PRODUCTION OF CEOP SATELLITE DATASETS JAXA'S CONTRIBUTION TO GEWEX/CEOP

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1. INTRODUCTION

The Coordinated Energy and Water Cycle Observation Project (CEOP) has been developing water-cycle datasets integrating various satellite data, in-situ observation data, and multi-dimensional model simulation results. It should be noted that the goals of producing the CEOP data set consisting of in situ, satellite, and model output data require a significant effort to compile the data in such a manner that they are both easily accessible and can be used by the scientific community with a minimum amount of extra data formatting and handling by individual research scientists. Therefore, the coordination effort itself will lead to a data set that is greater than the sum of its parts.

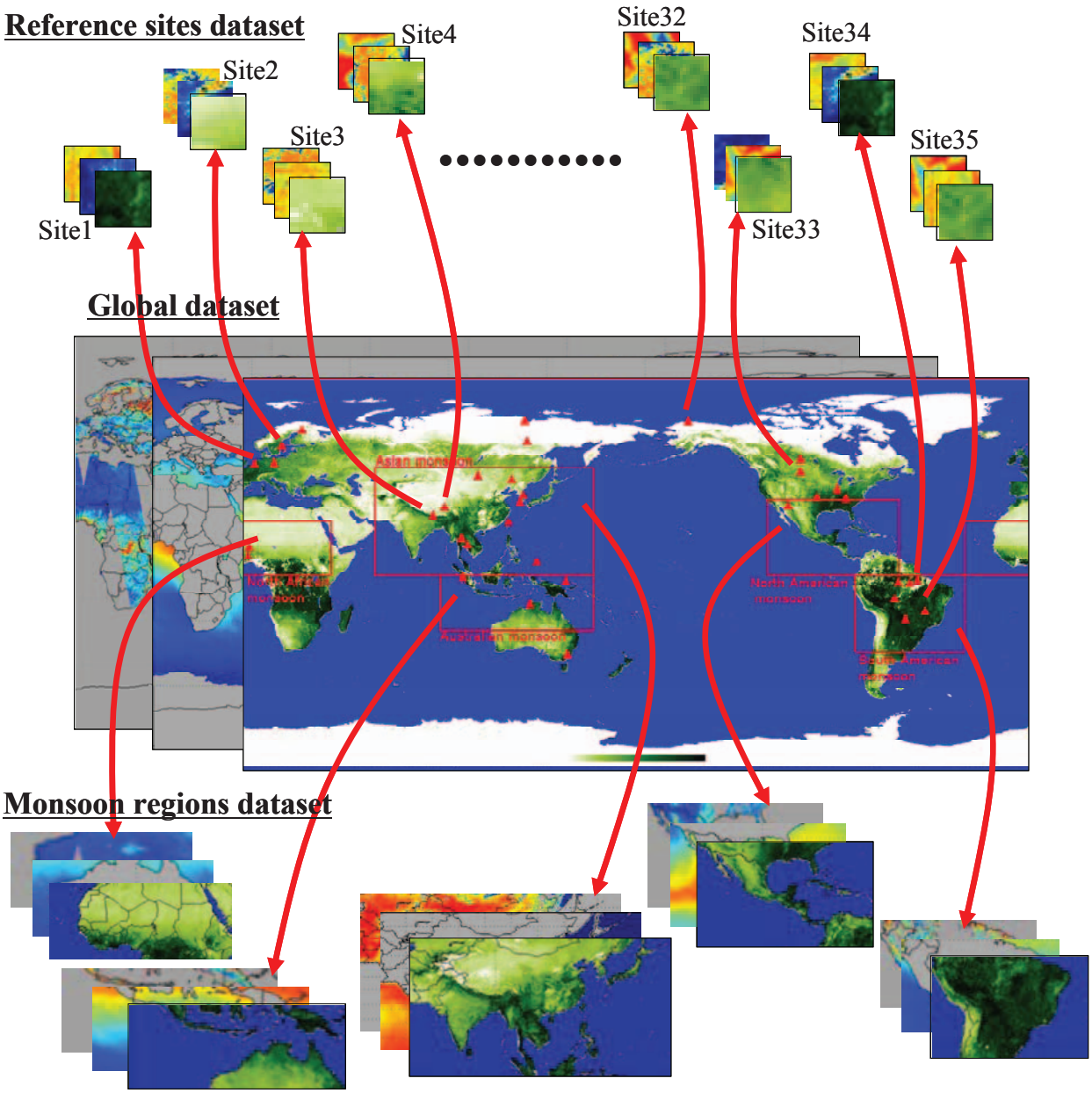
2. JAXA'S CONTRIBUTION

For this goal, the Japan Aerospace Exploration Agency (JAXA) has been producing and providing satellite datasets as a contribution to the CEOP activities since 2003. Satellite data will include Level 1B (radiances), Level 2 (geophysical parameters), and Level 3 (gridded/averaged) data associated with reference sites, Levels 2 and 3 for continental-scale experiments (CSE) regions, and Level 3 for global coverage from the new Earth-observing satellites, along with subsets of the Global Energy and Water Cycle Experiment (GEWEX) global cloud, surface radiation, precipitation, water vapor, and aerosol data sets.

3. DATASET DESCRIPTION

The JAXA's satellite datasets dedicated to CEOP are geo-coded data resampled to a regular latitude-longitude grid on three scales: small scale (35 to 52 reference sites), large scale (five monsoon regions), and global scale (the entire area of the Earth). It is easy to compare satellite data with in-situ measurement and/or model output. Also, the satellite datasets include radiance data and geo-physical parameters such as soil moisture, vegetation index, water vapor, precipitation, and sea-surface temperature acquired by JAXA's spaceborne sensors including the Advanced Microwave Radiometer (AMSR), Global Imager (GLI) aboard the Advanced Earth-Observing Satellite–II (ADEOS-II), Precipitation Radar (PR), TRMM Microwave Imager (TMI) aboard the Tropical Rainfall

Measuring Mission (TRMM) spacecraft, and the Advanced Microwave Radiometer for EOS (AMSR-E) aboard Aqua, as well as the US Special Sensor Microwave/Imager (SSM/I) aboard Defense Meteorological Satellite Program (DMSP) spacecraft.



Daichi (also called Advanced Land-Observing Satellite (ALOS)) sensor data was added in 2007. ALOS has three sensors: the Panchromatic Remote-sensing Instrument for Stereo Mapping (PRISM), which is comprised of three optical systems to measure precise land elevation; the Advanced Visible and Near Infrared Radiometer 2 (AVNIR-2), which observes land-surface cover; and the Phased-Array L-band Synthetic Aperture Radar

(PALSAR), which enables day-and-night, all-weather land observation. The ALOS datasets associated with the reference sites have been path-mosaics instead of subsets because of the original small scene size and the large data volumes.

4. INTERNATIONAL COOPERATION

In order to produce vast datasets smoothly, cooperation with space agencies like NASA and ESA was started. In this context, the Terra Moderate Resolution Imaging Spectroradiometer (MODIS) and Aqua Atmospheric Infrared Sounder (AIRS) datasets of the US were added in 2008. The NASA AIRS Team generates AIRS datasets for CEOP. In addition, the NASA MODIS Team generates subsets of MODIS data, while JAXA reformats and resamples the subsets, and prepares corresponding metadata. Both AIRS and MODIS datasets are archived in the CEOP centralized database located in the University of Tokyo, the same as the other CEOP products.

5. META-DATA BASED ON ISO STANDARDS

These datasets consist of raster image data and meta-data that describe observation conditions and processing conditions based on ISO standards. Metadata of satellite imagery is being standardized by several organizations such as ISO/TC211. Those metadata, however, do not meet all the requirements for integrating satellite imagery, in-situ observation data and 4D model simulation results collected in CEOP. For CEOP reference site data, no further data for geometric and radiometric correction need be included in the metadata because all satellite data are already geo-coded and radiometrically corrected, i.e. satellite image data are already converted to raster data. This means that the same metadata can be used for “data-finding” and “data integration” as far as CEOP reference site data are concerned.

6. CONCLUSION

The data-mining system with a new user interface is still under development in parallel by the University of Tokyo, while the volume of the datasets are increasing year after year. It should be noted that the CEOP datasets are already open to outside groups. The datasets can be accessed via the CEOP Satellite Data Gateway.

At the conference, we will present the specifications of CEOP satellite datasets and some processing results. The status and schedule of processing will also be discussed.

7. REFERENCES

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[2] Toshihiro NEMOTO, Toshio KOIKE and Masaru KITSUREGAWA: “Data Analysis System Attached to the CEOP Centralized Data Archive System”. JMSJ, Vol. 85A, 529-543. (2007)