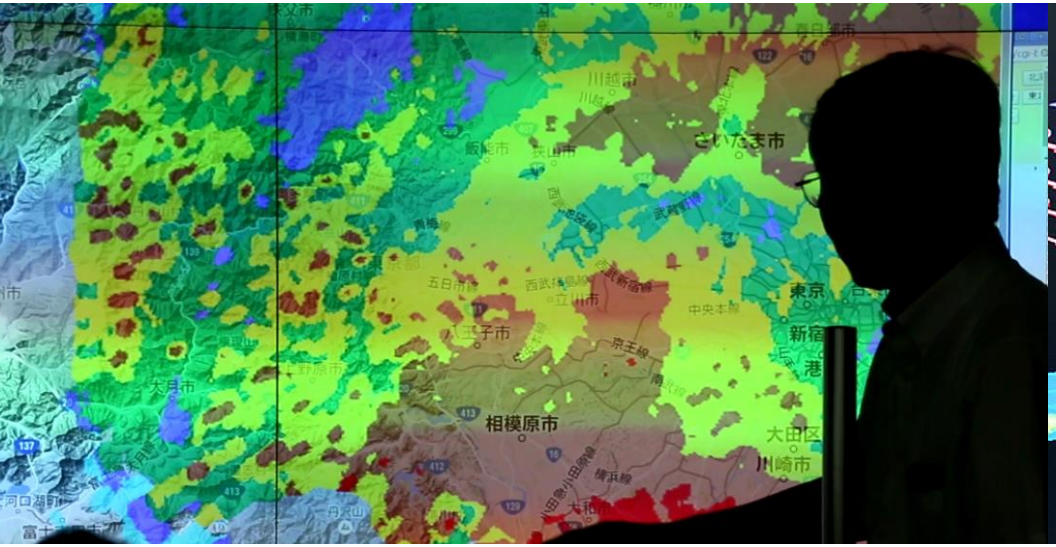
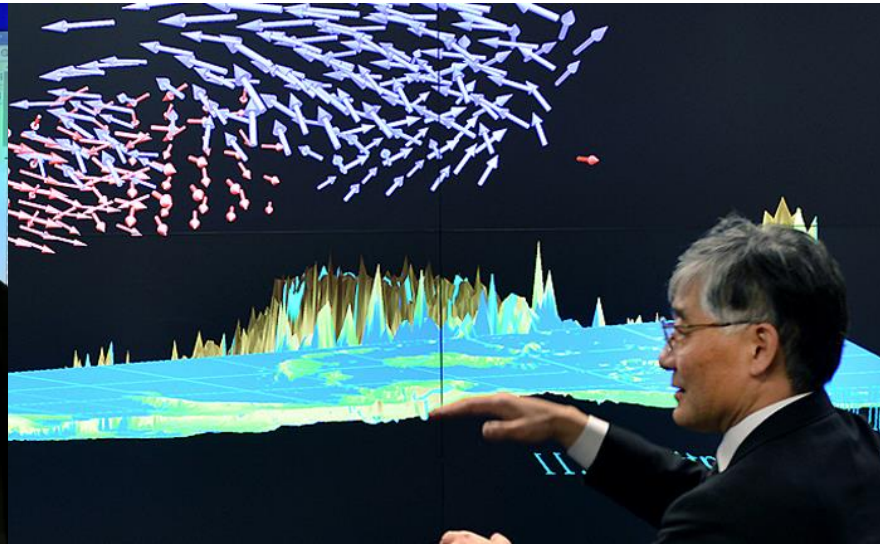
Data Integration and Analysis System (DIAS) as a platform for Asian Water Cycle Initiative (AWCI)





Akiyuki KAWASAKI and Toshio KOIKE
The Earth Observation Data Integration & Fusion Research Initiative (EDITORIA),
The University of Tokyo

DIAS
Data Integration & Analysis System

Acknowledgement

- Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) for their financial support
- Data providers including GEOSS community for DIAS project
- EDITORIA Science team and DIAS R&D community for their support of DIAS project

Agenda

- DIAS outline
- AWCI Data Archive System
- DIAS value
  - Applications and tools
  - In-situ (real-time) data
  - Data and motel integration
- Summary

DIAS
Data Integration & Analysis System

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THE UNIVERSITY OF TOKYO

DIAS as an advanced e-Infrastructure component.

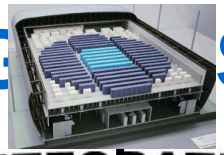
INTEGRATED

Land Observation

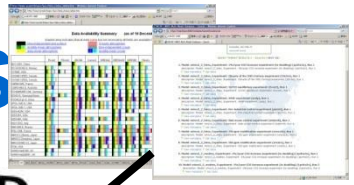
Ocean Observation

Satellite Imagery

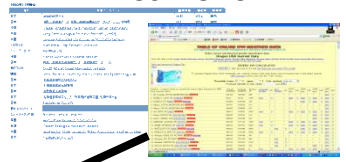
Simulations



WCRP CMIP3



MetBroker



INTEGRATED

Data Integration & Information Fusion Platform

App. Layer

User Apps. | User Apps. | User Apps. | User Apps. | User Apps.

Common Utility Layer

- •Visualizer(w display wall)
- •Discovery Work Flow Assist
- •Data Quality Manager
- •Data Transformer
- •Data Crawler
- •ETL
- •Data Mingrator
- •Data Navigator
- •Meta Data Manger

Data Management Layer

- •Database management system

File System Layer

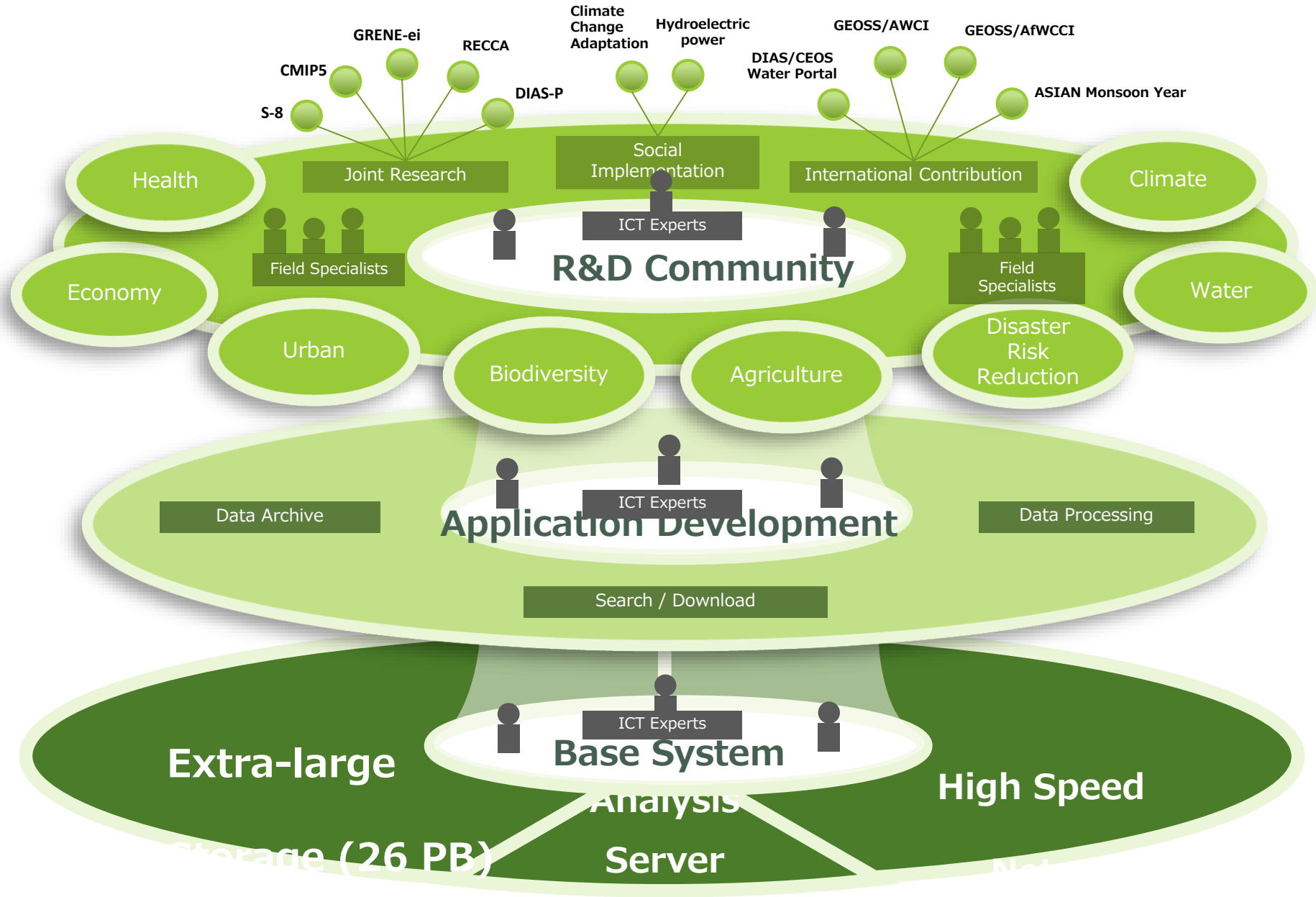
- •PB scale logical file
- •Storage management
- •Power management

Storage Layer

Disk Arrays

Human Health & Well-Being | Natural & Human Induced Disasters | Weather Information, Forecasting & Warning | Energy Resources | Water Resources | Climate Variability & Change | Sustainable Agriculture & Desertification | Ecosystems | Oceans

DIAS: Structure



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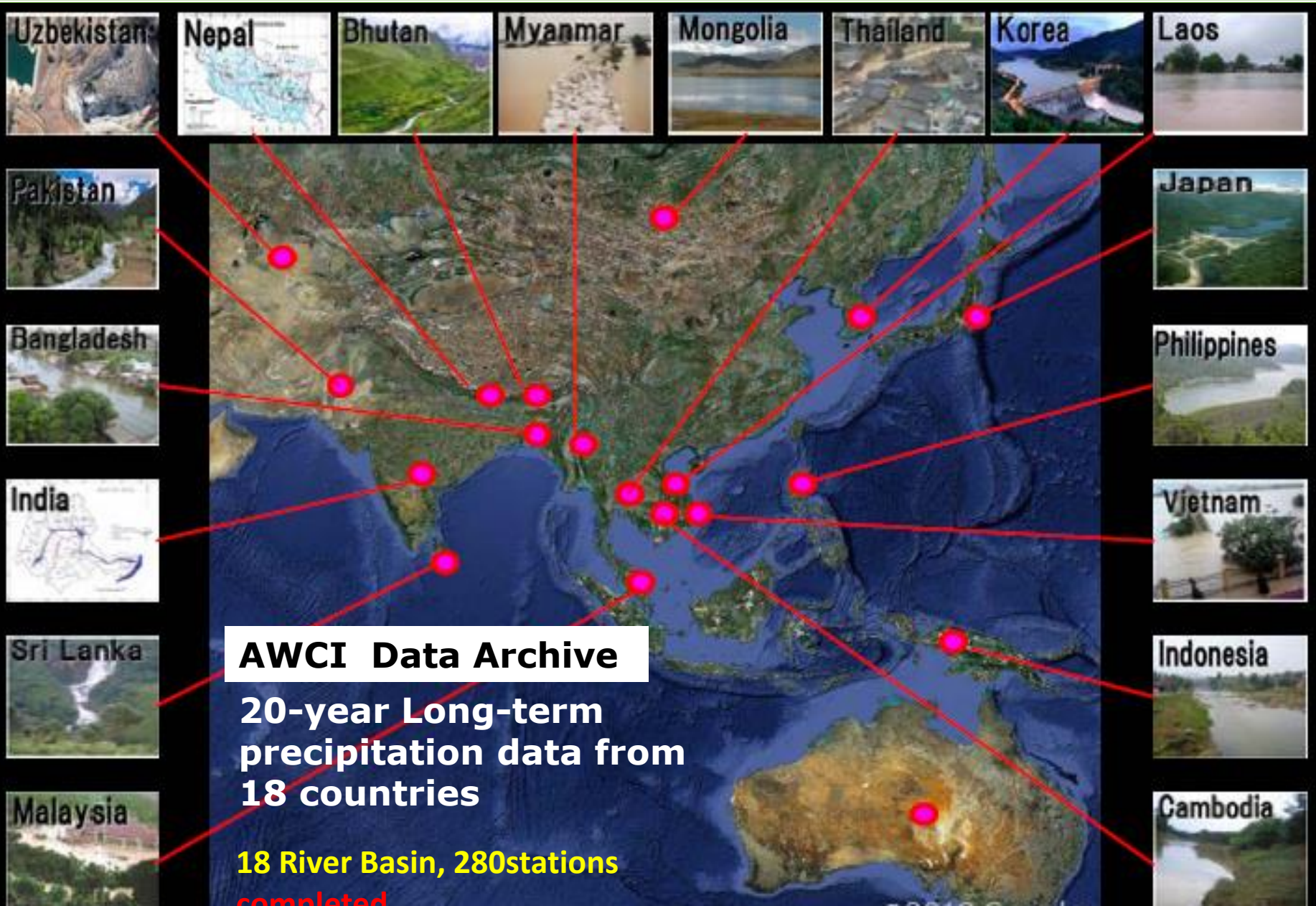
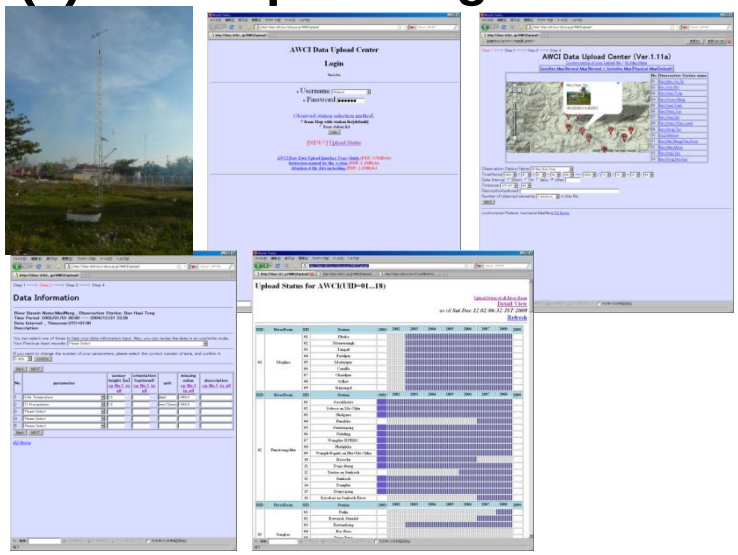
To archive hydro-meteorological dataset, including **data loading, QC** and **metadata registration**



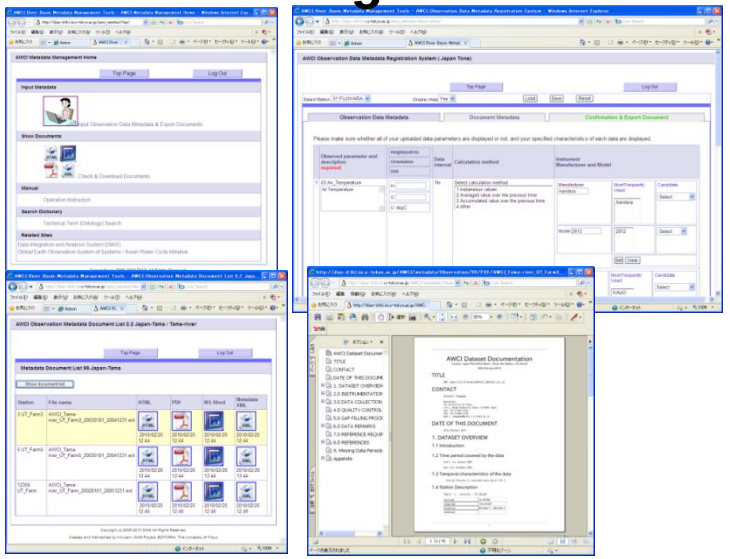
Tool for in-situ data input and management

DIAS
Data Integration & Analysis System

(1) Data Uploading

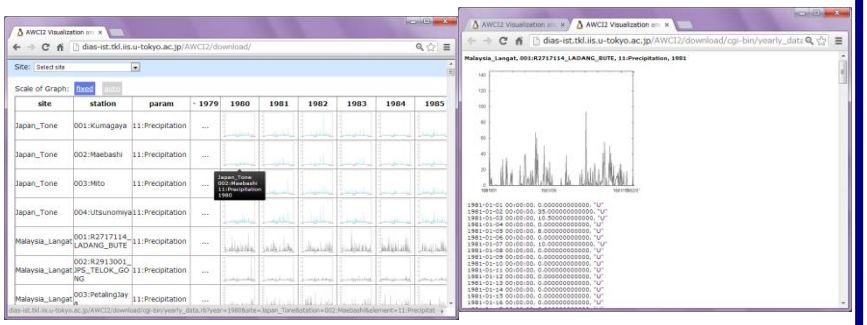


(3) Meta Data Registration

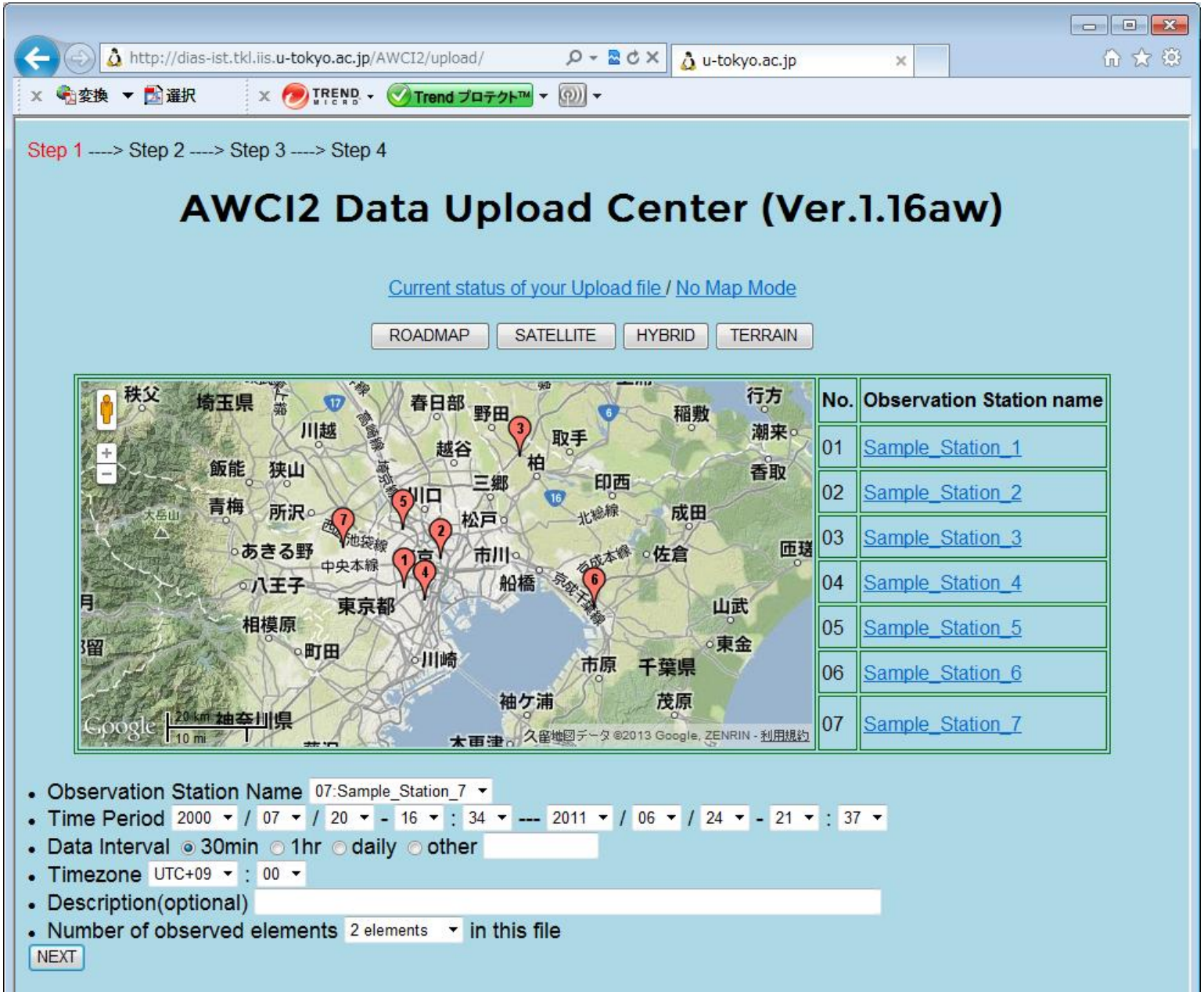


(2) Quality Controlling

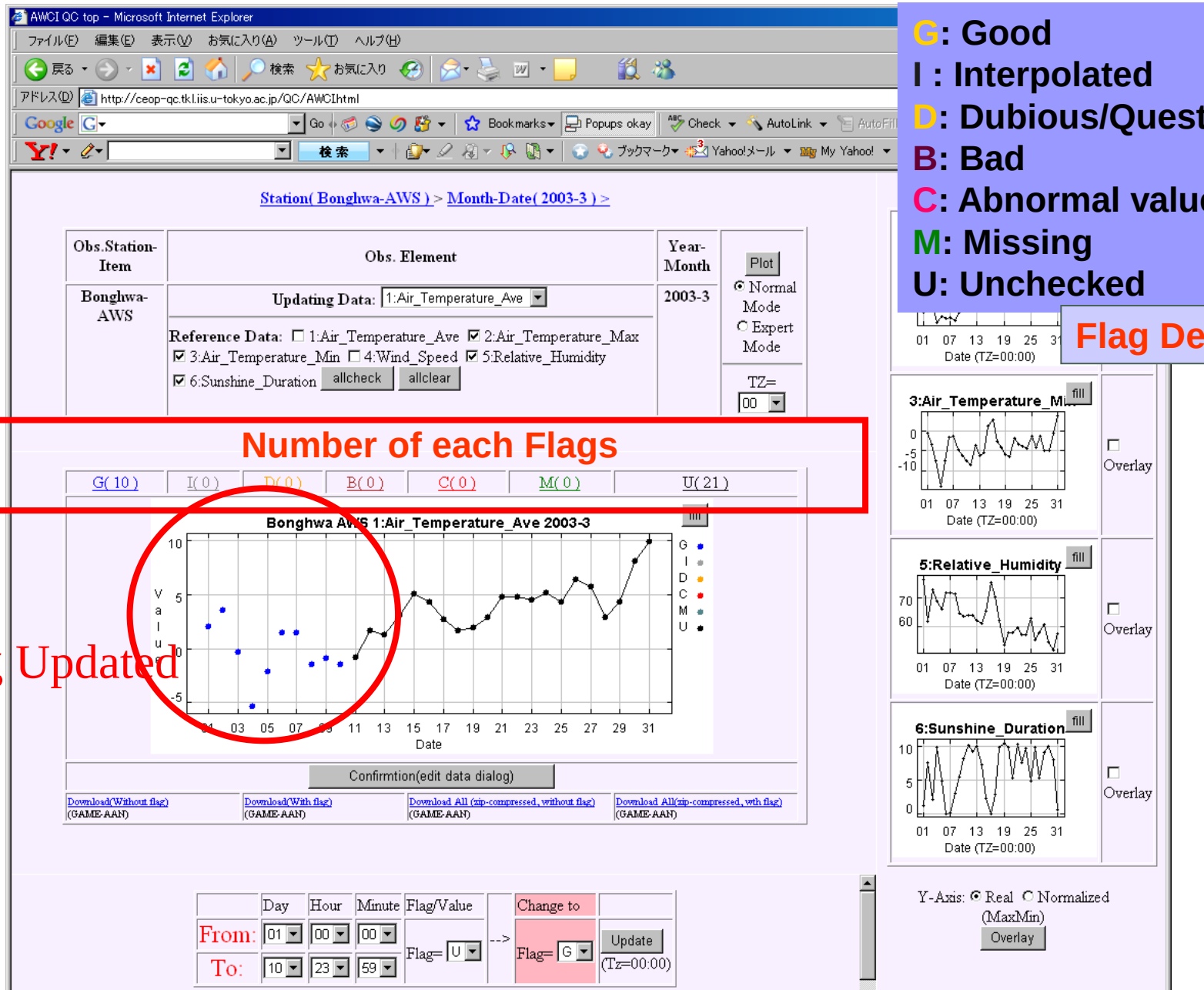
(4) Data Downloading



(1) Data Uploading



(2) Quality Controlling



G: Good
I : Interpolated
D: Dubious/Questionable
B: Bad
C: Abnormal value
M: Missing
U: Unchecked

Flag Definitions

Flag Updated data

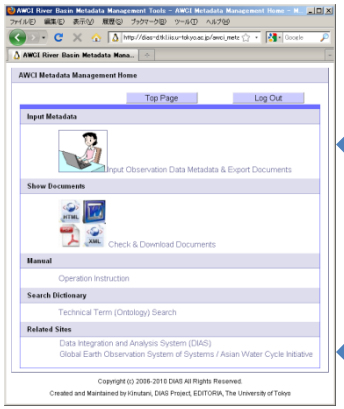
(3) Meta Data Registration

Role of Metadata & Dataset Documents

DIAS
Data Integration & Analysis System

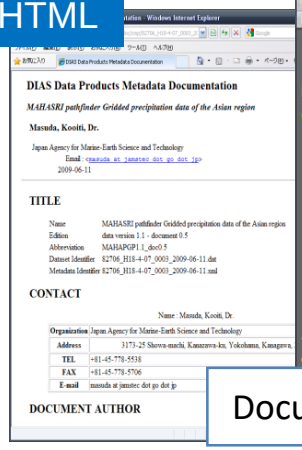
Data provider

Manual input

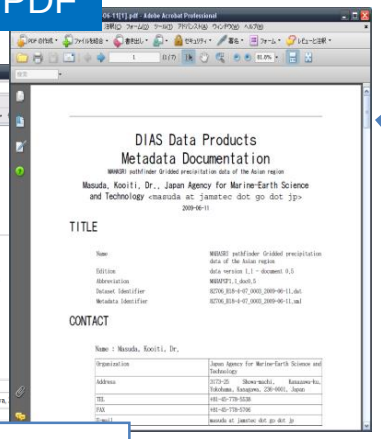


Publishing

HTML



PDF



Document

User

DIAS Core System
Metadata Management

API

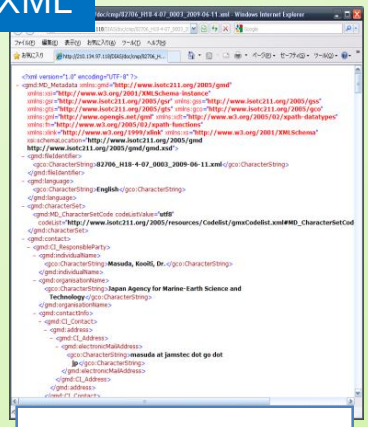
Automatic extraction

Quality Control

Metadata registration interface

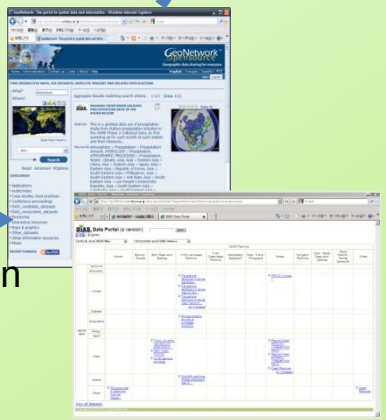
Storing to database

XML



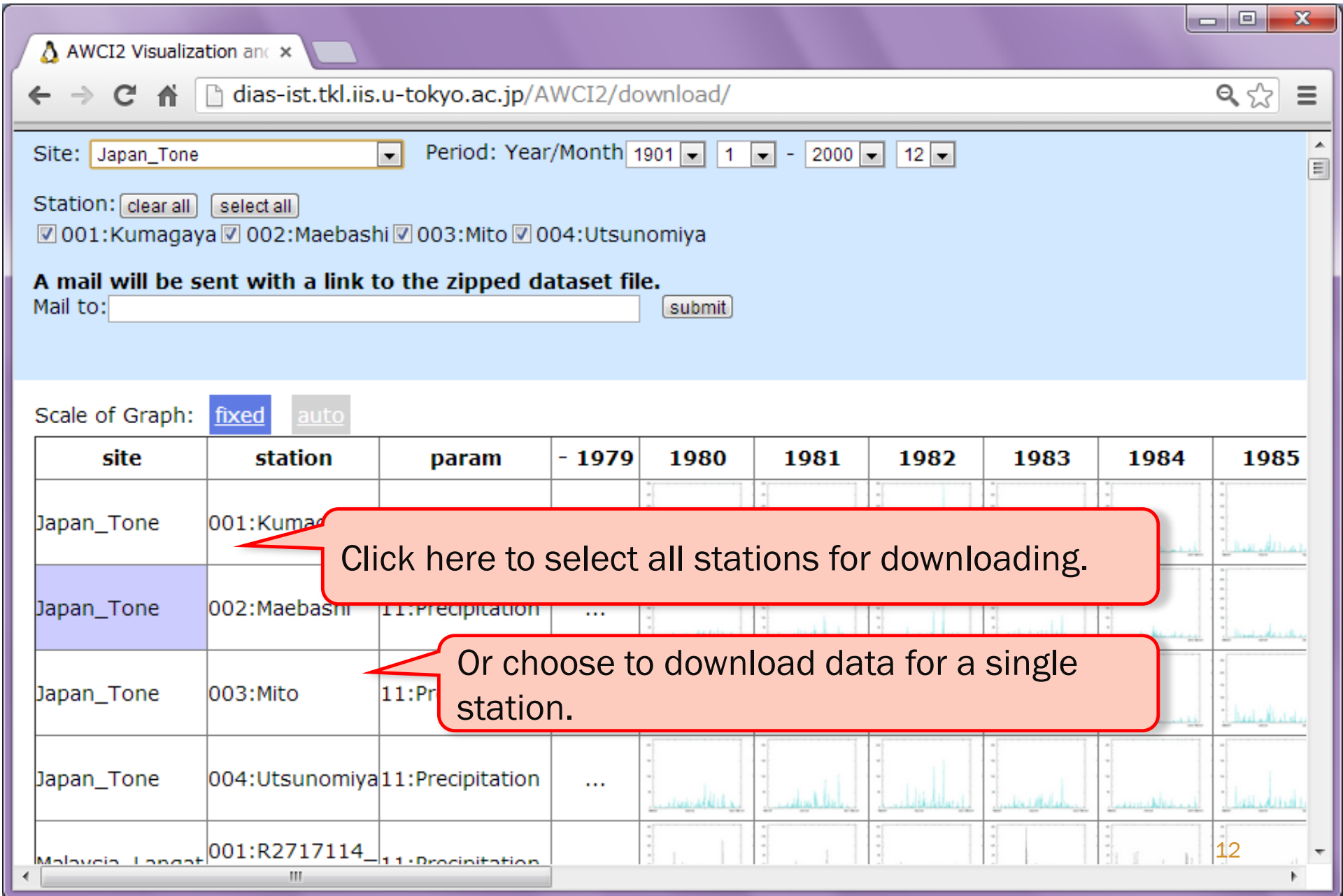
Metadata

Application

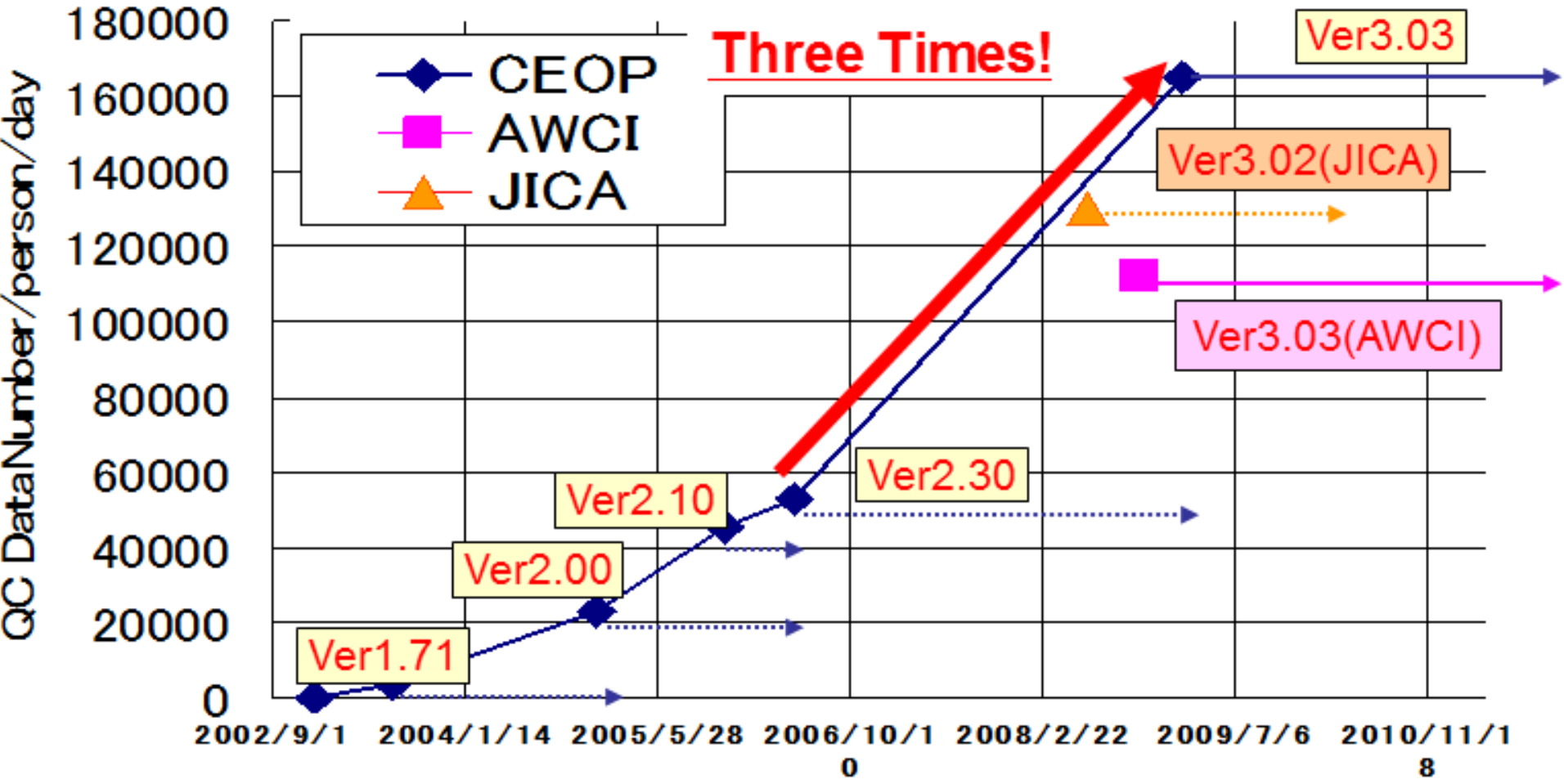


Search & browse Interface

(4) Data Downloading



Effect of the System !



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Data Integration & Analysis System

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“DIAS Value”

Archived extra-large volume of
observed and simulated data

Real-time in-situ data

Data and model integrator

R&D community
with domain scientists and IT experts

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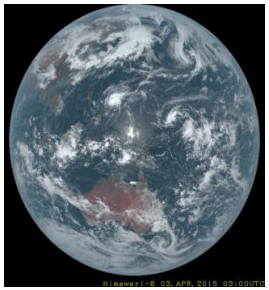
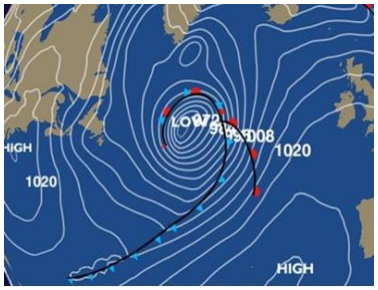
35 Applications and tools

< http://www.diasjp.net/en>

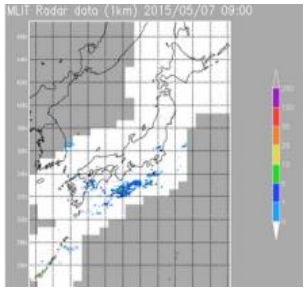
Data Dissemination



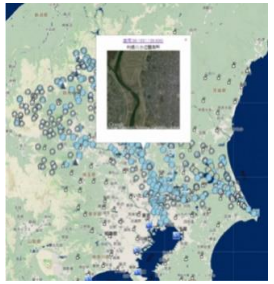
Himawari-8 data



GPV data



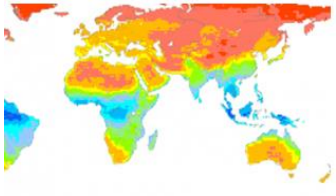
C-Band Realtime Precipitation Data



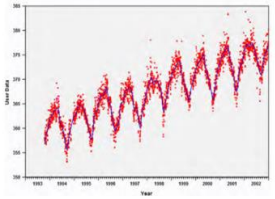
River Telemetry

Data Utilization

①Climate Change

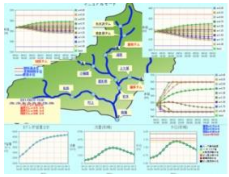


CMIP5 Data
Analysis System



Global Environmental
Data Analysis Support

②Water resource management



Tone River Management
support system

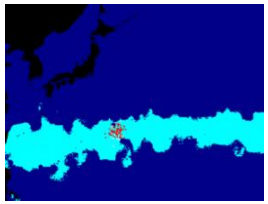
DIAS/CEOS Water Portal

③Agriculture

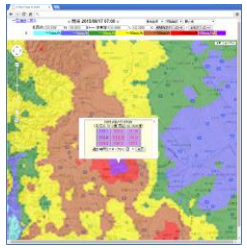
Simulation Model
for RIce-Weather relations

④Biodiversity

Ikimoni



Particle Tracking
Simulation System



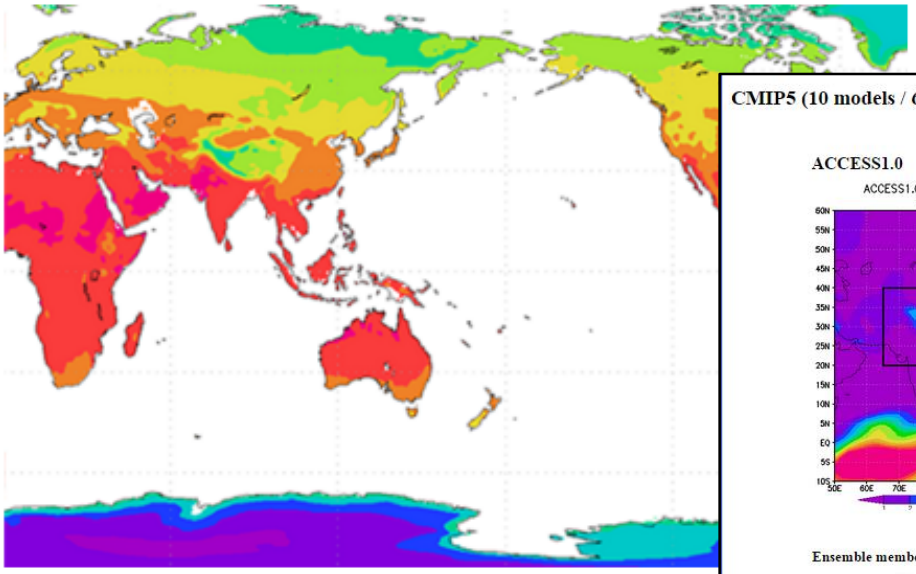
XRAIN data

DIAS
Data Integration & Analysis System

Data Integration and Analysis System Program

Home About Data & Apps Research

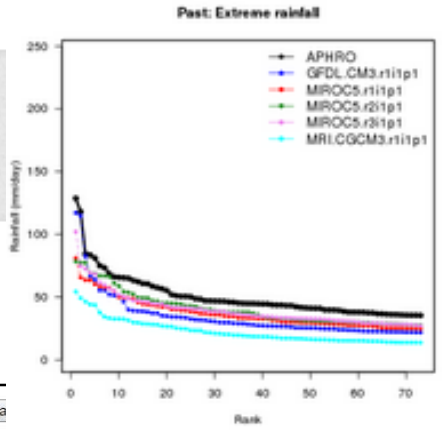
CMIP5 Data Analysis System

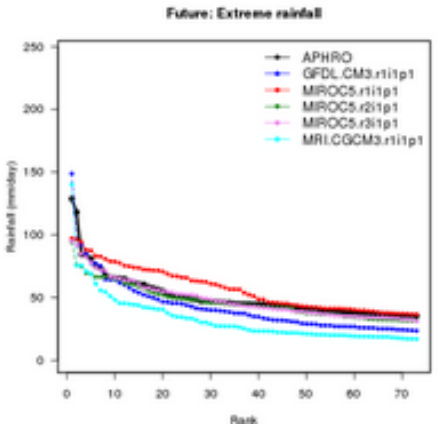


This system is comprised of a set of tools that provide the
Intercomparison Project Phase 5 (CMIP5), which has wide-
reanalysis data as reference data for comparison with CMI
reproducibility of climate models.

HOW TO USE

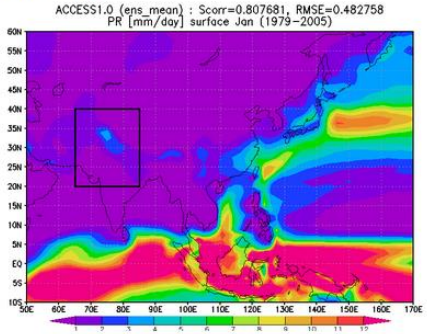
A common web application account is necessary.
Please contact the DIAS Office for details:





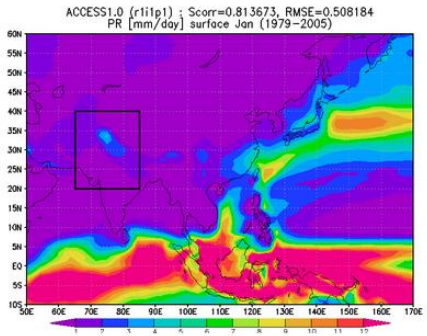
CMIP5 (10 models / 66 ensemble members): Open in New Ta

ACCESS1.0

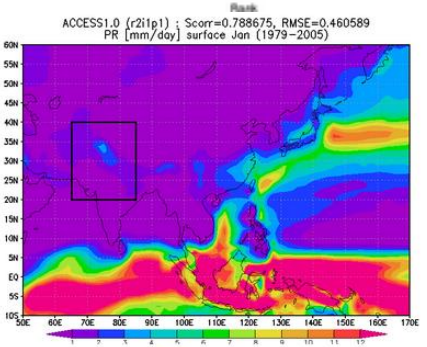


Difference Image

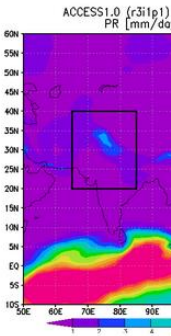
Ensemble member (3)



Difference Image



Difference Image



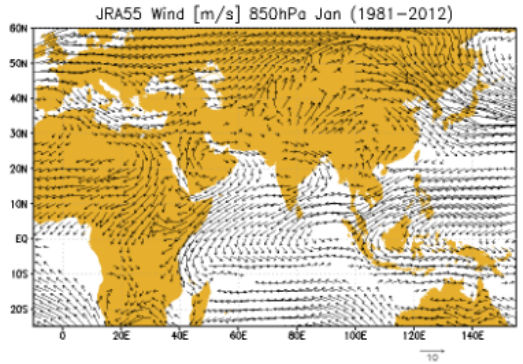
Di

Climate change impact analysis tool using CMIP 5 dataset (1.6PB)

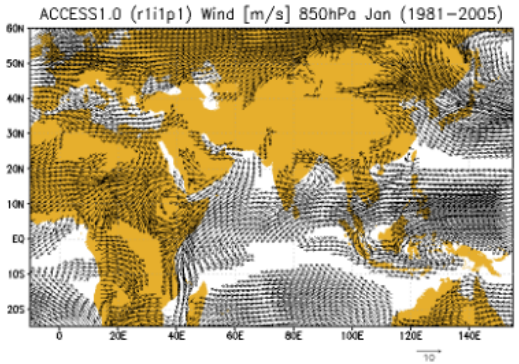
Meteorologic Element	Wind ▾	Level or Layer: 850hPa ▾
Analysis Area	Lon1(West): -10	Lat2(North): 60 Lat1(South): -25 Lon2(East): 155
Time Range	From 1981 ▾ To 2012 ▾ ;	For 1 ▾ month(s) starting from January ▾
Display Option	Maskout	☐ Altitude above 1500 meters ☑ Wind speed less than 2 m/s
	Skip factor	Reference: 2 in X, 2 in Y / Model: 1 in X, 1 in Y
	Colorbar for diff wind speed	○ Max range ○ Manual setting: (min) (max) ◉ Separate setting Recalculation

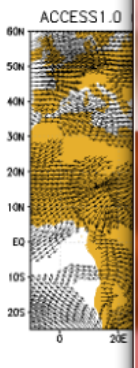
ID: cmip5-20576 View Reference Data View Model Output (3 per row)

Reference Data: JRA55

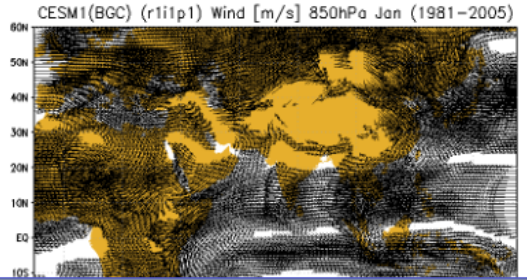


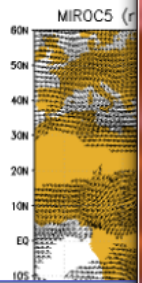
odel Output Open in New Window/Tab View All Difference Vector Images





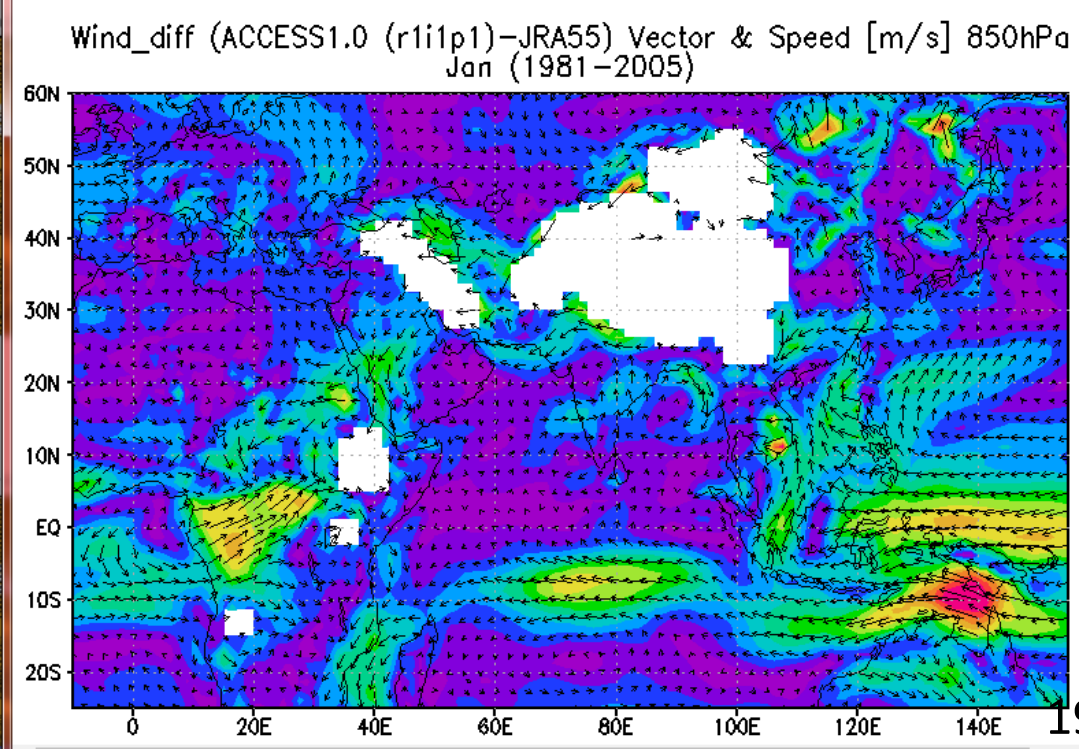
Difference Vector Image

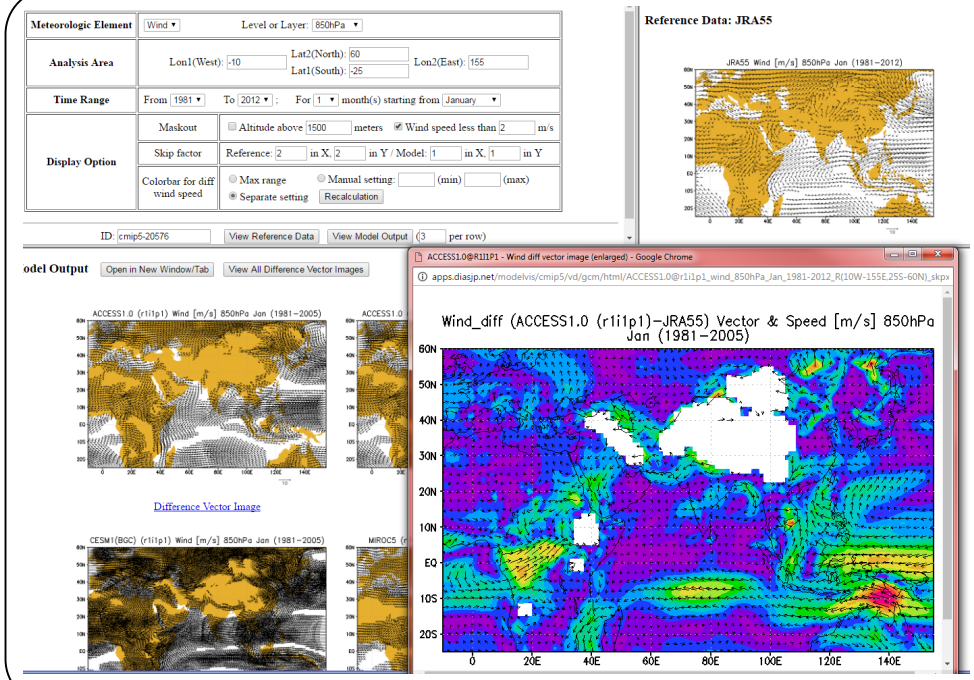




ACCESS1.0@R1I1P1 - Wind diff vector image (enlarged) - Google Chrome

apps.diasjp.net/modelvis/cmip5/vd/gcm/html/ACCESS1.0@r1i1p1_wind_850hPa_Jan_1981-2012_R(10W-155E,25S-60N)_skpx





A tool for Climate change impact analysis (*Model selections and BIAS correction*) using CMIP 5 (*Coupled Model Intercomparison Project*) data

Ability of data integration among archived observed and simulated data with real-time data is one of "DIAS Value"

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Real-time data archiving on DIAS

MLIT

Live Camera

River Telemetry

/10 min.

C-band Radar

X-band Radar

/1 min.
250m mesh
14area

/5 min.
1km mesh
All area

Live Camera Images

Local government etc.

/10min.

DIAS Core System

NOAA,GMS,MTSAT,
MODIS,AMSR-E,
GMS8

Satellite Data

/1 hour,
1300 points

AMeDAS

GPV JMA

/1-3 hour
84-264hr. forecast
0.2～1deg. mesh
Global, Japan area

/5 min.
91 points

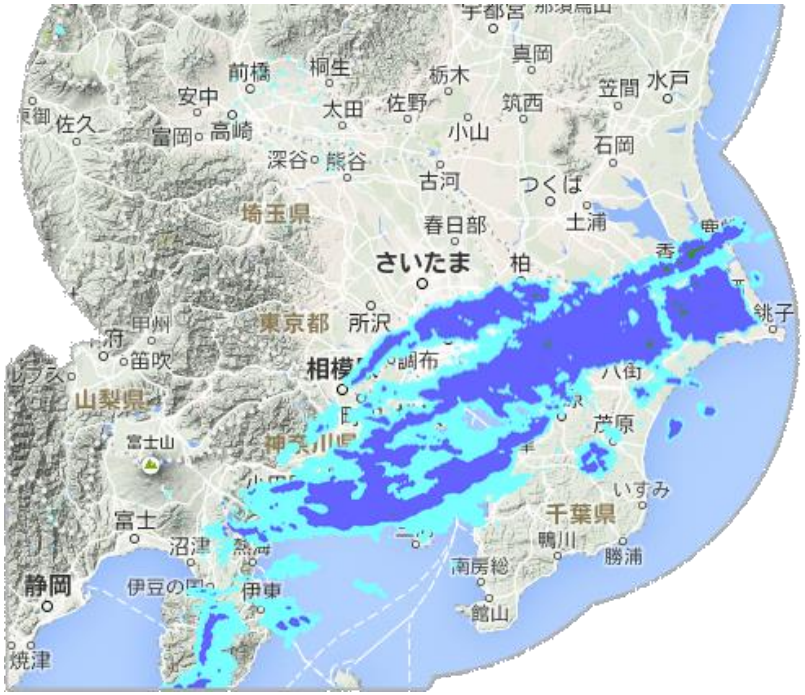
/1 hour
0.1deg. mesh
Global(60S-60N)

GSMaP JAXA

Tidal level

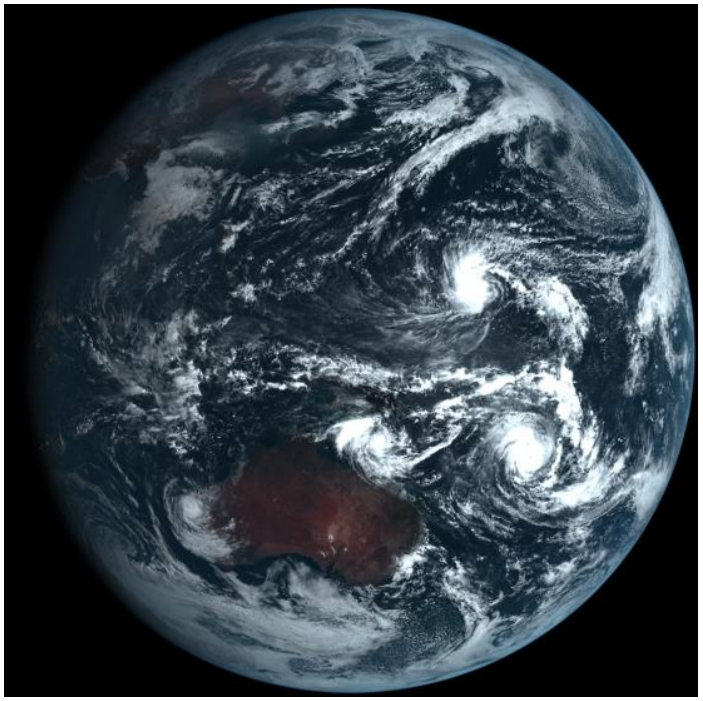
Japan Coast Guard

archiving, analyzing and disseminating data and information with high velocity.



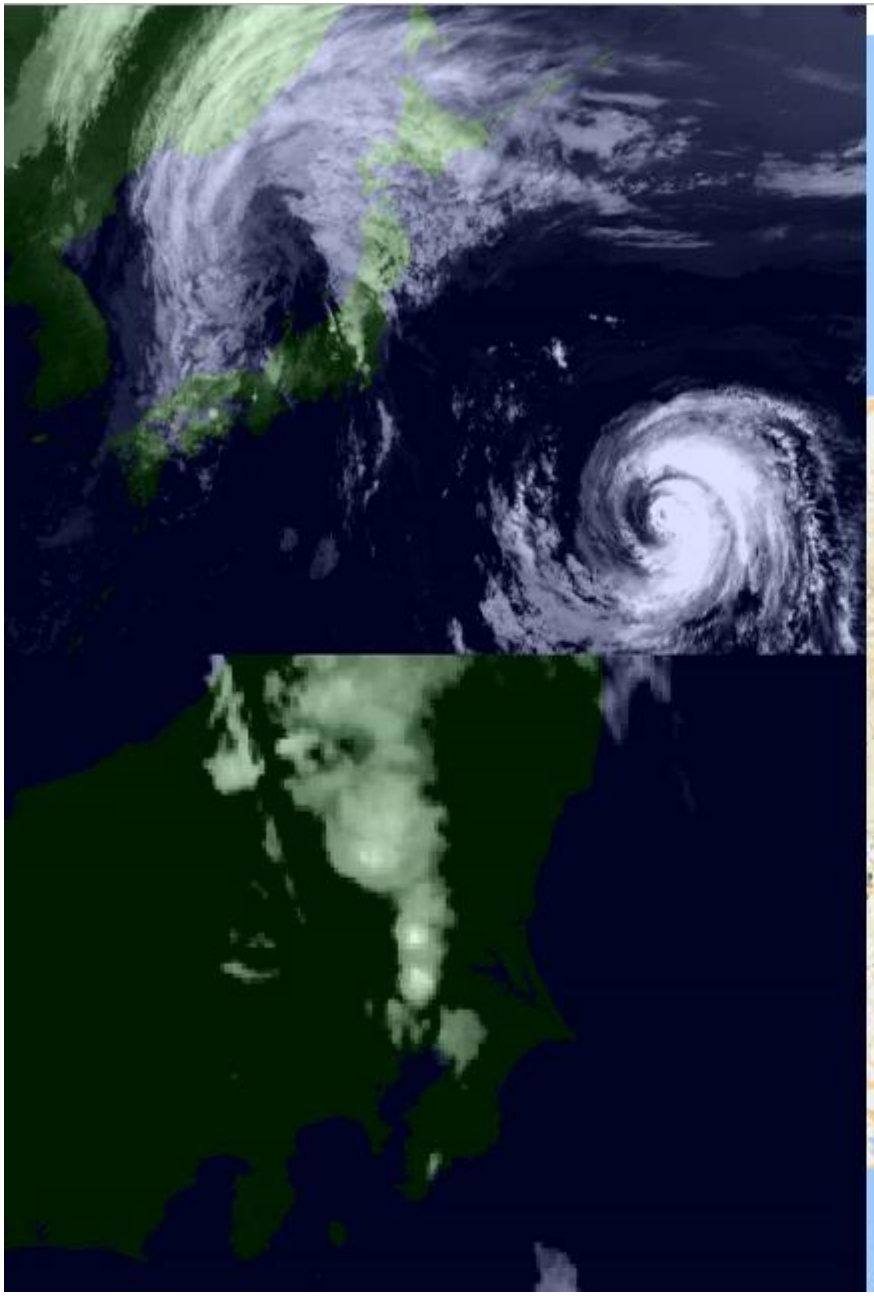
X-band MP Radar
- 250 m grid
- Every 1 min.

500GB/day



New Gestational Satellite
- 0.5 km grid
- Every 2.5 min.

500GB/day




0
～1mm/h
～5mm/h
～10mm/h
～20mm/h
～50mm/h
～100mm/h
100mm/h超
2015/09/09 21:00
関東
地図
長岡
柏崎
新潟県
十日町
郡山
いわき
白馬村
長野
群馬県
茨城県
軽井沢町
前橋
佐久
高崎
松本
長野県
ひたちなか
水戸
つくば
埼玉県
伊那
東京都
甲府
山梨県
横浜
神奈川県
富士山
箱根町
富士
千葉
静岡
沼津
焼津
静岡県
浜松
磐田
00:00まで 過去3時間の動き(1分毎)
Google

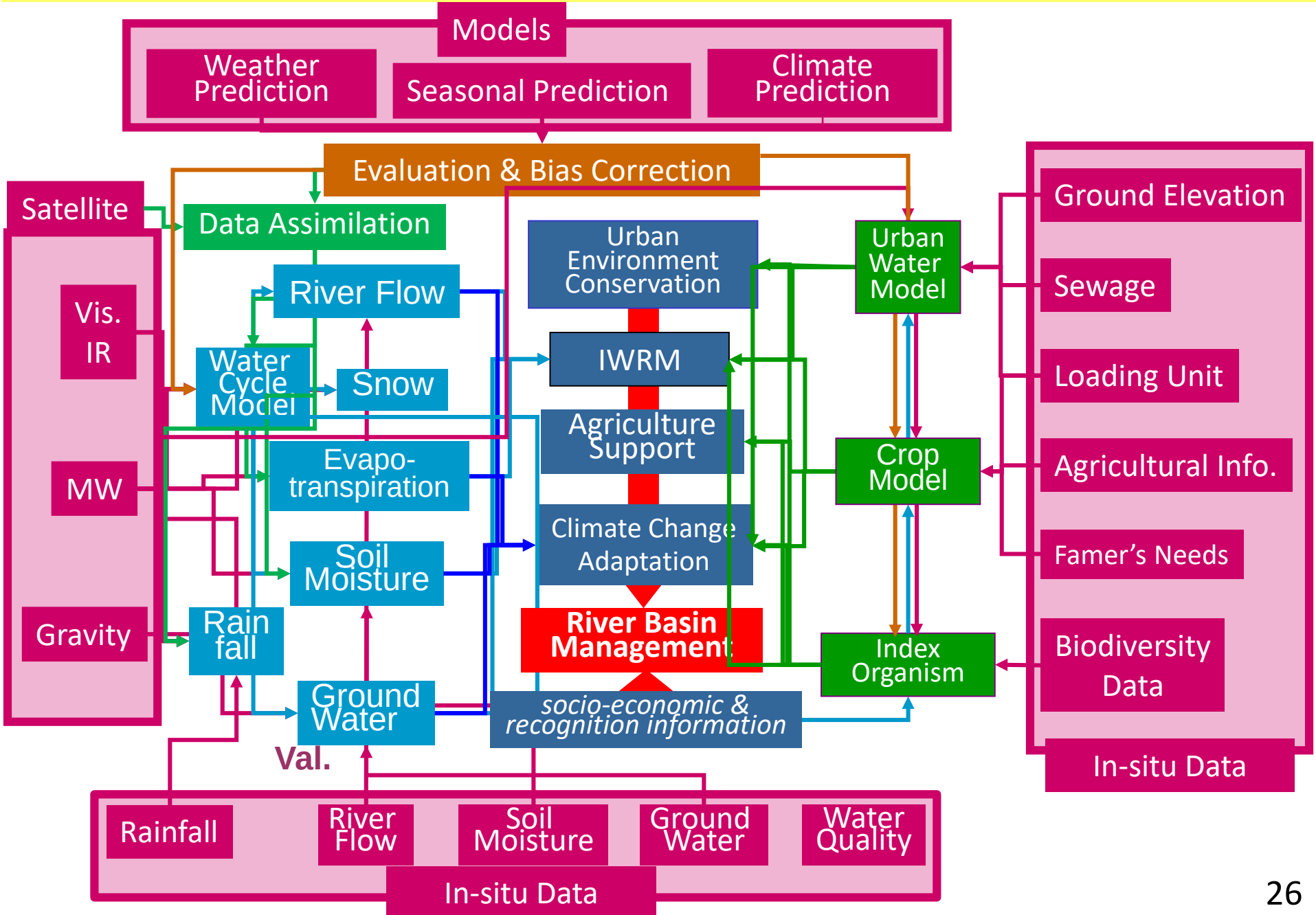
Agenda

- DIAS outline
- AWCI Data Archive System
- DIAS value
  - Applications and tools
  - In-situ (real-time) data
  - Data and motel integration
- Summary

DIAS
Data Integration & Analysis System

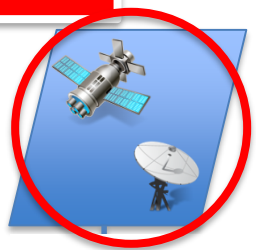
東京大学
THE UNIVERSITY OF TOKYO

Water Cycle Integrator (model)



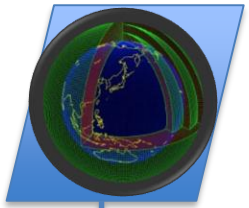
Real-time Flood Forecast System: Real Time Hydrol. Model

DIAS Data Archive



Satellite, Radar

Obs. weather



QPF

MLIT obs.

Real-time system

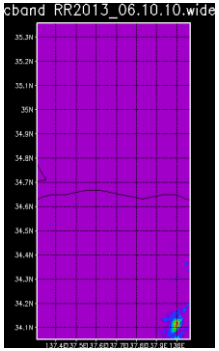
real-time simulation of basins' water content and discharges

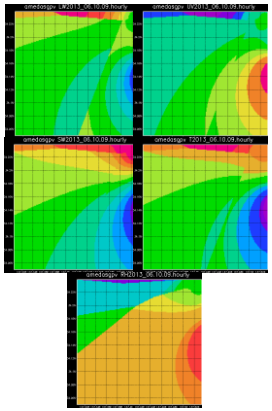
Basin water cont. river discharges

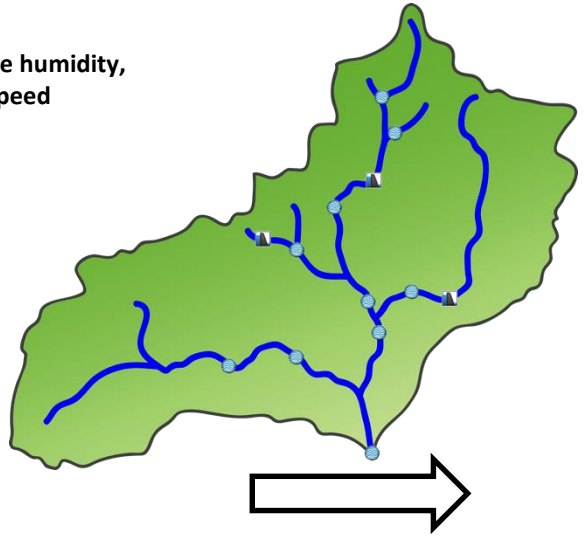
real-time hydro. model

Forcings

Cloud fraction, Longwave radiation, Relative humidity, Shortwave radiation, Temperature, Wind speed

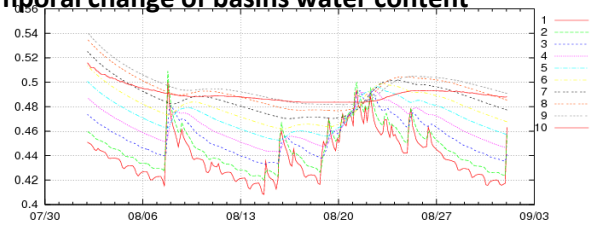






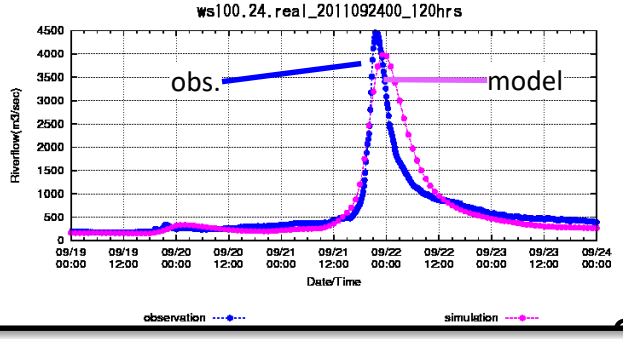
流域内保水状態の時系列変化：土壌水分

Temporal change of basins water content



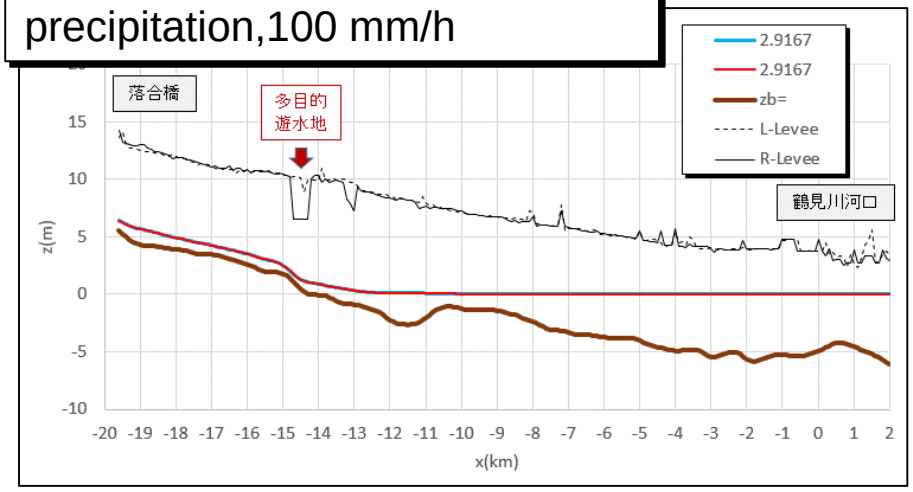
河川洪水流量：H23 台風15号、前橋

Simulated Flood on H23 . Th15

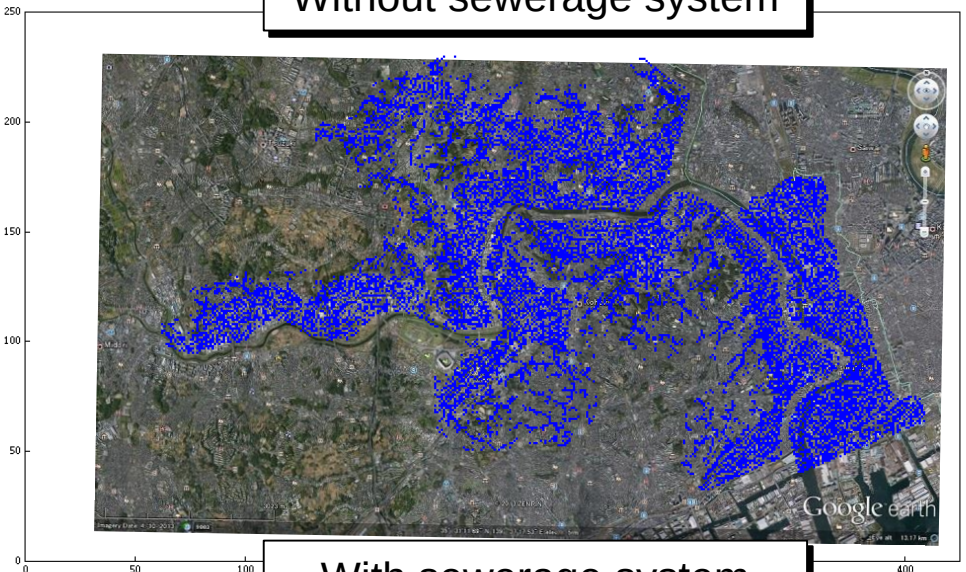


Trial simulation： River Water Level, Inundation Depth, and Sewerage Flow

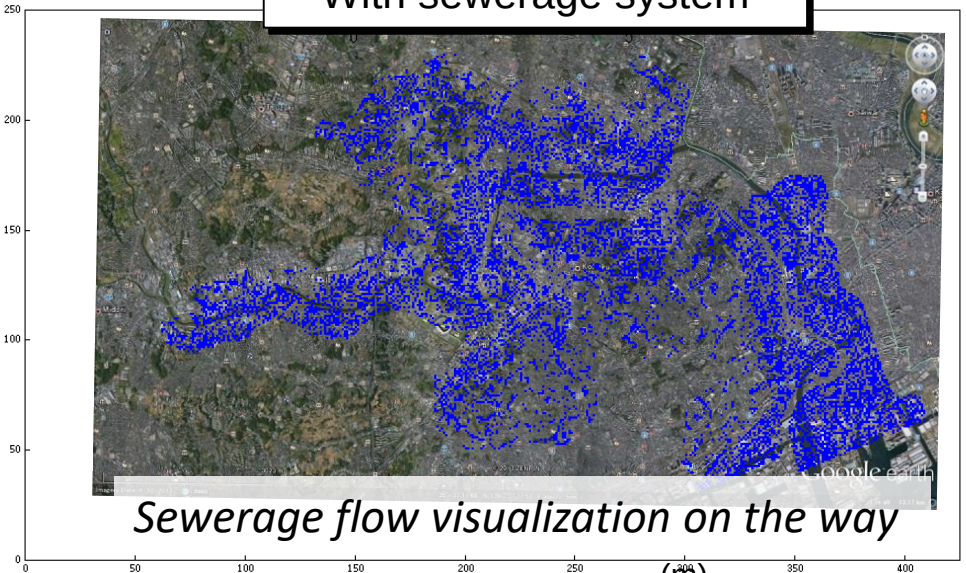
Conditions:
peak flow at Ochiai, 1000m3/s
precipitation,100 mm/h



Without sewerage system



With sewerage system



Sewerage flow visualization on the way

**timings of animation are not synched in this slide*

DROUGHT EMERGENCY

EXECUTIVE BRIEF

HORN of AFRICA DROUGHT

2011

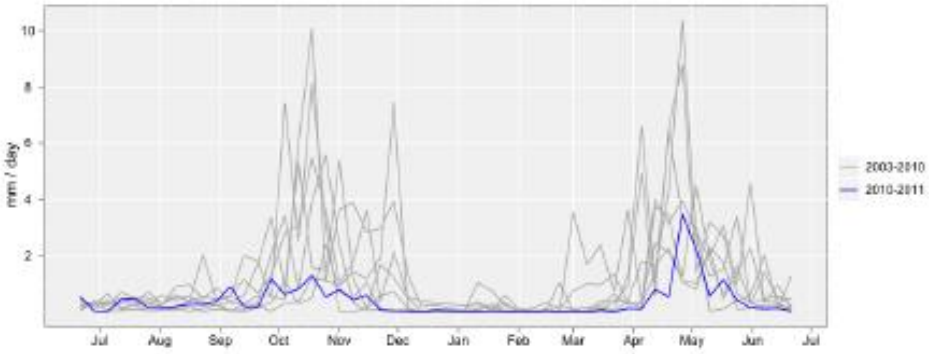
4 August 2011

HIGHLIGHTS

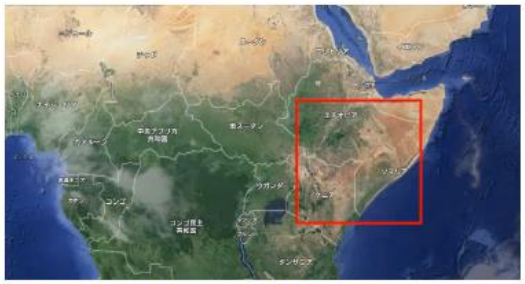
- 12.4 million people are in urgent need of assistance in Djibouti, Ethiopia, Kenya and Somalia.
- Neighbouring countries – South Sudan, Sudan, and Uganda – all require support to ensure the crisis in the Horn of Africa does not spill over their borders.
- FAO funding gap as of 4 August 2011: **USD 111.8 million.**

PRIORITY AGRICULTURAL CHALLENGES

- protecting livestock assets by preventing livestock disease outbreaks to ensure the continued functioning of vital livestock export markets.
- enabling farmers to plant during the coming rainy season to ensure the availability of food in the next season.
- increasing households' access to food through cash-for-work that has a longer-term benefit in terms of rehabilitating vital agricultural infrastructure.



Satellite Land Data Assimilation
: 303days, 60frames



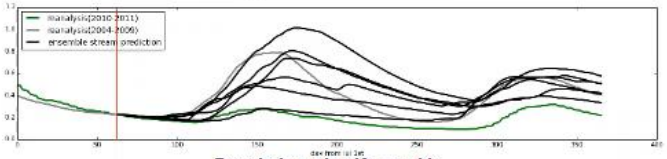
From:
Interval

201009 201011 201101 201103 201105
1 Day 3 Days 5 Days 7 Days 10 Days

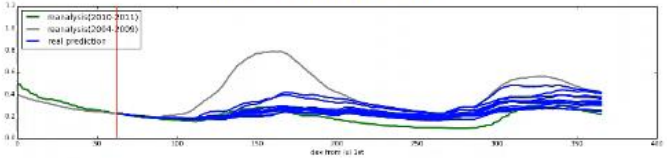
Loop: Int: 300 (ms) # 1 /60

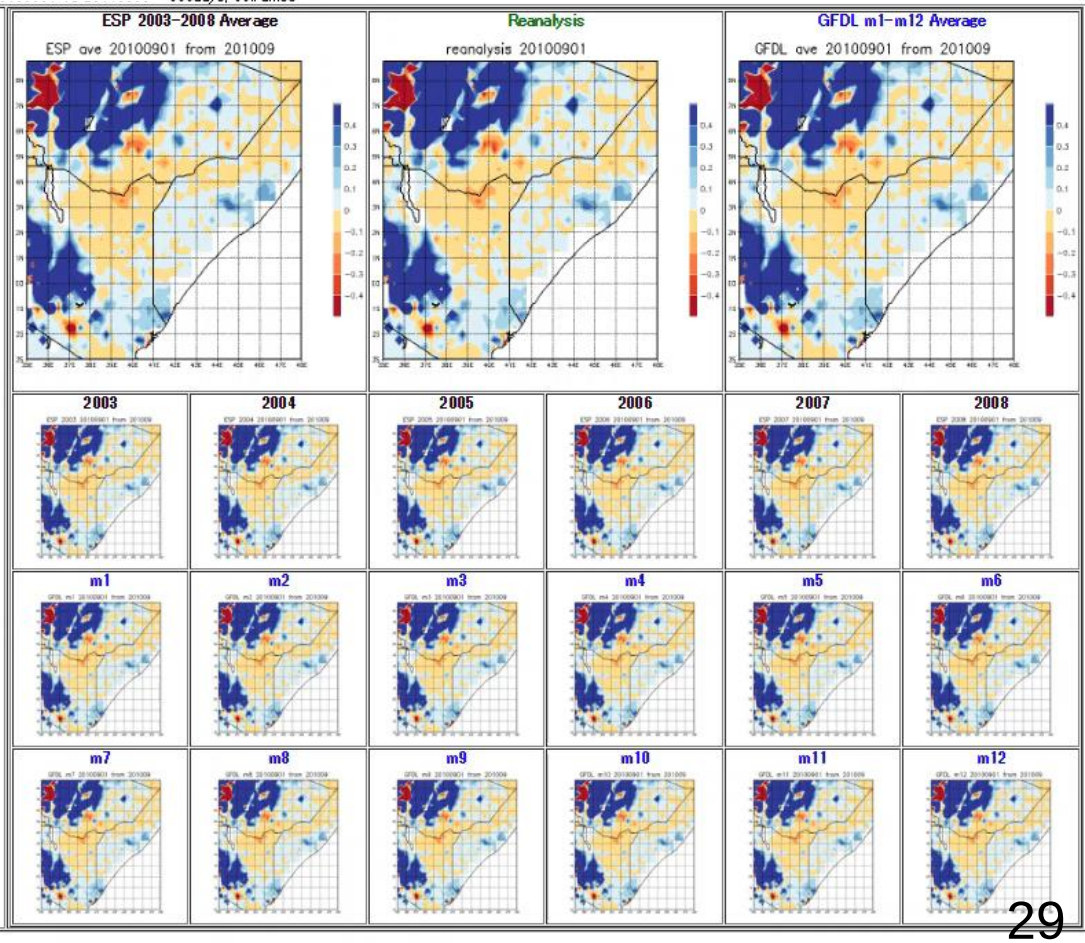
<< |< < || > >| >>

Reanalysis + 2003-2008 ensemble



Reanalysis + m1-m12 ensemble





Sawada, Koike, et.al., JGR (2016)

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“DIAS Value”

Archived extra-large volume of
observed and simulated data

Real-time in-situ data

Data and model integrator

R&D community
with domain scientists and IT experts

Need more collaboration!

We would like to expand our collaboration with international experts, organizations, and partners:

- To exchange knowledge and experience
- To fill the gap between e-infrastructure and the society
  →*Transdisciplinary, especially commercial sector*
- To promote education and capacity development in e-infrastructure

DATA SCIENCE JOURNAL

Special Collection: SciDataCon

Practice Papers

Data Integration and Analysis System (DIAS) Contributing to Climate Change Analysis and Disaster Risk Reduction

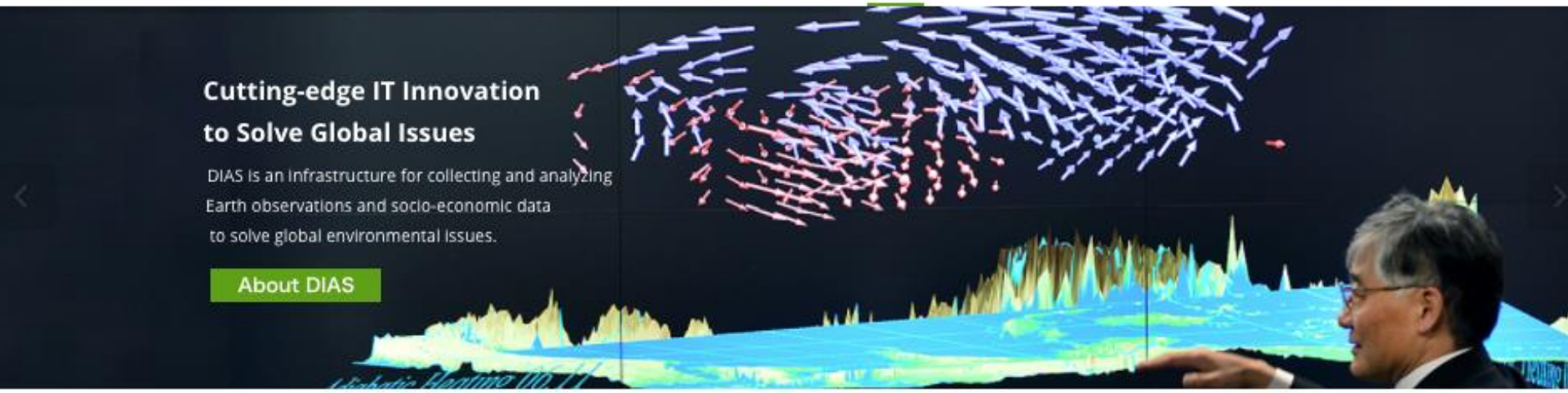
Authors: Akiyuki Kawasaki, Akio Yamamoto, Petra Koudelova, Ralph Acierto, Toshihiro Nemoto, Masaru Kitsuregawa, Toshio Koike

Open access paper!

https://datascience.codata.org/articles/10.5334/dsj-2017-041/

DIAS Data Integration and Analysis System Program

Home About Data & Apps Research Results News



Please visit http://www.diasjp.net/en !

Research Area

- Climate/Weather
- Water
- Urban
- Disaster Risk Management
- Agriculture
- Biodiversity
- Health
- Economy

News

30 SEP

Summer Program 2016: Sustainable Water Management in an Era of Big Data

Events

The University of Tokyo (UTokyo) and the International Centre for Water and Risk Management(ICHARM) under the auspices of UNESCO, Public Works Research Institute (PWRI), Tsukuba held an Internation...

Testimonials

> We have entered the period of Big Data, which recognizes the importance of data as evidence. Our construction of databases for Earth observations goes back over 30 years. The time has come for the true value of these observations to trigger social innovation.