Development of Data Integration and Analysis System (DIAS)

Eiji Ikoma*, Masaki Yasukawa*,

Hiroko Kinutani*, Toshihiro Nemoto**
and

Masaru Kitsuregawa**, Toshio Koike*,***

The University of Tokyo

*Earth Observation Data Integration and Fusion Research Initiative, UT

**Institute of Industrial Science, UT

***Department of Civil Engineering, UT

Outline

- 1. Outline of DIAS System
- 2. Introduction of Data Upload, Quality Control, and Meta-Data Registration System

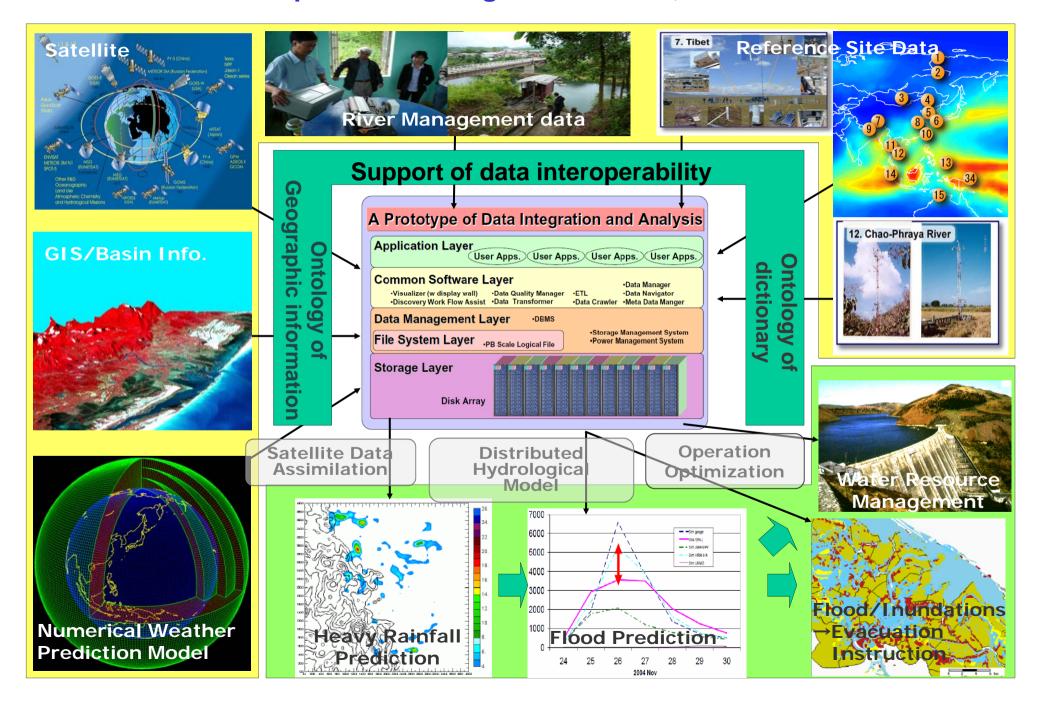
- 3. Introduction of CEOP Satellite Data Gateway system
- 4. Applications on DIAS System

What is DIAS?

• Since 2006, as part of the Earth Observation and Ocean Exploration System, which is one of five National Key Technologies defined by the 3rd Basic Program for Science and Technology of Japan.

DIAS

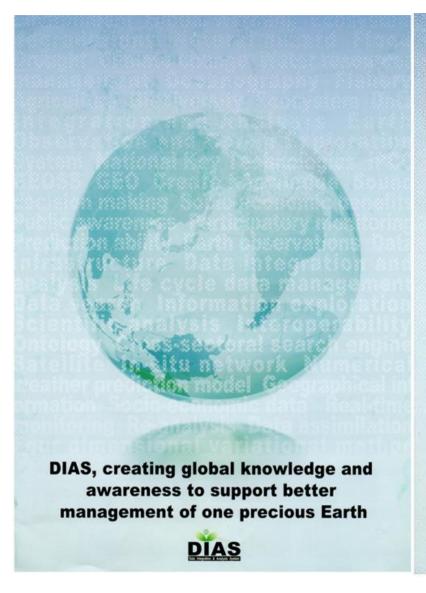
- Cooperation among the Observer, IT and Users -



The mission of DIAS

- to coordinate the cutting-edge information science and technology and the various research fields addressing the earth environment;
- to construct data infrastructure that can integrate earth observation data, numerical model outputs, and socio-economic data effectively;
- to create knowledge enabling us to solve the earth environment problems; and
- to generate socio-economic benefits.

In detail about DIAS, Please see



DIAS, a legacy for Japan's contributions to GEOSS

By coordinating the development of earth observation systems,

the Cloud Earth Observation System of Systems (GEOSS)

is enabling better decisions and actions for the benefit of society

The GEOSS Ten You Implementation Plan defined a cisk,

"To coordinate data management approaches that encompass a broad perspective

of the observation data I facycle, from input through processing, archiving,

and dissemination, including to processing, analysis and visual varian

of large volumes and a verse type of data".

Jupan, as a leader of this task, contributes to GEOSS

through the development of the Data Imagration and Analysis System (DIAS)

and its participation in alliances with data integration centars around the work



The tech Character fair Integrant A Tasks Research Indians (BUTOSIA) for Associate of Likys. Addison Nov., Brain, Business, Association (2008) 1870.

Edition (Color Association (Liky) on p. Paris 1834-284-4012 (AA 481-2841-402)

Minor-Belli Dan an Informació Jeprano (MBDD) Den Agercy (e. Mer de Frait Scinico del Tedra logo (AMSTEC) Andreos (1772) State-critari, Nataratecha Nationa, Kanassa, Co (00), Inpo-Estat, Attentigo (1774) p. 9. Printe (1814), Ph.-Silo PhAN-Floits (1885).

Estimative rout and Secretar Course, 1904. The an incompany Expanding Agency (1904) Additional Course (1904) Additional C

Data Integration on DIAS Core System

satellite



simulation



project



operational network



land



ocean



DIAS Core System

Application Layer

User Apps.

User Apps.

User Apps.

User Apps.

User Apps.

Common Software

- Visualizer(w display wall)
- Discovery Work Flow Assist
- Data Quality Manager

- Data Transformer
- Data Crawler
- •ETL

- Data Manager
- Data Navigator
- •Meta Data Manger

Data Management Layer •DBMS

File System Layer

- Storage Management System
- Power management System

Storage Layer





Tape Library



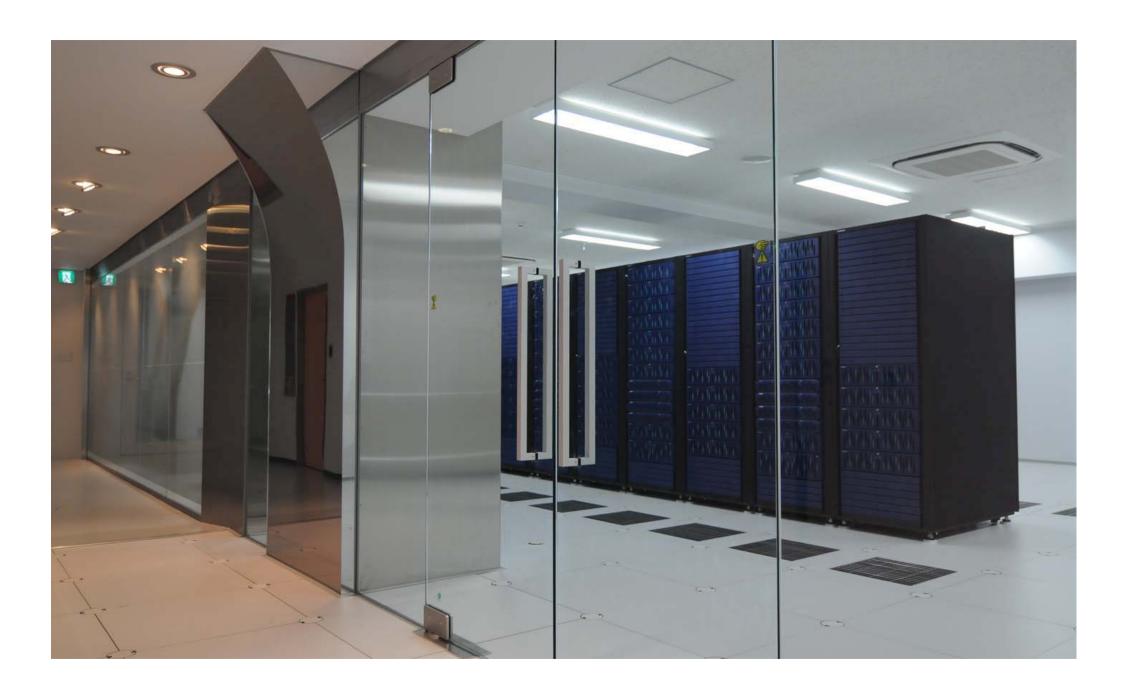
Storage System Structure

DIAS Storage System

- Connect to Dual 8-way Itanium2 Server
- 5-subsystem(Storage)
- Read 2.4GB/s/subsystem, total 12GB/s
- − = 1PB capacity HDD
- Advanced power management
 - Automatically turn off the power of idle part
 - Automatically turn on the power when accessed

New Installation around Petabyte-scale Storage at Institute of Industrial Science, U-Tokyo



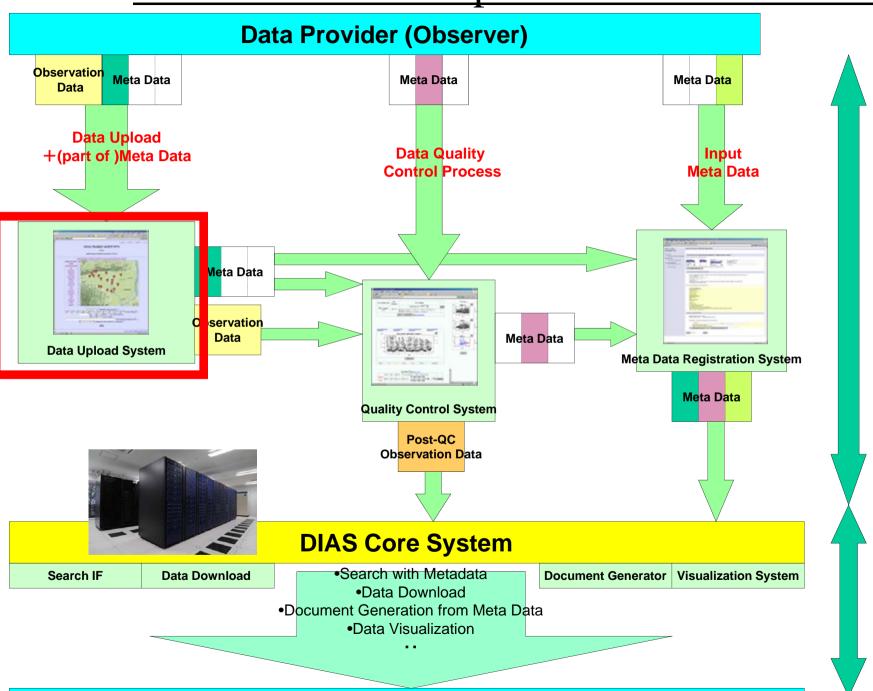


Outline

- 1. Outline of DIAS System
- 2. Introduction of <u>Data Upload</u>, <u>Quality Control</u>, <u>and Meta-Data Registration System</u>

- 3. Introduction of CEOP Satellite Data Gateway system
- 4. Applications on DIAS System

Observation Data Upload and DIAS Core System



User

Data Collection from observer

Data Integration

Observation Data Upload System

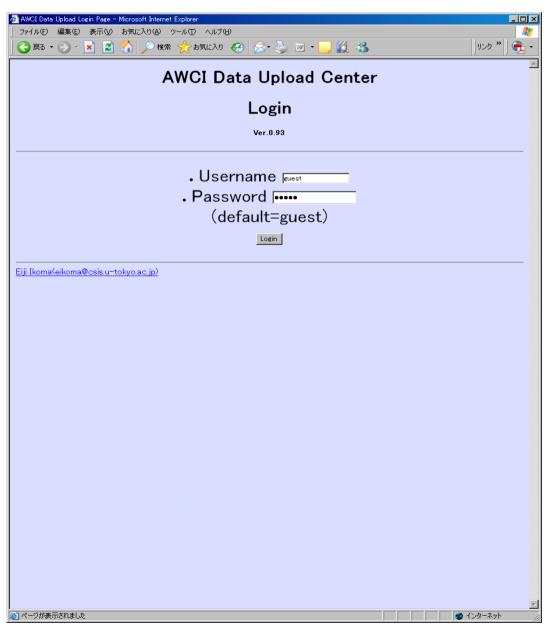
Eiji Ikoma

Katsunori Tamagawa, Hiroko Kinutani, Tetsu Ohta, Toshio Koike, Masaru Kitsuregawa

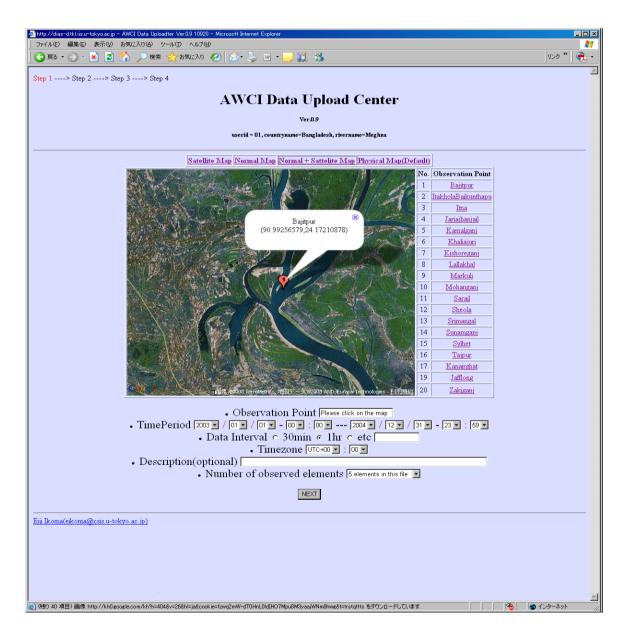
Data Upload System

- Observers can upload observation data and input some Metadata on Web Interface consisted of 4 steps.
- Easy Operation and Quick Response.
- This system has some function which reduce the complicatedness of upload process

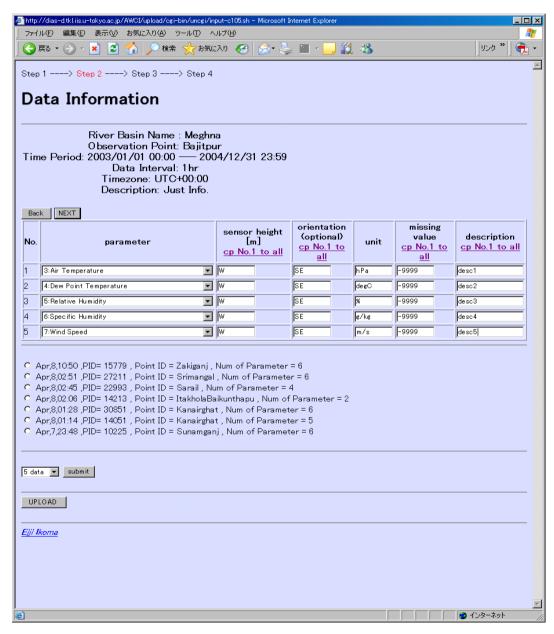
Login Page



- Username and Password are required.
- Each observation site manager has it own (unique) username and password.



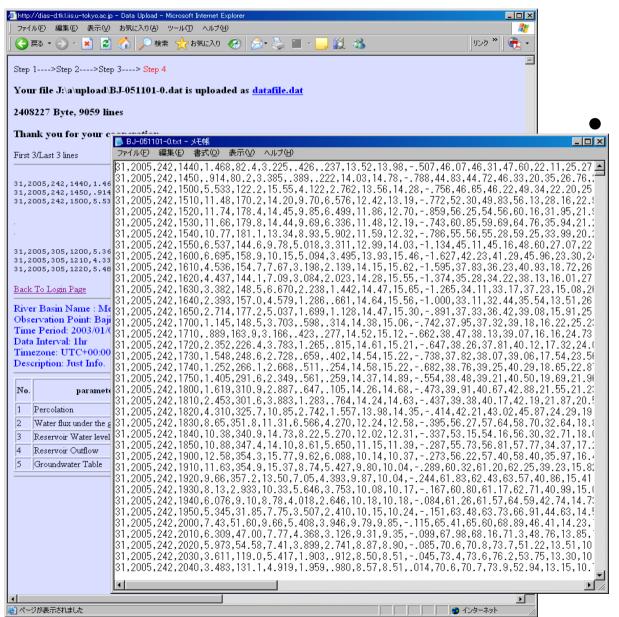
- Observation Point(Map/List)
- Time Period
- Data Interval
- Timezone
- Description (optional)
- Num. of observed elements



- Observation Data
 - Choose from pulldown menu
- Sensor height
- Orientation(op.)
- Unit
- Missing value
- Description(op.)
- 1. Copy from No.1 to all
- 2. Unit = Input Automatically when you choose observation data
- 3. Copy from former inputted data
- 4. Modify the num of observation data
- 5. Upload from prepared csv file



- Upload observation Data(File).
- Confirmation of metada inputted at STEP1,2.



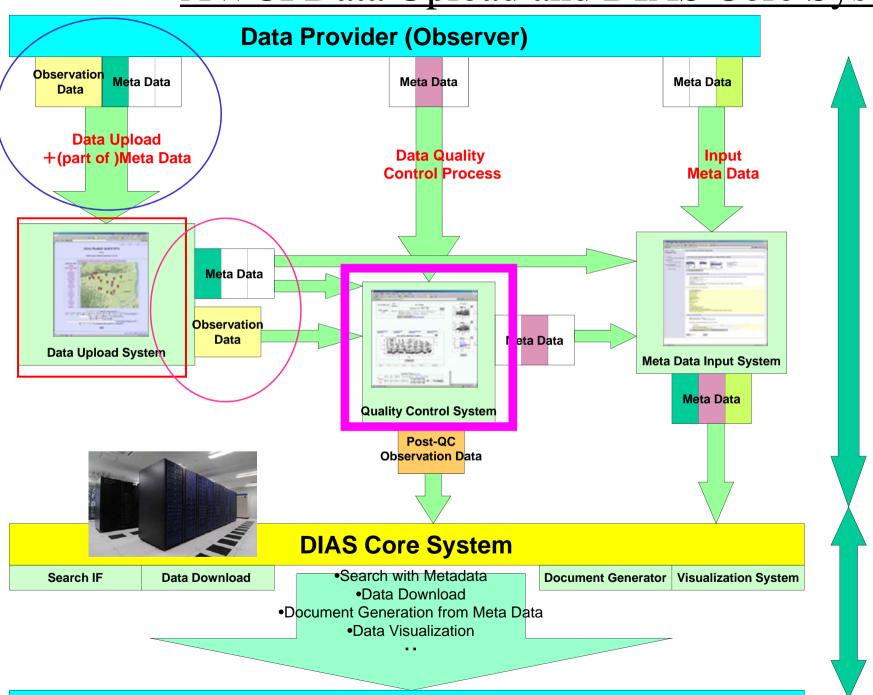
Confirmation of

- local path of uploaded file
- contents of the file
 (first/last 3lines and all lines when you require)
- All metadata inputted at STEP1,2,3

After STEP 4

- Our system send the confirmation message to observer by e-mail.
- Inputted metadata are stored in our Upload system --- Observer can use at next time.
- Observation data is loaded to Quality Control System

AWCI Data Upload and DIAS Core System



Data Collection from observer

Data Integration

User

Data Quality Control(QC) System

Eiji Ikoma, Katsunori Tamagawa,

Tetsu Ohta, Kenji Taniguchi, Toshio Koike, Masaru Kitsuregawa

Our QC System

- First version of our QC System was developed for CEOP Data in 2004.
- Ver.1(2004-2005) for \rightarrow Ver.2(2005-2006) \rightarrow Ver.3(2007-)
- 13site(Ver.1) \rightarrow 25site(Ver.2) \rightarrow Ver.3
- We are running QC-V3 system for CEOP Observation Data.

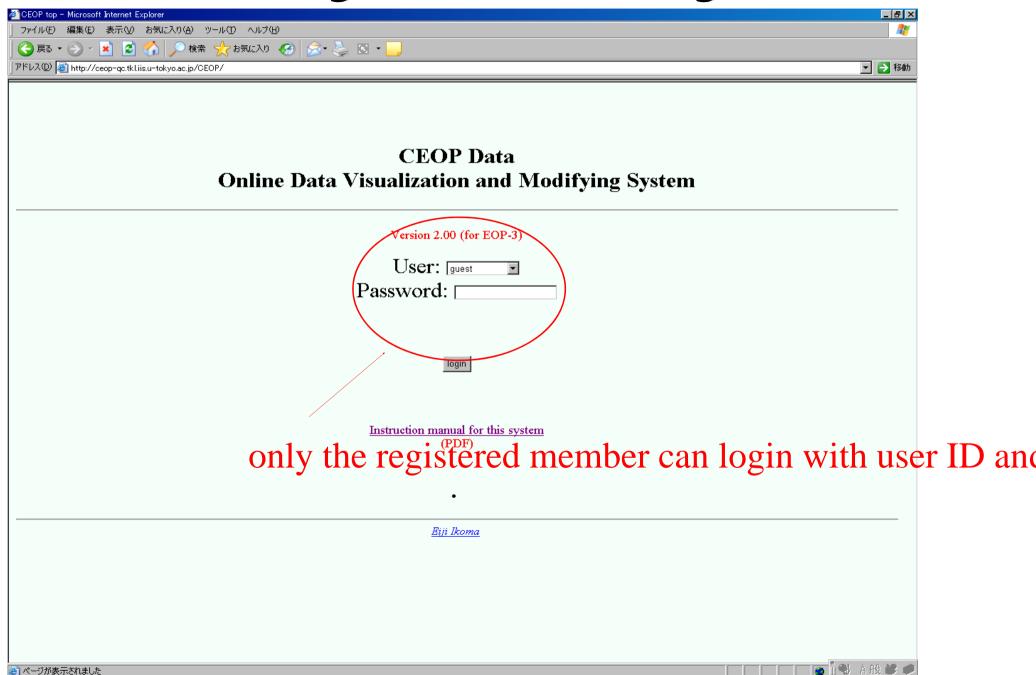
Features of our QC system

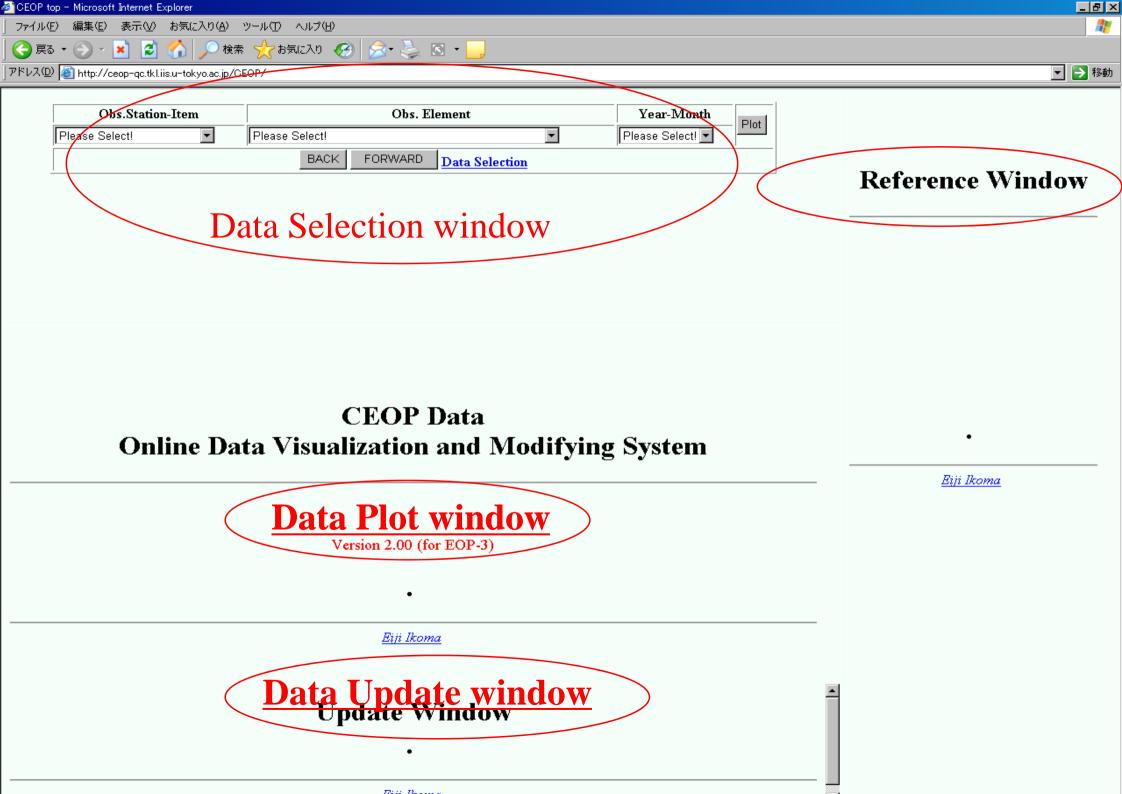
- Web-based UI (required only Web browser)
- Easy-to-use and light operation
- Data management mechanism for each user authority
- Post-QC Data download support system
- Progress Management system for Data Manager

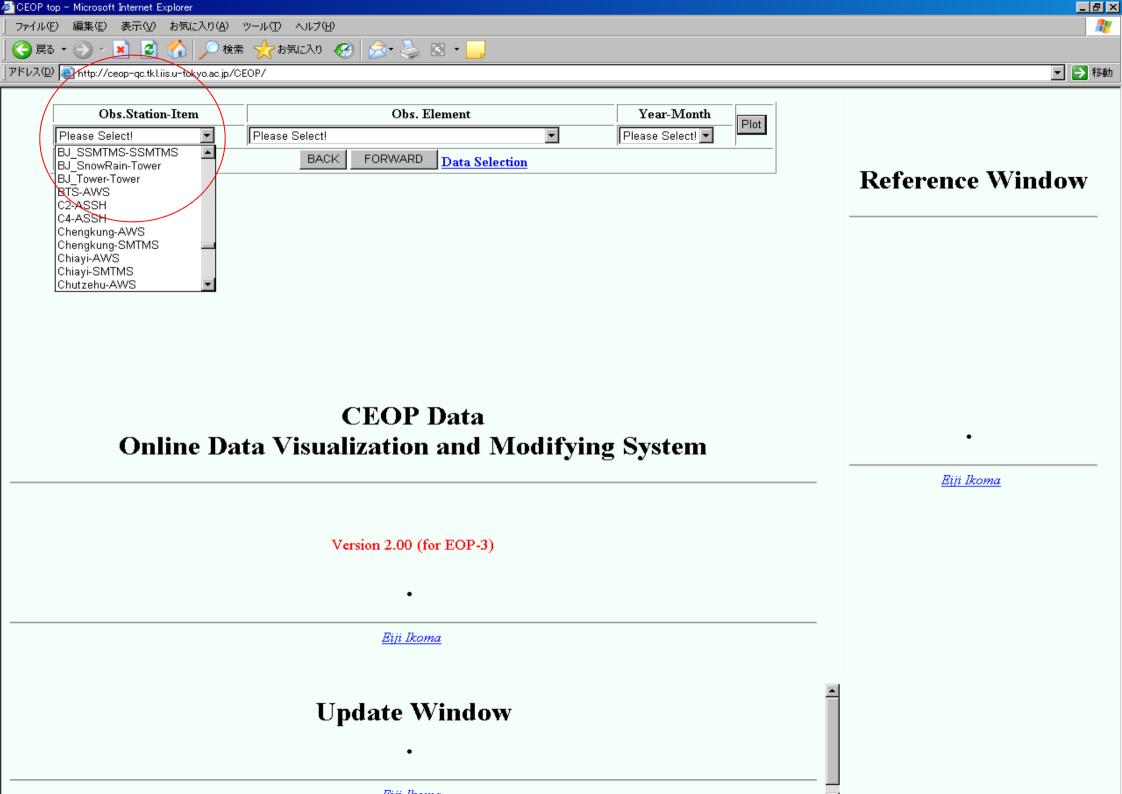
Outline of QC Process

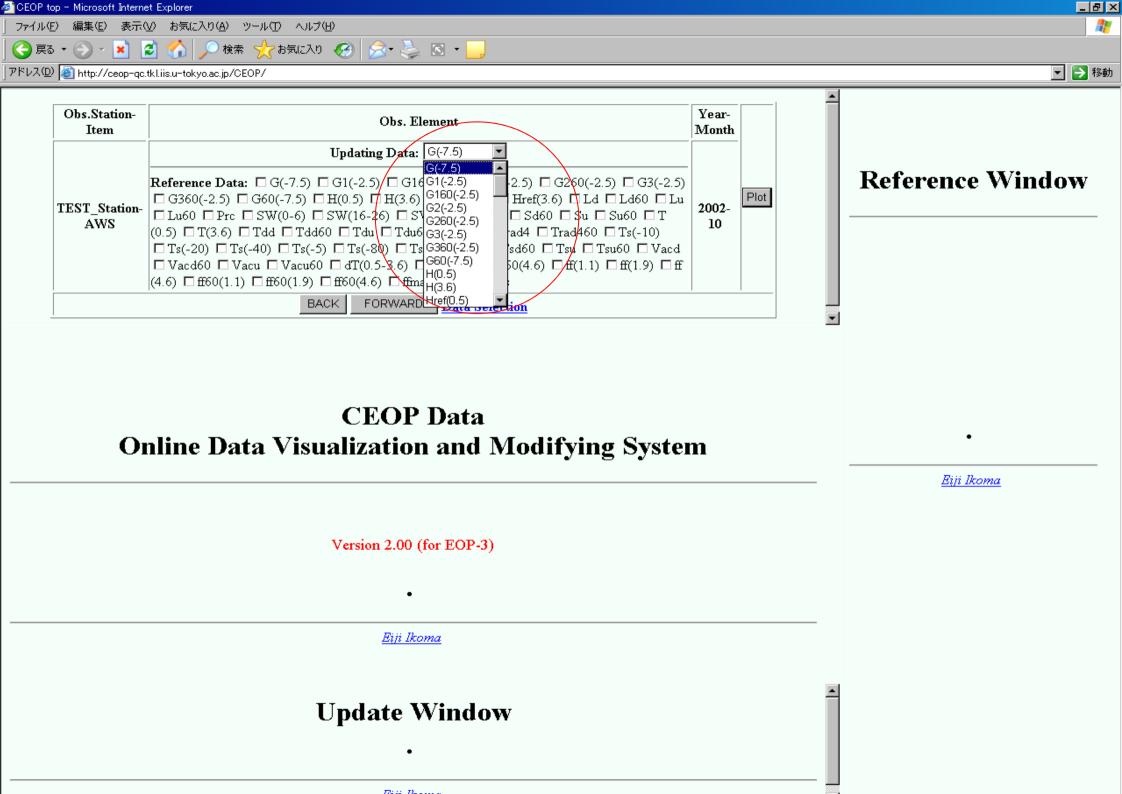
Data center (UT) Site Manager Data Pre-check the dataset **Observed Raw Data Upload** System **Database QC Tools** - Data selection **Quality Control** - Data plot QC Web Interface - Point out (Error & Noise) - Update Data, flag Use Own research purpose - Format Conversion **DIAS Core System Unified Format Dataset**

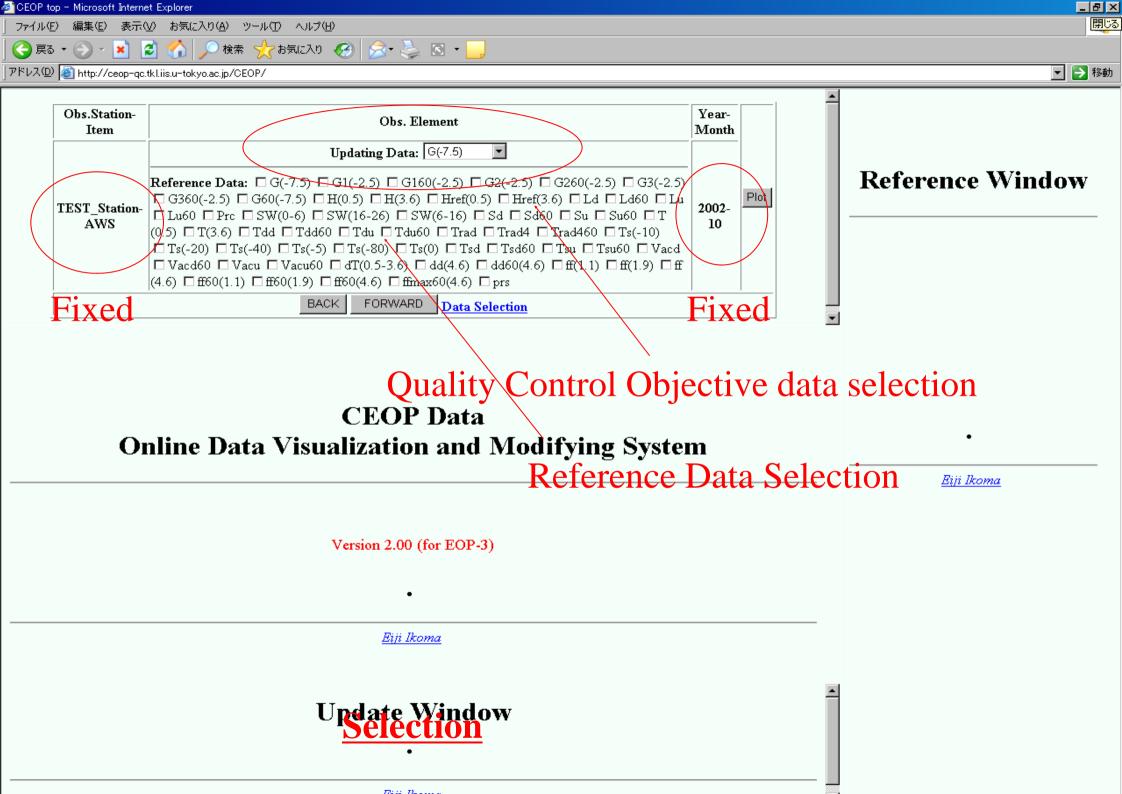
The Quality Control System

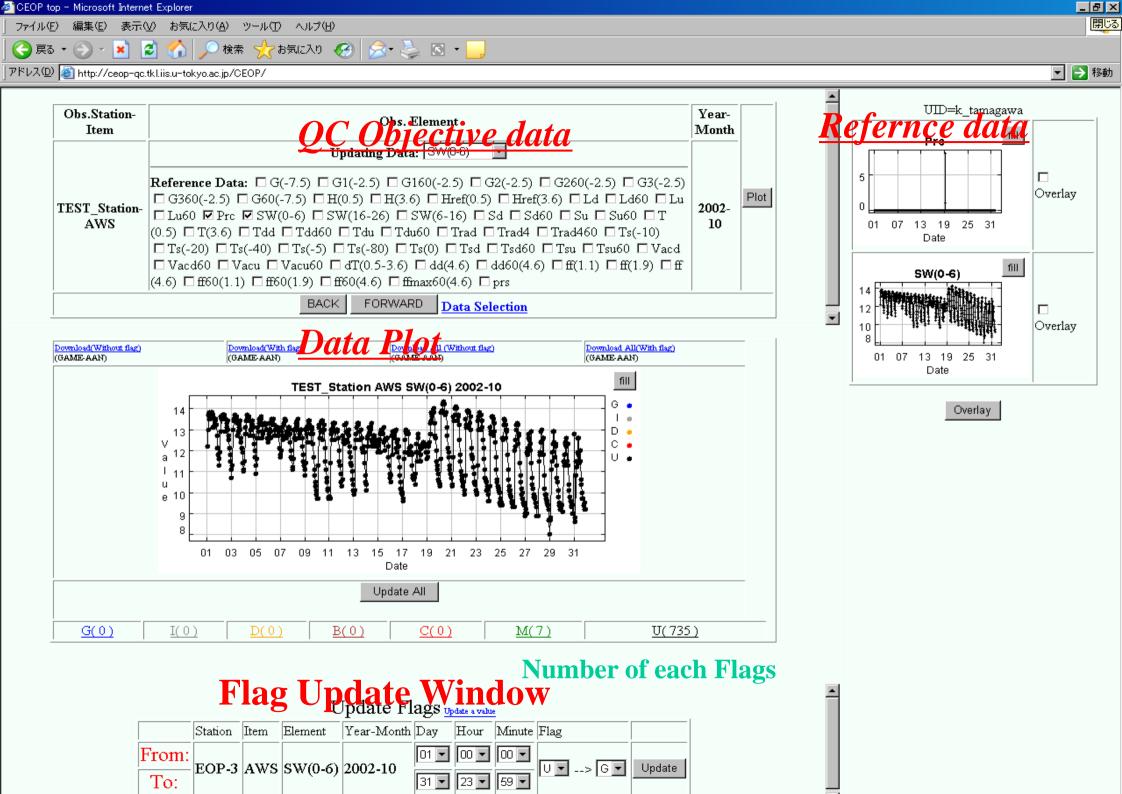


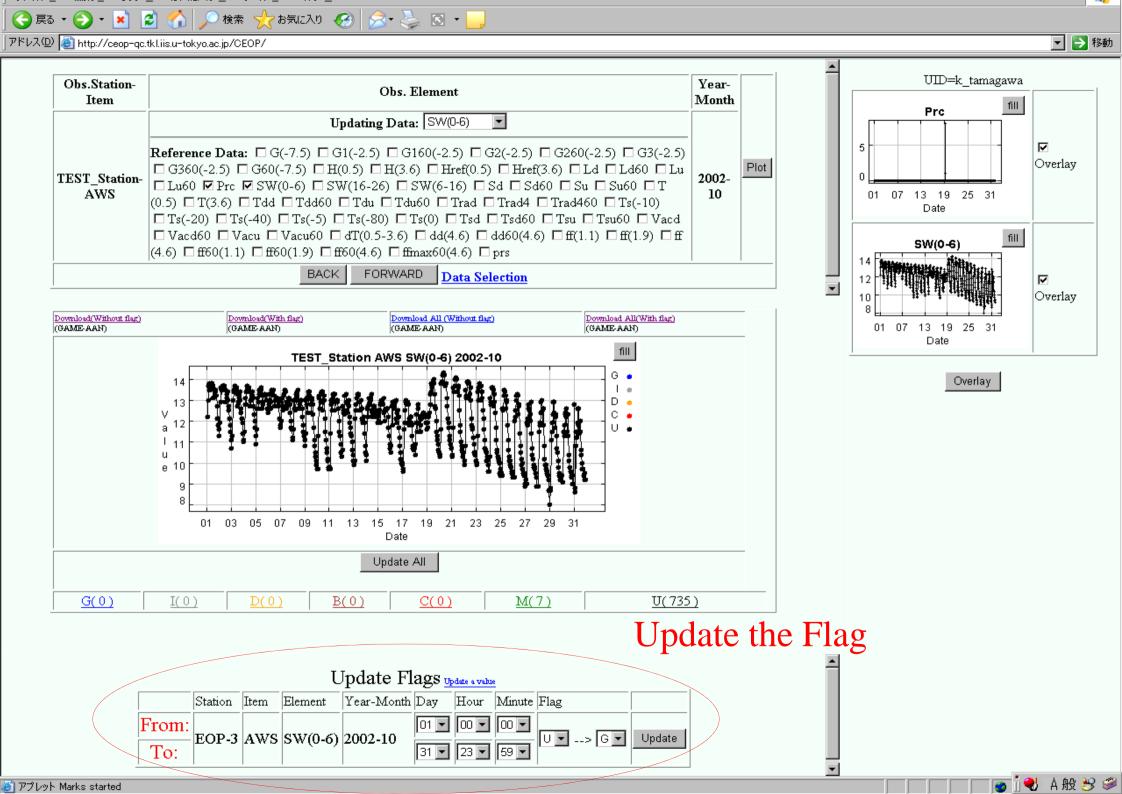


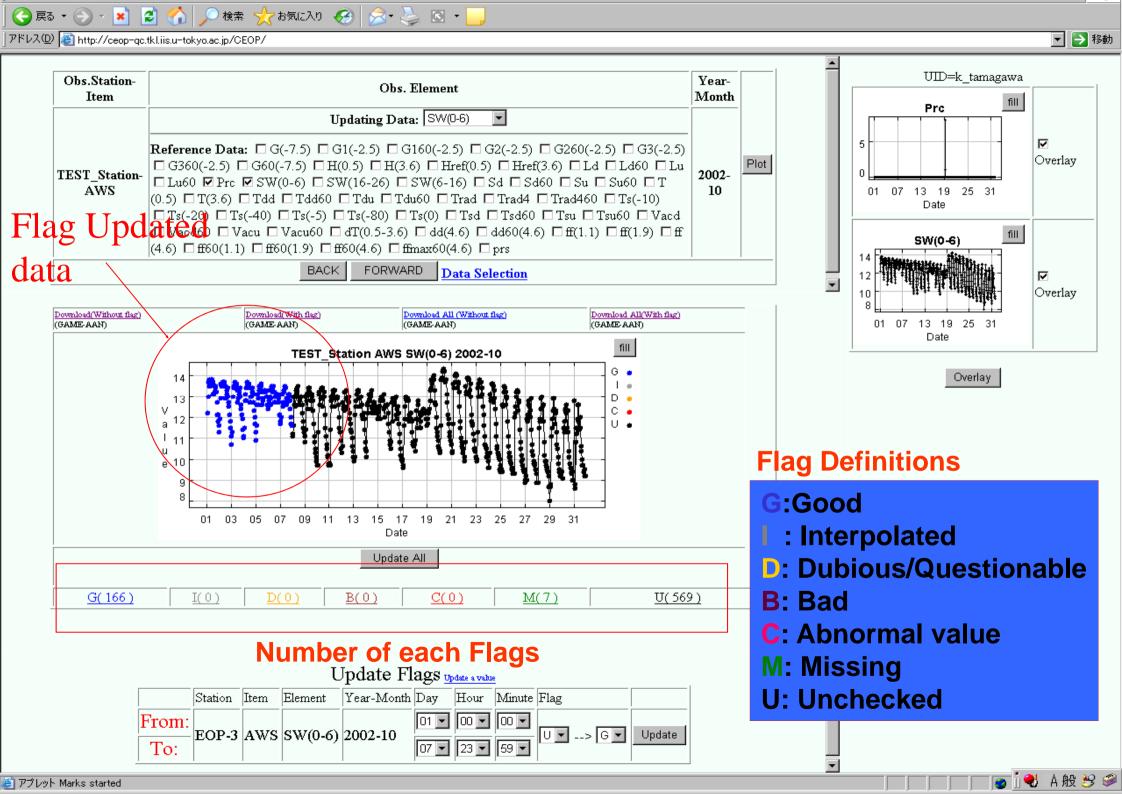


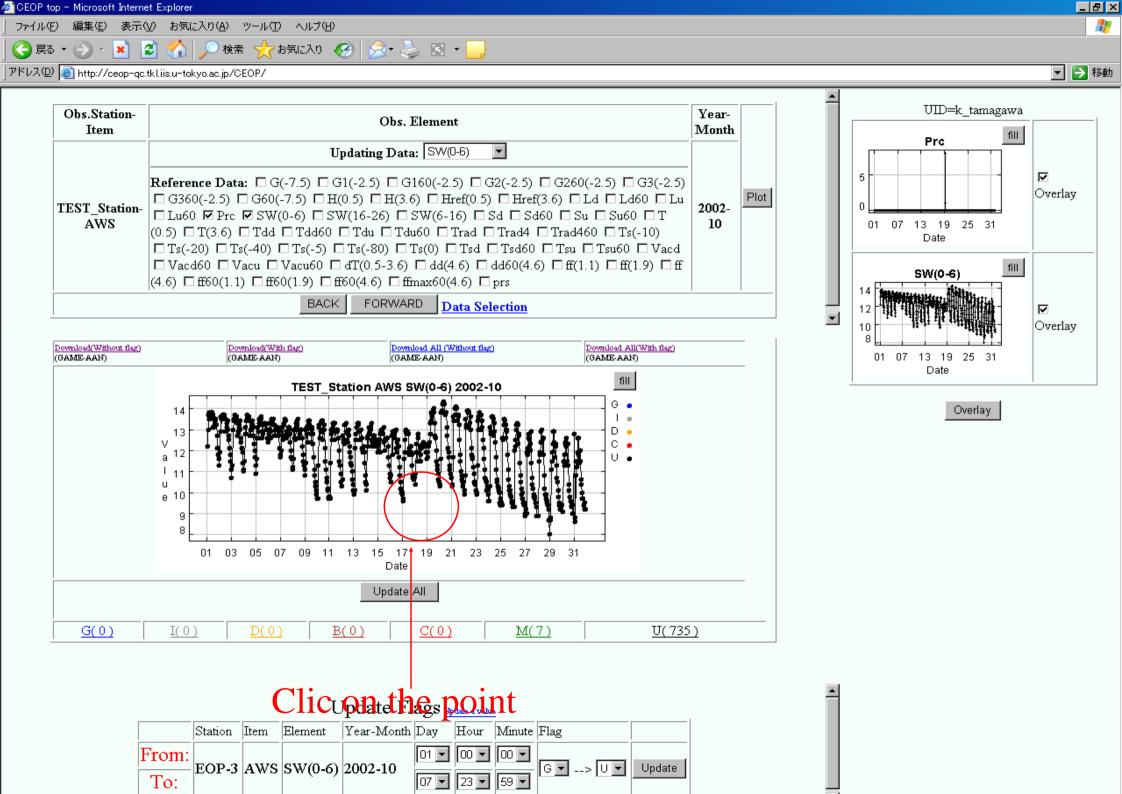


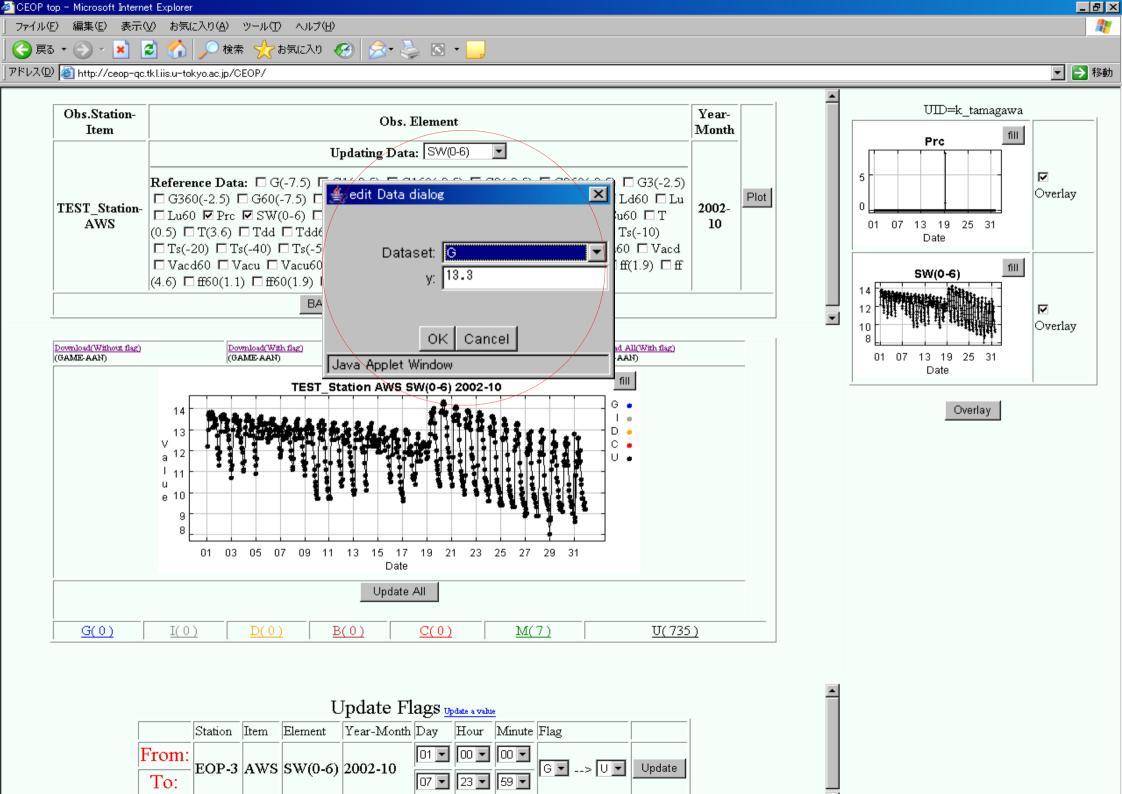


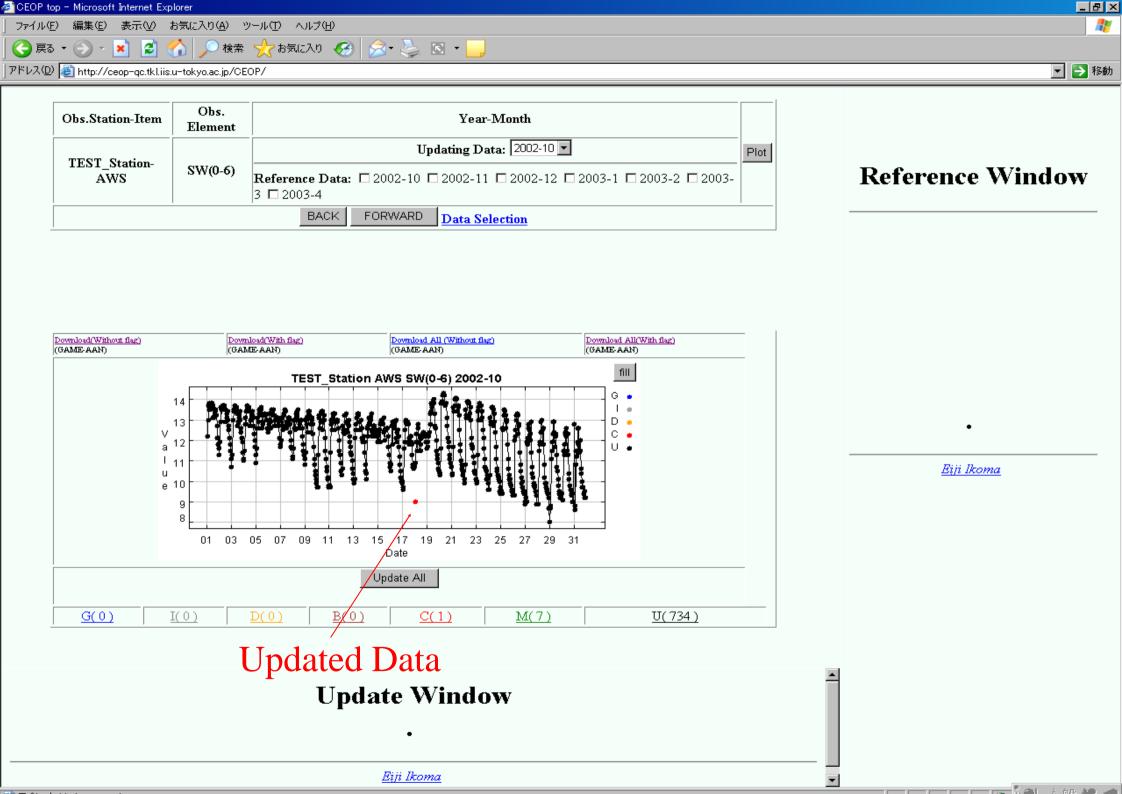


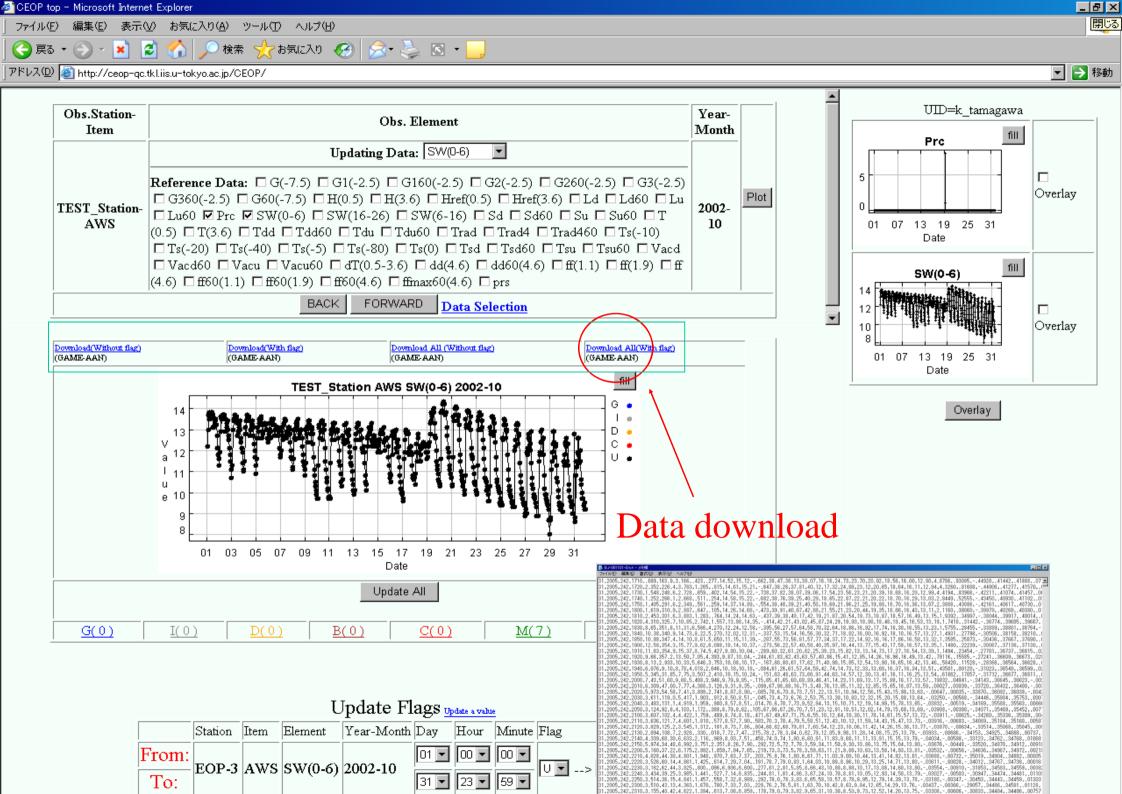




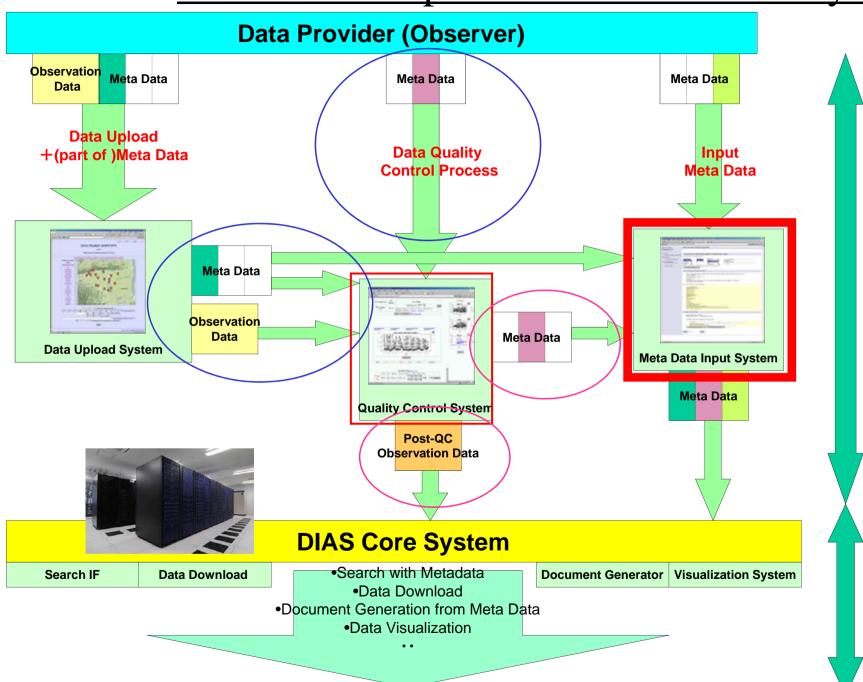








AWCI Data Upload and DIAS Core System



User

Data Collection from observer

Data Integration

Observation Data Metadata Registration System

Hiroko Kinutani

Eiji Ikoma, Katsunori Tamagawa

Tetsu Ohta, Masaru Kitsuregawa

Metadata Input System

- Observers can input metadata information related to observation data on Web Interface.
- This metadata is defined as an extension of ISO19115, ISO19139 metadata standards.
- The operation on this system is much easier than other similar system.

Top Page

AWCI River Basin Management

Contact Information

Update Contact Information

RiverBasin Information

River Basin Information Input

Observation Metadata

Observation Metadata Input (1st time)
Observation Metadata Input

Related Information

Related Information Input

Document Generation

Dataset Documentation Sample Document

User Logout

logout

return to Top page

AWCI Metadata Management Home

Welcome to the AWCI Metadata Management Sites!

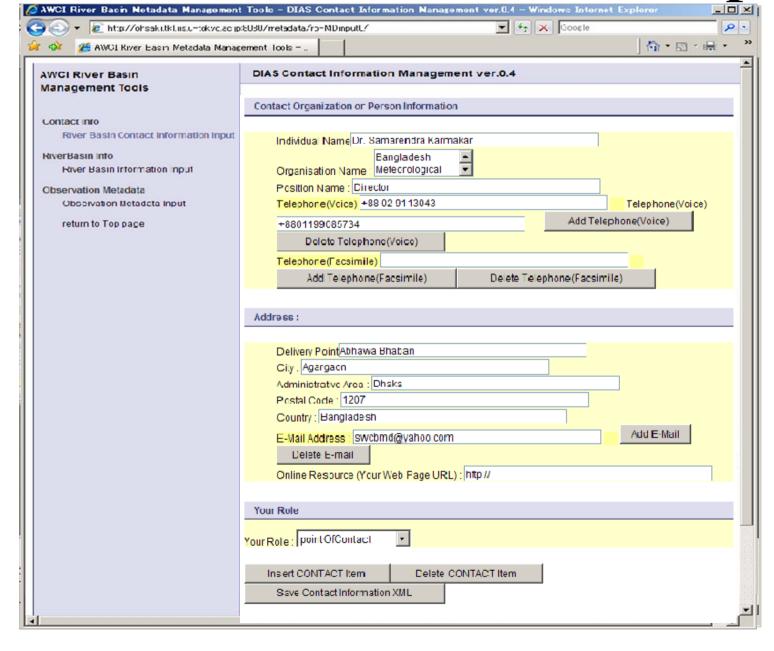
- Data Integration and Analysis System (DIAS)
- Global Earth Observation System of Systems / Asian Water Cycle Initiative

Metadata management Top Page

Input Menu

- Contact Info.
- River Basin Description
- River Basin Observation metadata

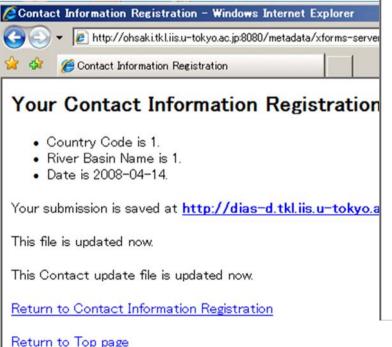
Contact Info. Input



- Contact
 Info. is
 often
 required to
 input.
- Name, Address, etc.
- Once input,
 Use many
 times

Contact Info. submit

Can view metadata as XML



```
http://dias-d.tkl.iis.u-tokyo.ac.jp/AWCI/mctadata/ContactInfc/1/1 2008-04-14.xml - Windows Internet Explorer
                                                                                                                      _ O X
                                                                                 ▼ 49 X Gcogle
        http://dias-d.tkl.iis.u-tokyo.ac.jp/AWCI/metadata/ContactInfo/1/1 2008-04-14.xml
                                                                                                          ♠ • ⋒ • ♣ •
         A http://dias-d.tkl.iis.u-tokyo.ac.p/AWCI/metadata/...
   <?xml version="1.0" encoding="UTF-8" ?>
 - <RB_RiverBasinDescription xmlns:xhtml="http://www.w3.org/1999/xhtml"
     xmins: diasis="http://www.diasjp.org/project/metadata_iso19139"
     xmins:xsi="http://www.w3.org/2001/XMLSchema-instance"
     xmins:xxd="http://www.w3.org/2001/XMLSchema" xmins:ev="http://www.w3.org/2001/xml-events"
     xmins:xforms="http://www.w3.org/2002/xforms">
   - cpointOfContact>
       <diasis:CI ResponsibleParty diasis:id="1 1 2008-01-11" diasis:uuid="/1/1 2008-01-11.xml">
      - <diasis:individualName>
          <diasis:CharacterString>Dr. Samarendra Karmakar/diasis:CharacterString>
         </dasis:individua Name>
      - <diasis:organisationName>
          <diasis:CharacterString>Bangladesh Meteorological Department</diasis:CharacterString>
         </dasis:organisationName>
      - <diasis:positionName>
          <drasis:CharacterString>Director</drasis:CharacterString>
         </dasis:positionName>
       - <diasis:contactInfo>
         - <diasis:CI_Contact>
          + <diasis:phone>
          - <diasis:address>
            - <diasis:CI Address>

    - <diasis:deliveryPoint>

                  <diasis:CharacterString>Abhawa Bhaban/diasis:CharacterString>
                </diasis:deliveryPcint>
              - <diasis:city>
                  <diasis:CharacterString>Agargaon</diasis:CharacterString>
                </diasis:city>
              + <diasis:administrativeArea>
              I <diasis:postalCode>
              + <diasis:country>
              - <diasis:electronicMailAddress>
                  <diasis:CharacterString>swcbmd@yahoo.com</diasis:CharacterString>
                </diasis:electronicMailAddress>
              </diasis:CI_Address>
             </diasis:address>
          + <diasis:onlineResource>
          </diasis:CI Contact>
         </dasis:contactInfo>
      - <diasis:role>
          <diasis:CI_RoleCode
            diass:codeList="http://eden.iqn.fr/xsd/isotc211/20070227/resources/Codelist/qmxCodelists.xml#CI_Role
            diasis:codeListValue="pointOfContact" />
         </dasis:role>
       </diasis:CI ResponsibleParty>
     </RB RiverBasinDescription>
```

Observation metadata input(automatically)



Country: E-mail Address

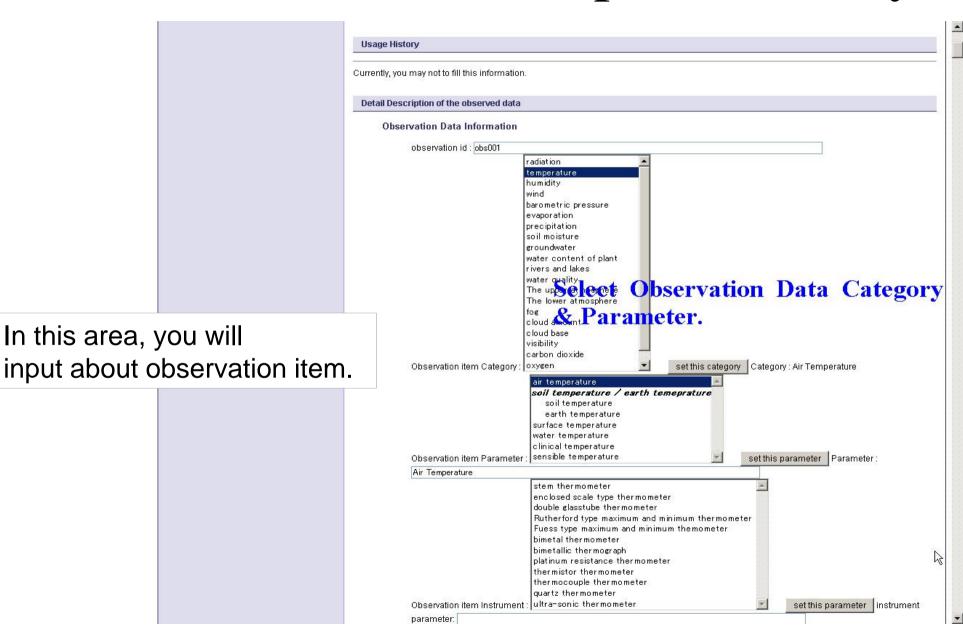
CI_Online Resource ididvalue5 CI_Online Resource uuid

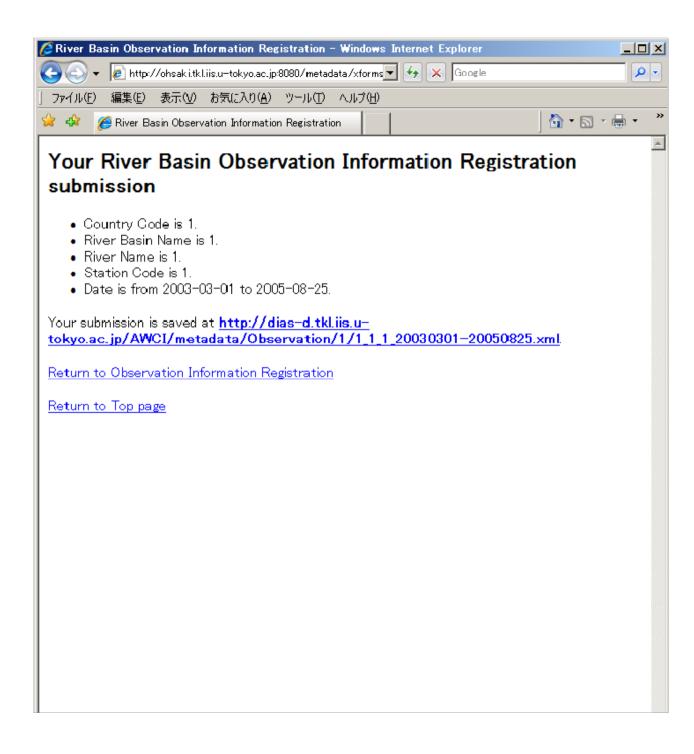
Online Resource URL: http://www.example.org

Code List: http://www.icote311.org/2005/recourses/C

- Your inputted metadata using data upload system can be loaded here
- Default Contact Info., Longitude
 Latitude can be loaded automatically.

Observation metadata input(manually)



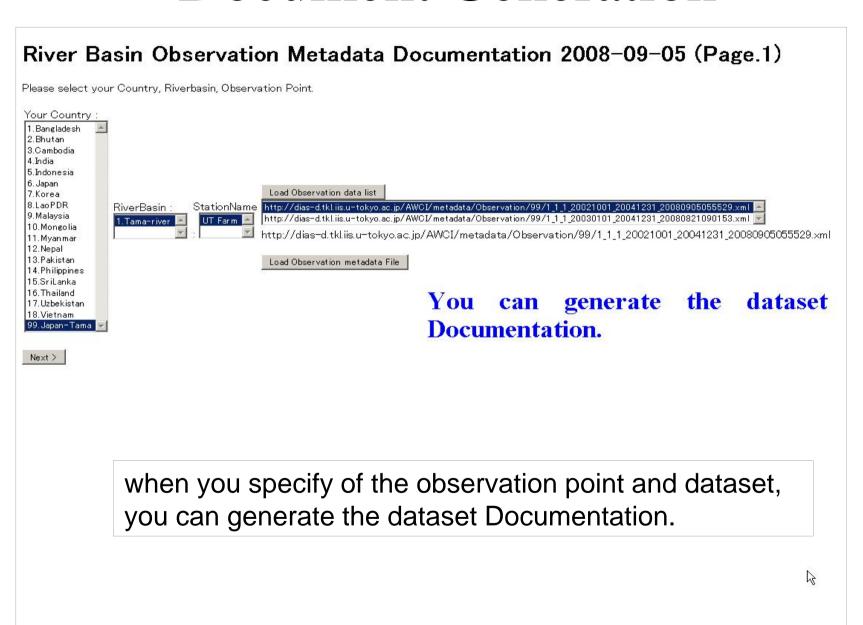


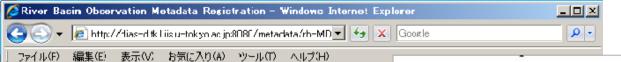
Metadata Access

When the input process is finished, the metadata XML file is stored at the displayed URL.

You can always see this file.

Document Generation





Automatically Generated **Document**

River Basin Observation Medadata Posistration 1.0 DATASET OVER

1.1 Introduction

To clarify the energy and water characteristics of the basic me (Automatic Weather Station)

1.2 Time period covered by

Start: 2003-10-01 End: 2004-08-14

Once a hour

1.4 Physical location of the

Longitude: 92.17241 Latitude: 31.25442

Elevation:

Landuse: Bare land (with the Landcover: Bare land (with the Canopy height: Less than 5cr

1.6 WWW address reference

2.0 INSTRUMENTAT

2.1 Platform

http://ssrs.dpri.kyoto-u.ac.jp/

1.0 DATASET OVER 1.5 Data source

1.1 Introduction

2006-10-17

TITLE

CONTACT

Professor

Uji

Kvoto 611-0011

JPN

Hirohiko Ishikawa

md CAMP Tibet ANNI-A

Disaster Prevention Research

Phone: 181-774-38-4159

Email: ishikawa@storm.dpri

URL: http://ssrs.dpri.kyoto-u

Fax: +81-774-38-4158

DATE OF THIS DO

To clarify the energy and wat characteristics of the basic me (Automatic Weather Station)

1.2 Time period covered by

Start : 2003-10-01 End: 2004-08-14

6.1.2 Quality issues

7.0 REFERENCE REQUIREMENTS

1. Character StringFree when agreed the CEOP data policy

8.0 REFERENCES

1. H. Ishikawa and GAME-Tibet Boundary Layer Group

What has been known and what has not in GAME/Tibet BL observation

:Proceedings of the Fifth

International Study Conference on GEWEX in Asia and GAME, 691

1.3 Temporal characteristics 9.0 Missing Data Periods

- 1. Snow depth there has sporadic noise in the data but the reason is still not be sure. Then the Quality
- 2. The incoming longwave values seem low during part of February 2004. Then the data flag "D" was put during this period. There was the same phenomenon in Amdo station in 1998 winter season. Then this
- 3. Outgoing longwave sensor was trouble during EOP4. Then the regular sensor correction was not executed. But this effect is not so serious (several tens of W/m2) Then data flag was put "I". (Actually, the "I"+" G" flag will be better.)
- No gap filling procedure was applied.
- Snow Depth No missing data. Incoming Shortwave 2004/08/14 08:00 2004/08/14 23:00 (16) Outgoing Shortwave 2004/08/14 08:00 - 2004/08/14 23:00 (16) Incoming Longwave 2004/04/12 07:00 2004/08/14 05:00 - 2004/08/14 06:00 (2) 2004/08/14 08:00 - 2004/08/14 23:00 (16) Outgoing Longwave 2004/04/12 06:00 - 2004/04/12 13:00 (8) 2004/04/12 20:00 - 2004/04/12 22:00 (3) 2004/04/13 03:00 - 2004/04/13 05:00 (3) 2004/04/13 20:00 - 2004/04/13 21:00 (2) 2004/04/14 01:00 - 2004/04/14 03:00 (3) 2004/04/14 05:00 - 2004/04/14 13:00 (9) 2004/04/15 05:00 - 2004/04/15 12:00 (8) 2004/04/16 02:00 2004/04/16 04:00 - 2004/04/16 06:00 (3) 2004/04/12 20:00 - 2004/04/12 22:00 (3) 2004/04/13 03:00 - 2004/04/13 05:00 (3) 2004/04/13 20:00 - 2004/04/13 21:00 (2) 2004/04/14 01:00 - 2004/04/14 03:00 (3) 2004/04/14 05:00 -2004/04/14 13:00 (9) 2004/04/15 05:00 - 2004/04/15 12:00 (8) 2004/04/16 02:00 2004/04/16 04:00 - 2004/04/16 06:00 (3) 2004/08/14 05:00 - 2004/08/14 23:00 (19) Skin Temperature 2004/08/14 08:00 - 2004/08/14 23:00 (16) Incoming PAR 2003/10/01 00:00 - 2004/08/14 23:00 (ALL) Outgoing PAR 2003/10/01 00:00 - 2004/08/14 23:00 (ALL)

- control flag was put "D".
- ANNI stations phenomenon is probable. But we could not
- - 2004/08/14 06:00 2004/08/14 23:00 (18) Net Radiation 2004/04/12 06:00 2004/04/12 13:00 (8)

The AWS of this site was constructed in summer 2002 as a part of the meso-scale triangle network

Summary

- 1. Outline of DIAS System DIAS Core system which can co-exist of Energy Saving and Peta-scale Storage Space
- 2. Introduction of Data Upload, Meta-Data Registration, and Quality Control System -
 - all systems can support observers to regist data and information to DIAS with easy/user-friendly interface..

Outline

- 1. Outline of DIAS System
- 2. Introduction of Data Upload, Quality Control, and Meta-Data Registration System

- 3. Introduction of CEOP Satellite Data Gateway system
- 4. Applications on DIAS System