Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

ACG38-01 Room:213 Time:April 28 09:00-09:15

Development of a visualization and download system for dataset of ocean state estimation

FUKUDA, Kazuyo[1*] ; SAITO, Hideaki[1] ; ISHIKAWA, Yoichi[1] ; MASUDA, Shuhei[1] ; SUGIURA, Nozomi[1] ; ISHIGURO, Shun[1] ; SONODA, Akira[1]

[1]JAMSTEC

In order to promote the use of a dataset of ocean state estimation useful for climate research, a data visualization and download system called ”Estimated State of Global Ocean for Climate Research (ESTOC) [1]” has been developed. The dataset contains 3- or 2-dimensional grid data of eight physical parameters such as potential temperature and salinity, and five geochemical parameters such as nitrate and phytoplankton. It covers the 53-year period from 1957 to 2009, and consists of 6996 NetCDF files of 55 gigabytes. We have considered the functions required for the system based on the assumption that the main users of the dataset are researchers not only in climatology but also in ocean ecosystem science and fisheries science.

Quick look of the data can be carried out under the conditions specified by users in the visualization page. Contour lines or vector arrows are drawn on a base map. Users can zoom in an area of the map that they are interested in, and change display color with color tables. Animations of the estimated ocean state can also be played easily. The data at users’specified location on the map can be displayed as a graph of time series, vertical profile, latitude-depth or longitude-depth sections. Furthermore, the displayed map and graph can be downloaded as png or jpeg image files.

Logged-in users are able to download a data file of the map being displayed in the visualization page, and also able to download multiple files in the download page. The following two download methods are available. One is the normal download via web browser. The other is the sending an e-mail describing a download URL to user’s registered e-mail address to use the wget command. The download state of data files is recorded in the log files for the system administrator. It will be used for improvement of data dissemination service in this system in the future.

URL
[1] http://www.godac.jamstec.go.jp/estoc/e/

Japan Geoscience Union Meeting 2014
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ACG38-02 Room:213 Time:April 28 09:15-09:30

Development of Wide-area Observation Monitoring System and Data Crawling System for Global Earth Observation

MURATA, Ken T.[1*] ; NAGATSUMA, Tsutomu[1] ; YAMAMOTO, Kazunori[1] ; WATANABE, Hidenobu[1] ; UKAWA, Kentaro[2] ; MURANAGA, Kazuya[2] ; YUTAKA, Suzuki[2]

[1]NICT, [2]Systems Engineering Consultants Co., LTD.

This paper is to propose a cloud system for data-intensive science, which has been developed at NICT (National Institute of Information and Communications Technology), Japan. The NICT science cloud is one of the cloud systems for scientists who are going to carry out their research works.

The science cloud is not for simple uses. Many functions are expected to the science cloud; such as data standardization, data collection and crawling, large and distributed data storage system, security and reliability, database and meta-database, data stewardship, long-term data preservation, data rescue and preservation, data mining, parallel processing, data publication and provision, semantic web, 3D and 4D visualization, out-reach and in-reach, and capacity buildings.

In the present talk, we introduce two types of tools for global data collection (crawling) and data transfer. The former is to collect observation data files from a variety of data server public on the Internet. The latter is to manage observation systems at observatories over the world. Data file transfer, monitoring servers and networks and system recovery are easily carried out using this system.

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ACG38-03 Room:213 Time:April 28 09:30-09:45

WCRP/AMY data archive and data release on the DIAS

TAMAGAWA, Katsunori[1*] ; OHTA, Tetsu[1] ; IKOMA, Eiji[1] ; KINUTANI, Hiroko[1] ; OYANAGI, Misa[1] ; MATSUMOTO, Jun[2] ; KITSUREGAWA, Masaru[3] ; KOIKE, Toshio[4]

[1]EDITORIA, The University of Tokyo, [2]Dept. of Geography, Tokyo Metropolitan University, [3]IIS, The University of Tokyo, [4]Dept.Civil Eng., The University of Tokyo

The purpose of this presentation is to introduce World Climate Research Programme (WCRP)/Asian Monsoon Years (AMY) data archiving and opening status along with its data uploading, data quality control, and metadata registration systems on the Data Integration and Analysis System (DIAS).

DIAS was launched in 2006 as a part of the Earth Observation and ocean Exploration System that provides cooperative opportunities for constructing data archives, and developing data integration and analysis functions (http://www.editoria.u-tokyo.ac.jp/projects/dias/).

The goal of WCRP/AMY is to improve Asian monsoon prediction for societal benefits through coordinated efforts and to promote a better understanding on Asian monsoon variability and predictability. Under the framework of the WCRP/AMY the various kinds of in-situ data have been archived among 21 different international projects. (http://www.wcrp-amy.org/). The basic for the WCRP/AMY collaborative framework is the mutual consensus among the participating countries, international organizations, individual participants, and their partner projects. It that defines the data sharing and exchange policies and is responsible for the data management.

Keywords: DIAS, WCRP/AMY, in-situ data, Water Cycle, Asian Monsoon

Japan Geoscience Union Meeting 2014
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ACG38-04 Room:213 Time:April 28 09:45-10:00

VDVGE: Volume Data Visualizer for Google Earth

KAWAHARA, Shintaro[1*] ; SUGIYAMA, Tooru[1] ; ARAKI, Fumiaki[1] ; TAKAHASHI, Keiko[1]

[1]JAMSTEC

Software to visualize volume data that is called VDVGE (Volume Data Visualizer for Google Earth) has been developed. VDVGE visualizes a four-dimensional scalar data, and exports it to KML and COLLADA which are suitable format to Google Earth. Currently, VDVGE are used not only visualization of simulation data, also visualization of observed data, such as meteorological radar and meteorological satellites. In the presentation, the development status of VDVGE is introduced. Application examples of the recent will be also introduced.

Keywords: Google Earth, Volume visualization, Software development

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ACG38-05 Room:213 Time:April 28 10:00-10:15

Introduction of the UndearwayCTD observation: A new instrument of oceanography

HASEGAWA, Takuya[1*] ; YOKOI, Satoru[1] ; MOTEKI, Qoosaku[1] ; KATSUMATA, Masaki[1] ; UEKI, Iwao[1] ; ANDO, Kentaro[1] ; YONEYAMA, Kunio[1]

[1]JAMSTEC

Abstract is written in Japanese.

Keywords: In-situ observation in the upper-ocean, UnderwayCTD

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ACG38-06 Room:213 Time:April 28 10:15-10:30

Development of a satellite land and cloud data assimilation system coupled with WRF, and its application to Kanto area

SETO, Rie[1*] ; RASMY, Mohamed[1] ; KOIKE, Toshio[1]

[1]Department of Civil Engineering, the University of Tokyo

For flood prediction and optimized dam control, it is crucial to predict whether a rain area will be over the river basin or not after few hours, and this needs very fine prediction of time and space distribution. For system development focusing on the ‘location‘ of rain areas, it is effective to introduce the information of cloud distribution from the observations into the model as initial conditions. Clouds can be observed by microwave remote sensing by satellite. But it is not easy to observe the cloud over the land from the satellite because emissivity of clouds is so week compared to that of land surface.

In order to observe cloud over the land, we at first have to adequately represent the heterogeneity of land state, especially soil moisture distribution, which has large effect on emissivity of the land, and estimate the surface emissivity, then remove it as background information for cloud observation. Therefore, we developed a satellite-based land and cloud data assimilation system coupled with the Weather Research and Forecasting Model (CALDAS-WRF) and applied it to the Kanto area.

The CALDAS-WRF includes Simple Biosphere model version 2 (SiB2) as a land surface driver, radiative transfer models for soil and atmosphere as observation operators, and Ensemble Kalman Filter (EnKF) and 1DVAR as assimilation algorithms for land and cloud, respectively.

The CALDAS-WRF first initializes the whole system, integrates the WRF and the SiB2 repeatedly until observations are available, and then assimilates the soil moisture heterogeneity, using passive microwave brightness temperature (Tb) at lower frequency, which has a high sensitivity to soil moisture. Then the CALDAS-WRF assimilates cloud over the land, using Tb at higher frequency, which is sensitive to cloud, and optimized emissivity of land as a background information.

We applied the CALDAS-WRF to the Kanto area, and the system effectively assimilated information of clouds and largely improved the representation of cloud distribution. Precipitation areas were also reproduced in the correct locations and consistent atmospheric fields were generated around the cloud areas through dynamical and physical processes in the atmospheric model. However the precipitation amount and duration were not enough, which will be the next target of our development.

Keywords: cloud, soil moisture, satellite microwave data assimilation, Kanto area, heavy rain prediction

Japan Geoscience Union Meeting 2014
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ACG38-07 Room:213 Time:April 28 10:30-10:45

Atmosphere-Ocean coupled regional modeling for dynamical downscaling of current and future climates

YOSHIMURA, Kei[1*] ; HAM, Suryun[1] ; LI, Haiqin[2]

[1]Atmosphere and Ocean Research Institute, The University of Tokyo, [2]Center for Ocean-Atmospheric Prediction Studies, Florida State University

We have developed regional downscaling system of the Regional Spectral Model for the atmosphere and the Regional Ocean Modeling System (RSM-ROMS) to improve the downscaling simulation accuracy of particularly coastal area, and we have achieved a dynamical downscale of the climate model simulation for 20th and 21st century forced by SST and atmospheric state from the global Community Climate System Model version 3.0 (CCSM3) for California area. The results indicate that the surface air temperature rise was decreased over San Francisco Bay area due to the effect of uplifting current at the Pacific coast. The projected change of extreme warm events is quite different between the coupled and uncoupled downscaling experiments, with the former projecting a more moderate change. The projected future change in precipitation is not significantly different between coupled and uncoupled downscaling. Both the coupled and uncoupled downscaling integrations predict increased onshore sea breeze change in summer daytime and reduced offshore land breeze change in summer nighttime along the coast from the Bay area to Point Conception. Compared to the simulation of present climate, the coupled and uncoupled downscaling experiments predict 17.5 % and 27.5 % fewer Catalina eddy hours in future climate respectively. Similar framework was applied for East Asian region, and preliminary results show quite significant change in surface temperature and precipitation field due to having dynamically predicted fine scale ocean currents. Particularly in summer to fall, when Kuroshio Current direction and prevailing surface wind direction are about opposite, coastal subsidence occurs so that it warms the coastal air temperature. This feature is opposite from the California's case, and potentially indicating the possible underestimation of warming. We will further investigate the detail of the influence of regional atmosphere-ocean coupling in the presentation, as well as the impact of fresh water input from the terrestrial runoff.

Keywords: Atmosphere-Ocean coupled regional model, coastal uplifting current, regional climate projection, dynamical downscaling

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ACG38-08 Room:213 Time:April 28 11:00-11:15

What can we find with the ensemble atmospheric reanalysis: ALERA2? -New aspect of the MJO-

MOTEKI, Qoosaku[1*]

[1]JAMSTEC

An ensemble atmospheric reanalysis ALERA2 is now open to public for the period of 2003-2013. New aspect of the MJO with the ensemble spread of the ALERA2 will be introduced.

Keywords: ALERA, ensemble, reanalysis, MJO

Japan Geoscience Union Meeting 2014
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ACG38-09 Room:213 Time:April 28 11:15-11:30

Climate Change Signal Represented in Reanalyses

KAMAHORI, Hirotaka[1*]

[1]Meteorological Research Institute

Since NOAA/NCEP competed the first atmospheric reanalysis NCEP/NCAR, 20 years are passed. During these 20 years, many reanalyses NCEP/DOE, ERA-15, ERA-40, JRA-25 MERRA, CFSR, and ERA-Interim were released. Last year, JRA-55 was completed as the third generation reanalysis.

Now a day, the atmospheric reanalyses are widely utilized as fundamental database of pseudo observations in meteorology as well as in in various research fields. However, their adaptation to the climate change studies have not been advanced very much, because of less temporal S/N ratio in reanalyses products. That is, present available reanalyses include large artificial variations compared with natural variations in real atmosphere. Since the first reanalysis NCEP/NCAR, all reanalysis assumes the frozen data assimilation system in order to avoid artificial variations accompanying with changes of the system. We expected the homogeneous products with the frozen systems, but there are many artificial changes in the products different from the change of the real atmosphere, due to the change of the observation systems. As the largest artificial change, it should be noted that the large gaps in the products characteristics were introduced due to introduction of geosynchronous satellites around 1979. These artificial variations in the products make difficult to adapt them to climate change studies. On the other hand, continuous efforts have been made to reduce the artificial variation and make the products applicable to the climate change studies. For examples, bias correction techniques for satellite and upper air observations that are input data in the data assimilation system, are developed and adapted in recent reanalyses. As a result, homogeneity of reanalysis products is largely improved, and we become to be able to extract the signals of climate change from the products. Of course, degrees of availability of the climate change signals in the products largely depend on the variables. Here, I introduce specific examples of the application possibilities of the products for the climate change studies.

Keywords: Climate Change, Reanalysis, Data Assimilation, Observation