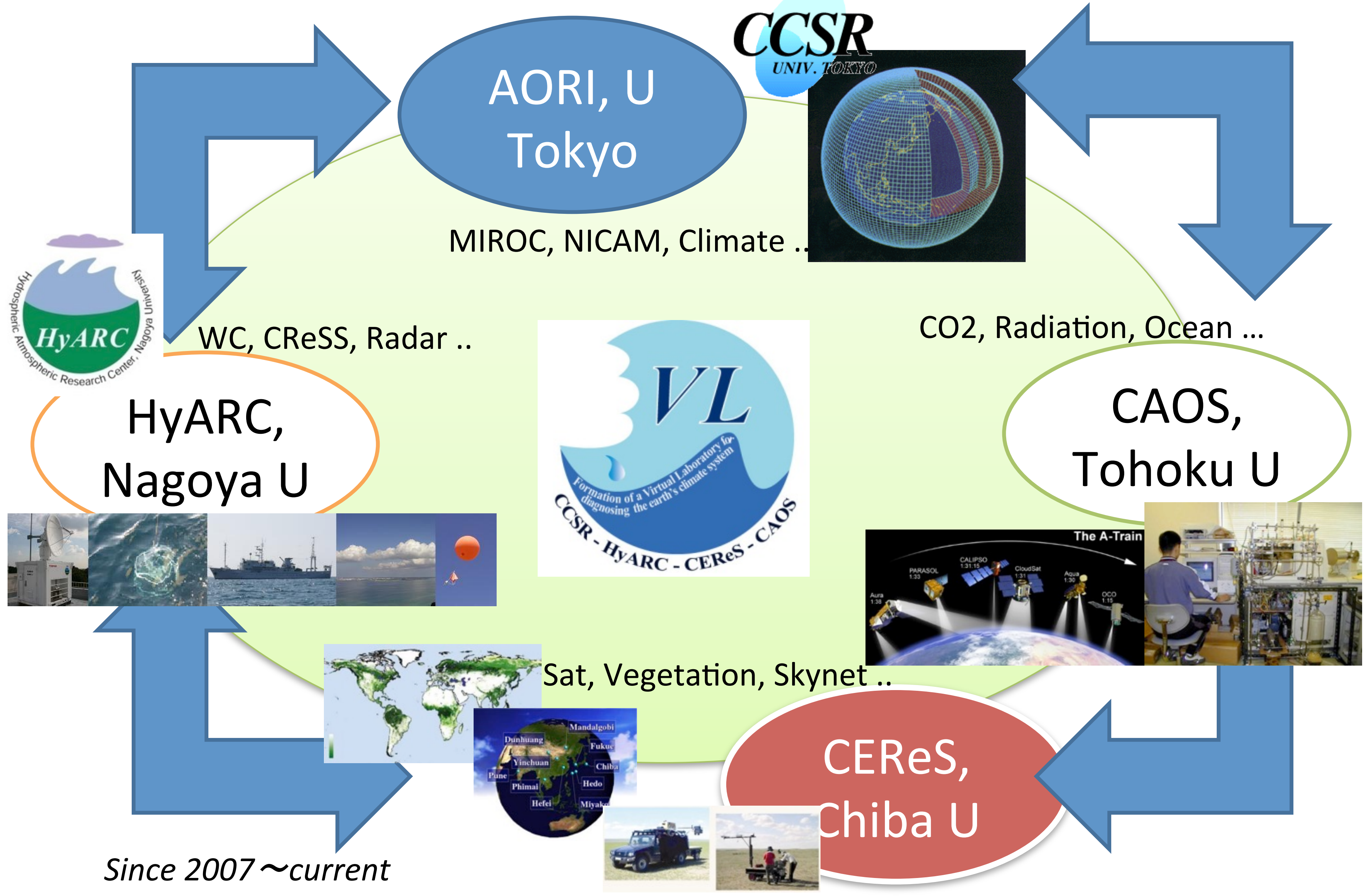
衛星データ処理室室長，Program2 リーダ，VL支援室員

# VL formation (http://www.cr.chiba-u.jp/~4vl/)


CCSR
UNIV. TOKYO
Hydrospheric Atmospheric Research Center, Nagoya University
HyARC
VL
Formation of a Virtual Laboratory for diagnosing the earth's climate system
CCSR - HyARC - CEReS - CAOS
The A-Train
Aura 1:38
PARASOL 1:33
CALIPSO 1:31:15
CloudSat 1:31
Aqua 1:30
OCO 1:15
Mandalgobi
Dunhuang
Fukue
Yinchuan
Chiba
Pune
Hedo
Phimai
Hefei
Miyak

AORI, U Tokyo

MIROC, NICAM, Climate ..

CAOS, Tohoku U

CO2, Radiation, Ocean …

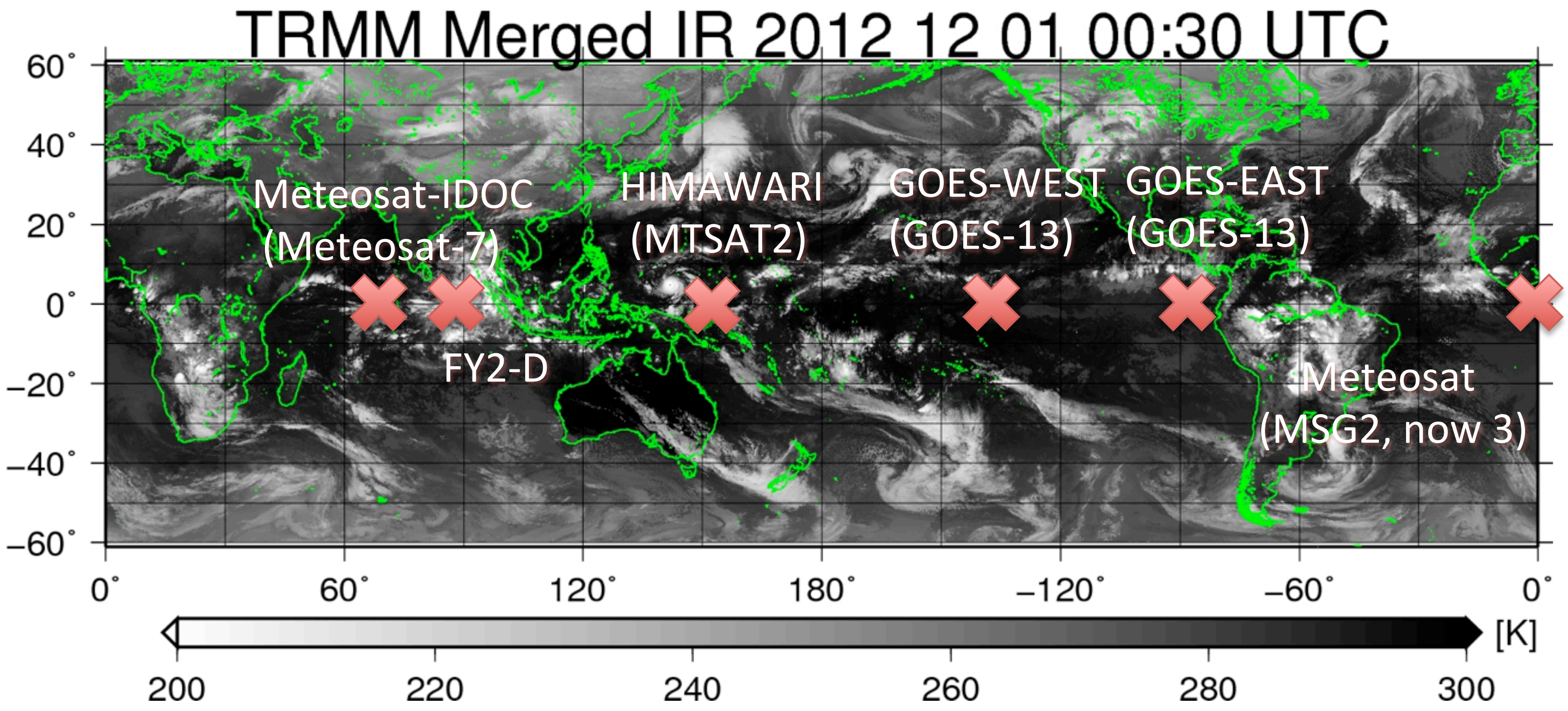
CEReS, Chiba U

Sat, Vegetation, Skynet ..

HyARC, Nagoya U

WC, CReSS, Radar ..

*Since 2007〜current*

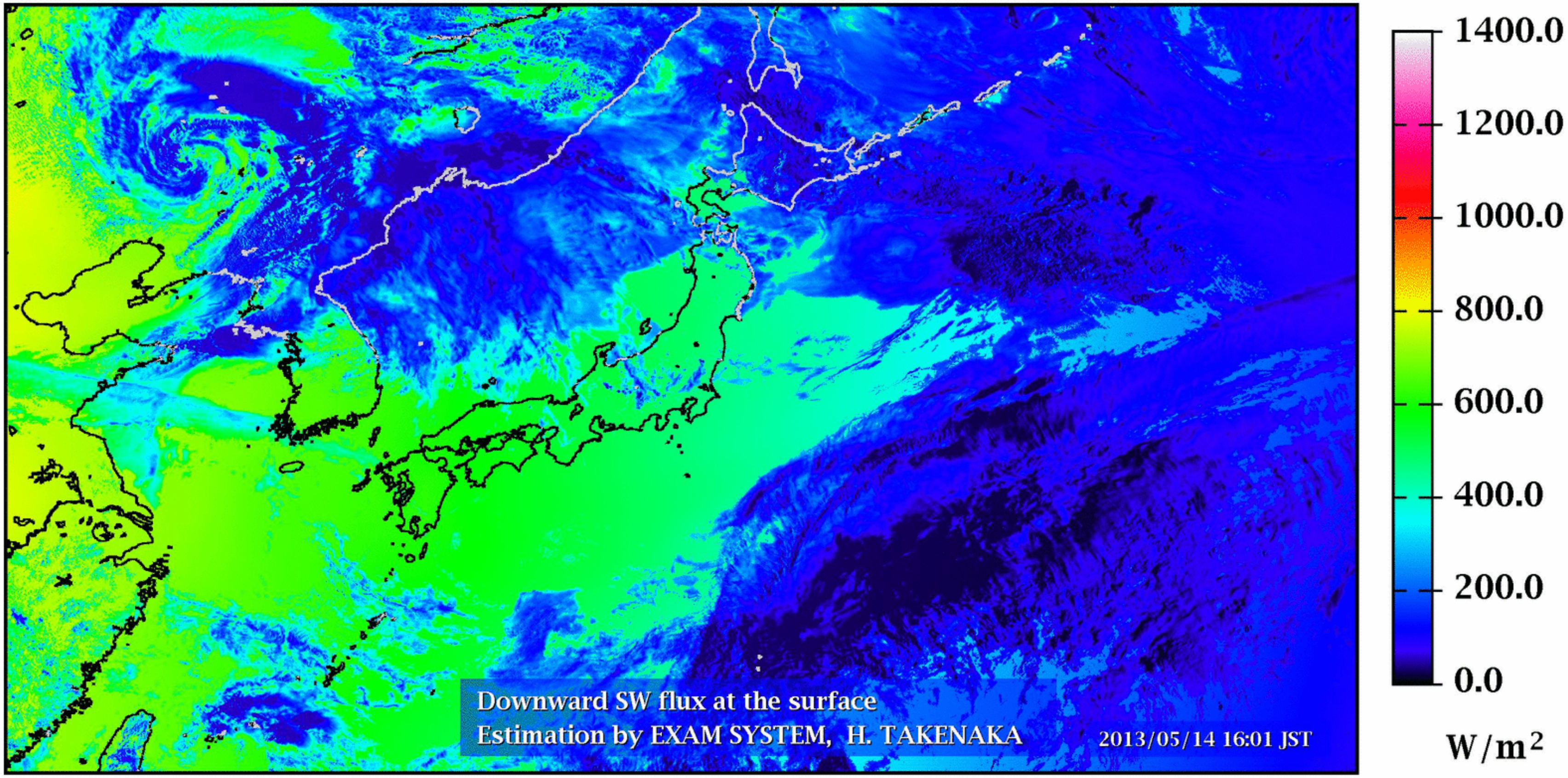

TRMM Merged IR 2012 12 01 00:30 UTC
Meteosat-IDOC
(Meteosat-7)
FY2-D
HIMAWARI
(MTSAT2)
GOES-WEST
(GOES-13)
GOES-EAST
(GOES-13)
Meteosat
(MSG2, now 3)
60˚
40˚
20˚
0˚
−20˚
−40˚
−60˚
0˚
60˚
120˚
180˚
−120˚
−60˚
0˚
[K]
200
220
240
260
280
300

- More than a ten year (at least) six GEO data archiving
- Grided data product generation & sensor calibration algorithm
- Open data (JMA GEOs, GOES-W, -E, FY-C, -D) via anonymous ftp servers, MTSAT2, FY, GOES-W, -E are quasi-realtime processing & data released.
- ALL channels VIS (0.63 μm), IR1&2 (10.8, 12.0 μm) WV (6.75 μm), released

# EXAM system

by Dr. Takenaka, AORI, UT

# Q-RT shortwave radiation by GEO



Downward SW flux at the surface
Estimation by EXAM SYSTEM, H. TAKENAKA 2013/05/14 16:01 JST

1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
$W/m^2$

- Neural Network (NN) retrie “real-time” radiation product

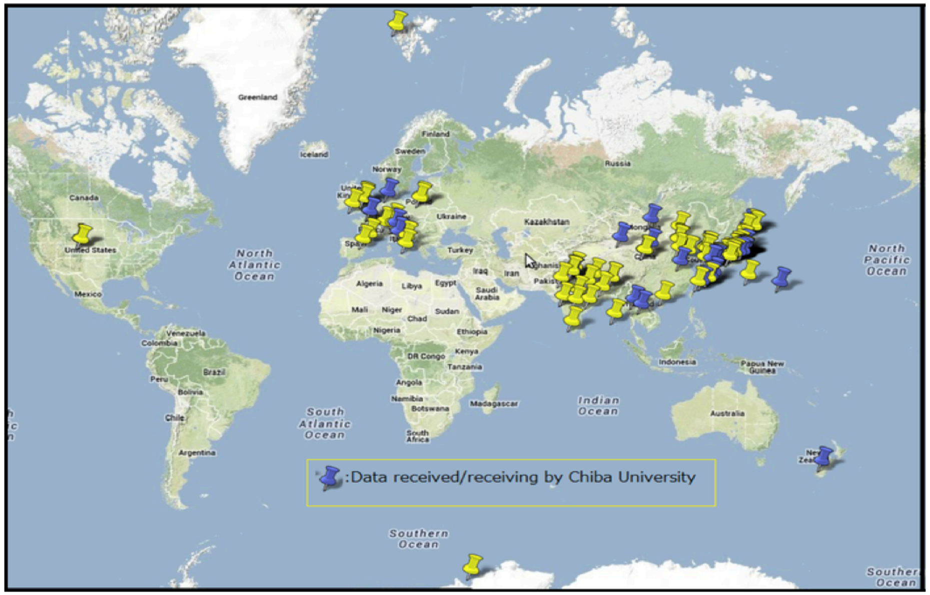
http://atmos.cr.chiba-u.ac.jp/takenaka/en/ Takenaka et al. (2011): JGR

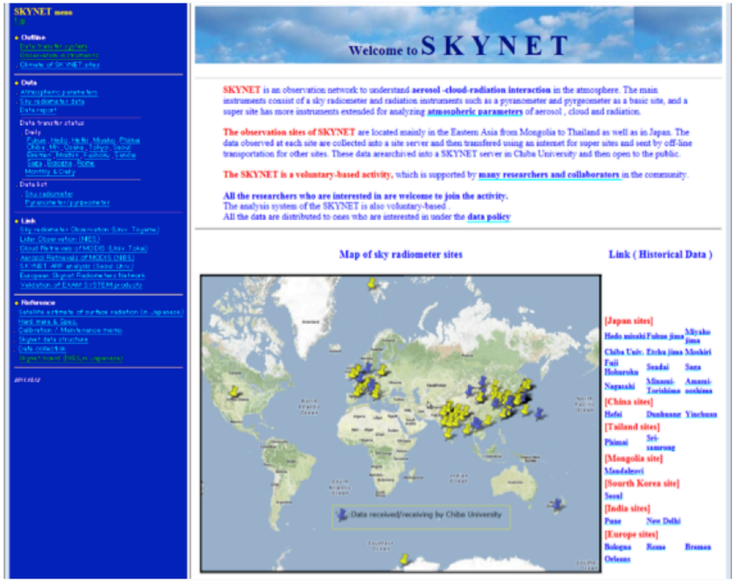
# SKYNET

- An observation network dedicated for aerosol-cloud-radiation interaction researches
  (e.g., Takamura et al., 2004; Nakajima et al., 2007).

- Initiated under the WCRP/GAME project and expanded focusing on East Asia as GLI validation activity.

- A growing network linking more than 60 sites (as of 2013) all over the world.


Greenland
Iceland
Finland
Sweden
Norway
Russia
Canada
United States
Mexico
North Atlantic Ocean
Ukraine
Kazakhstan
Mongolia
Turkey
Iraq
Iran
Afghanistan
Pakistan
Algeria
Libya
Egypt
Saudi Arabia
Mali
Niger
Chad
Sudan
Nigeria
Ethiopia
Venezuela
Colombia
Brazil
Peru
Bolivia
Chile
Argentina
DR Congo
Kenya
Tanzania
Angola
Namibia
Botswana
South Africa
Madagascar
Indonesia
Papua New Guinea
Australia
New Zealand
North Pacific Ocean
South Atlantic Ocean
Indian Ocean
Southern Ocean
:Data received/receiving by Chiba University


SKYNET menu
Top
Outline
Data transfer system
Observation instruments
Climate of SKYNET sites
Data
Atmospheric parameters
Sky radiometer data
Data report
Data transfer status
Daily
Fukue, Hedo, Hefei, Miyako, Phimai
Chiba, Mt. Osaka, Tokyo, Seoul
Bremen, Moshiri, Fushoku, Sendai
Sapa, Bologna, Rome
Monthly & Daily
Data list
Sky radiometer
Pyranometer/pyrgeometer
Link
Sky radiometer Observation (Univ. Toyama)
Lidar Observation (NIES)
Cloud Retrievals of MODIS (Univ. Tokai)
Aerosol Retrievals of MODIS (NIES)
SKYNET ARF analysis (Seoul Univ.)
European Skynet Radiometers Network
Validation of EXAM SYSTEM products
Reference
Satellite estimate of surface radiation (in Japanese)
Hard ware & Spec.
Calibration / Maintenance memo
Skynet data structure
Data collection
Skynet board (NIES,in Japanese)
Welcome to SKYNET
Map of sky radiometer sites
Link ( Historical Data )
[Japan sites]
Hedo misaki
Fukue jima
Miyako jima
Chiba Univ.
Etchu jima
Moshiri
Fuji Hokuroku
Sendai
Sara
Nagasaki
Minami-Torishima
Amami-ooshima
[China sites]
Hefei
Dunhuang
Yinchuan
[Tailand sites]
Phimai
Sri-samrong
[Mongolia site]
Mandalsovi
[Sourth Korea site]
Seoul
[India sites]
Pune
New Delhi
[Europe sites]
Bologna
Roma
Bremen
Orleans
Data received/receiving by Chiba University

**SKYNET** is an observation network to understand **aerosol -cloud-radiation interaction** in the atmosphere. The main instruments consist of a sky radiometer and radiation instruments such as a pyranometer and pyrgeometer as a basic site, and a super site has more instruments extended for analyzing **atmospheric parameters** of aerosol , cloud and radiation.

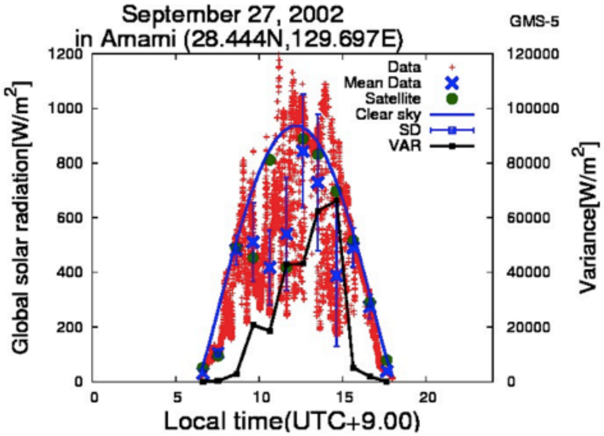
**The observation sites of SKYNET** are located mainly in the Eastern Asia from Mongolia to Thailand as well as in Japan. The data observed at each site are collected into a site server and then transfered using an internet for super sites and sent by off-line transportation for other sites. These data arearchived into a SKYNET server in Chiba University and then open to the public.

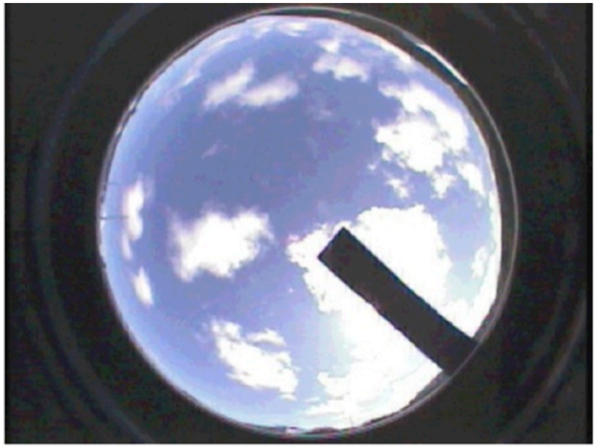
**The SKYNET is a voluntary-based activity,** which is supported by **many researchers and collaborators** in the community.

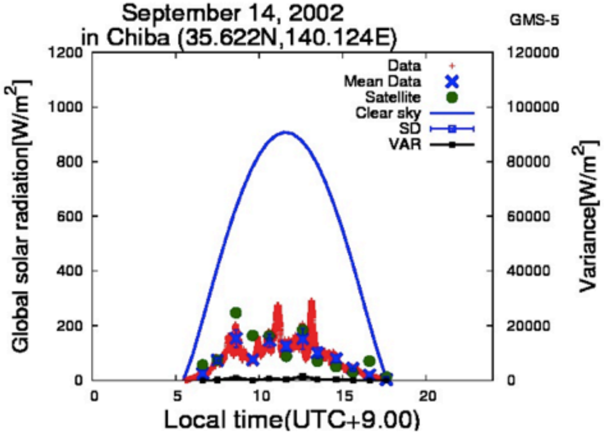
**All the researchers who are interested in are welcome to join the activity.**
The analysis system of the SKYNET is also voluntary-based .
All the data are distributed to ones who are interested in under the **data policy**

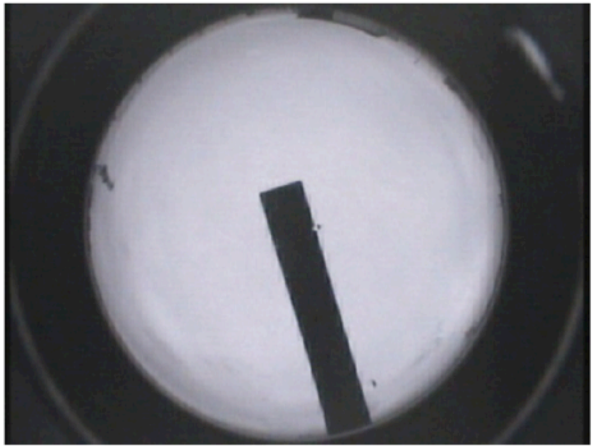
http://atmos.cr.chiba-u.ac.jp/

# Validation with sky-camera









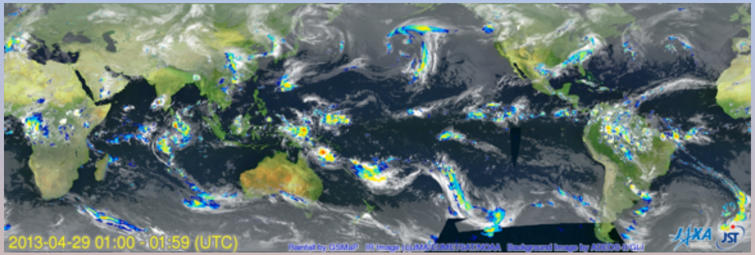
平成25年5月13日（様式6）

# 課題名：食糧安全保障のための衛星入力を活用した環太平洋域での広域収量推定および短期予測の試み

プログラム名：[✓ ・宇宙科学技術利用推進プログラム]・宇宙航空人材育成プログラム（宇宙分野）・宇宙航空人材育成プログラム（宇宙分野）

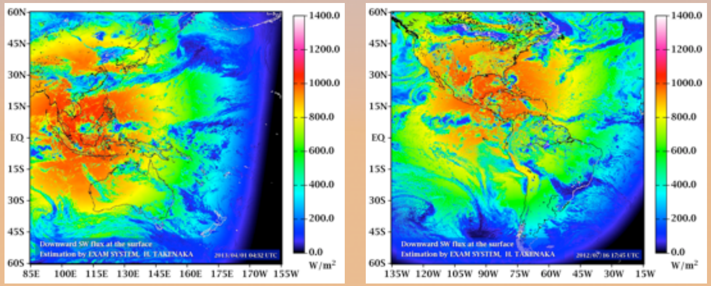
## 衛星より得られる高時間分解能プロダクト

### 衛星降水量プロダクトGSMaP @JAXA


2013-04-29 01:00 - 01:59 (UTC)
JAXA
JST

http://sharaku.eorc.jaxa.jp/GSMaP/

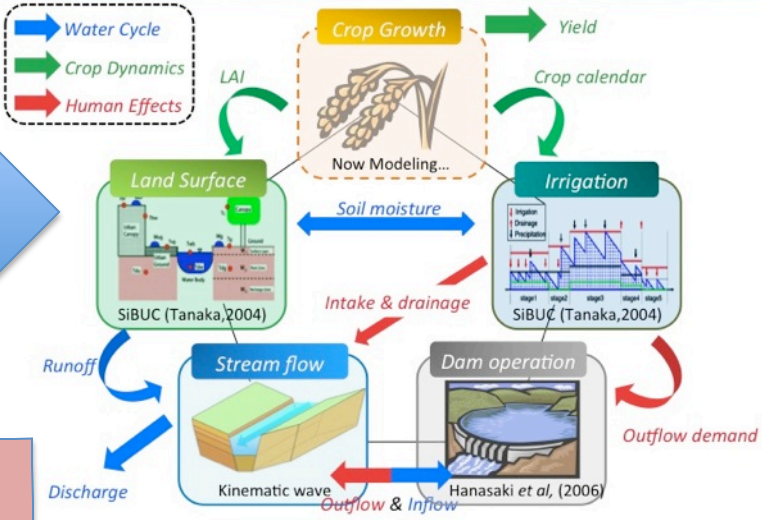
### 放射（日射）プロダクトEXAM@東大，千葉大


Downward SW flux at the surface
Estimation by EXAM SYSTEM, H. TAKENAKA
W/m²
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0

http://atmos.cr.chiba-u.ac.jp/takenaka/

衛星観測のリアルな入力

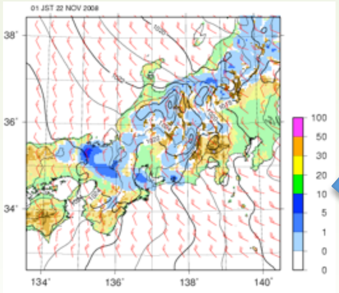
## 統合陸面過程モデリング＠京大（水文過程[SiBUC]＋作物生長[SIMRIW]モデル）


Water Cycle
Crop Dynamics
Human Effects
Crop Growth
Yield
LAI
Crop calendar
Now Modeling...
Land Surface
Irrigation
Soil moisture
SiBUC (Tanaka,2004)
Intake & drainage
SiBUC (Tanaka,2004)
Runoff
Stream flow
Dam operation
Outflow demand
Discharge
Kinematic wave
Outflow & Inflow
Hanasaki et al, (2006)

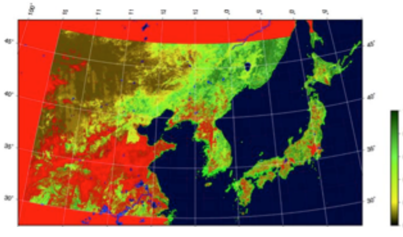
**より正確な初期値を元に現況計算**

モデル検証
初期値修正

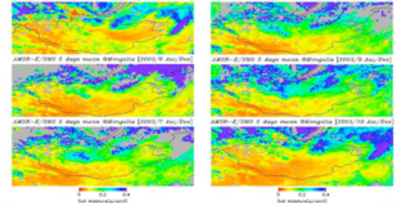
## 雲解像モデル(CReSS)+統合陸面過程モデルでの短期予測(1-5日先)@名大


01 JST 22 NOV 2008

## 低時間分解能であるが，モデル入力・検証に重要な衛星プロダクト



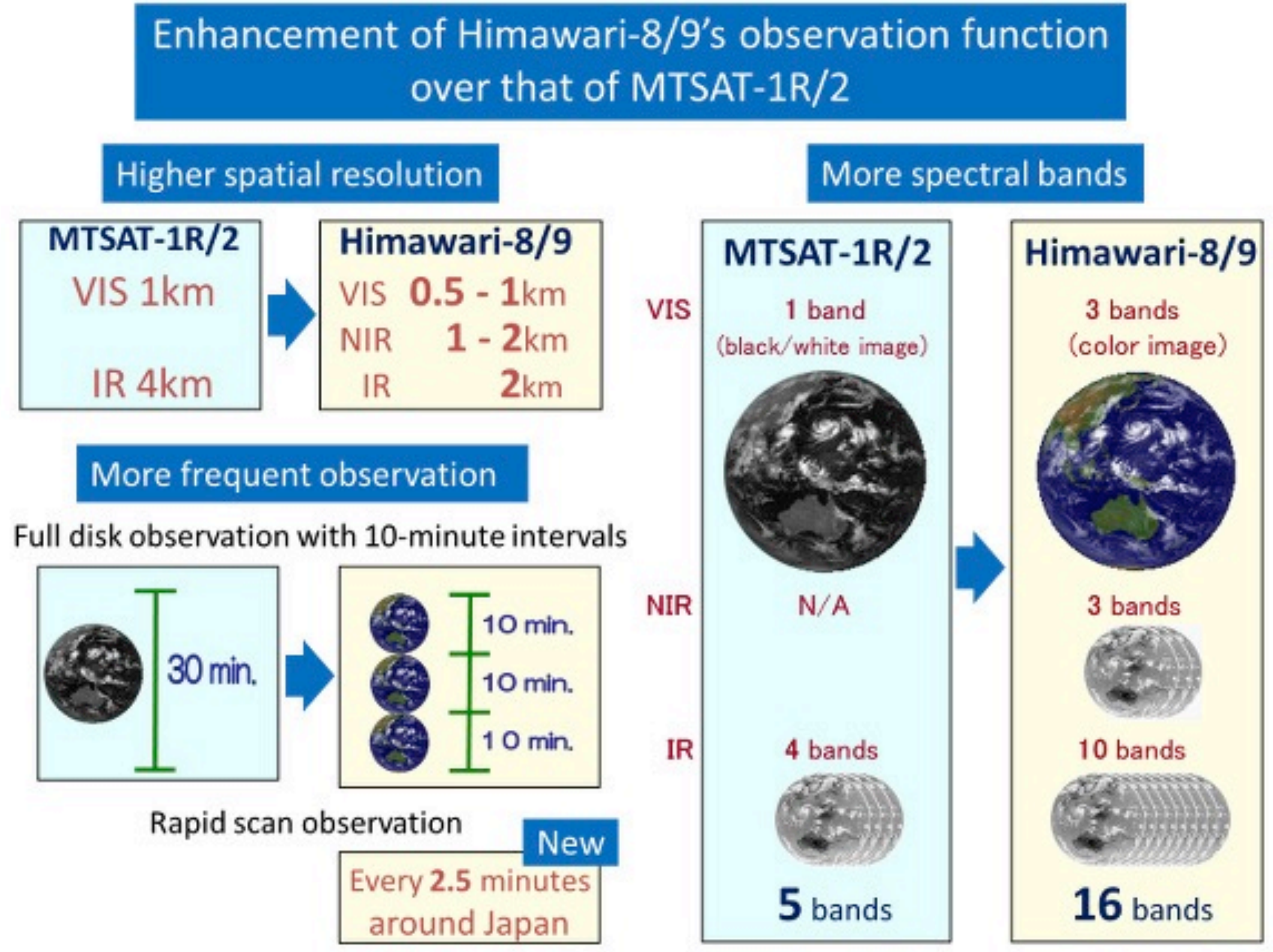
光学センサバイオマス



マイクロ波土壌水分

- 衛星観測とモデルの高度な結合事例の提示
- 統一されたツール群による広域収量推定スキームの構築（汎用性の確保）
- 短期予測情報による収穫，水管理への対策判断情報
- （最終的には）食糧安全保障に資する半公財インフラとしての役割を担う

# HIMAWARI-8 successfully launched in 07 October 2014



**Enhancement of Himawari-8/9's observation function over that of MTSAT-1R/2**

**Higher spatial resolution**

MTSAT-1R/2
VIS 1km
IR 4km

Himawari-8/9
VIS 0.5 - 1km
NIR 1 - 2km
IR 2km

**More frequent observation**

Full disk observation with 10-minute intervals

30 min.

10 min.
10 min.
10 min.

Rapid scan observation

New
Every 2.5 minutes around Japan

**More spectral bands**

| | MTSAT-1R/2 | Himawari-8/9 |
|---|---|---|
| VIS | 1 band<br>(black/white image) | 3 bands<br>(color image) |
| NIR | N/A | 3 bands |
| IR | 4 bands | 10 bands |
| | 5 bands | 16 bands |

**Approx. 100TB /yr!**

→ CEReS will contribute as archive center

# RIHN-CEReS (関連）大気系連携模索

- データ・プロダクト利用はwelcome
  - 4月から研究員着任．もう少しきめ細かい対応
- 静止気象衛星，雲降水，水文（樋口），skynet・MaxDOAS・大気化学（入江），CO2，成層圏大気化学（斎藤），ライダ，計測機開発（久世）