Japan Geoscience Union Meeting 2012
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ACG36-P01 Room:Convention Hall Time:May 21 15:30-17:00

seismic precursors in the ionospher, atmosphere and groundwater

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Precursory phenomena of M7.2 Hyogoken-nanbu earthquake in the morning of Jan.17, 1995 are investigated using avairable time-variations of ionospheric foF2 and foEs, seismic clouds, radio noises and Radon concentration around the epicenter before this earthquake.

The earth crust consisting largely of the granite is rich in the Radon which escapes into the atmosphere, and is chemically inert, but soluble in the water.

As the contact surface of rock grains with the groundwater increases due to the decrease of grain size by microcracks, Radon atoms are released more into the groundwater. The groundwater Radon concentration in an well of the Nishinomiya city, east of Kobe city began to increase from 78 days before the M7.2 Hyogoken-nanbu earthquake of Jan 17, 1995. Then, the Radon concentration returned to the normal level.

In general, the Radon concentration in the water and atmosphere is in reverse proportional to the water temperature and air one, the rapid decrease of groundwater Radon concentration down to the minimum suggests an arrival of hot or warm matter such as the magma coming up to the observed region from the deep origin. Therefore the rapid decrease of groundwater Radon concentration down to the minimum suggests an arrival of warm matter such as the magma from a deep origin in the Earth.

Keywords: Earthquake, Precursor, Ionosphere, Atmosphere, Groundwater

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ACG36-P02 Room:Convention Hall Time:May 21 15:30-17:00

Adjustment of a spaceborne DEM for use in floodplain hydrodynamic modelling

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Precise Digital Elevation Models (DEMs) are required for the accurate modelling of floodplain hydrodynamics. The accuracy of currently available spaceborne DEMs however is hindered by a variety of errors which reduce the flow connectivity between river channels and the surrounding floodplains. Here we introduce a new algorithm for adjusting a spaceborne DEM which utilizes the information from a prescribed drainage networks dataset. The algorithm is designed to remove all the pits in the spaceborne DEM caused by vegetation canopies, sub-pixel sized structures, and random radar speckles while minimizing the amount of modification required for removing the pits. The proposed algorithm was applied to the SRTM3 DEM with reference to the drainage network information in the HydroSHEDS flow direction map. With consideration of the systematic errors in the SRMT3 DEM, small channels connecting floodplains were successfully implemented into the adjusted DEM. The accuracy of the adjusted DEM was validated using hydrodynamic simulations with the LISFLOOD-FP model in a middle reach of the Amazon River. The simulated water surface elevations and flooded areas with the adjusted DEM shows better agreement to observation data when compared to the results from the original SRTM3 DEM. The flow connectivity ensured by the DEM adjustment algorithm is found to be essential for representing realistic water exchanges between river channels and floodplains in hydrodynamics modeling.

Keywords: DEM adjustment, Floodplain Hydrodynamics, Pit Removal, Flow Connectivity, SRTM, HydroSHEDS

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ACG36-P03 Room:Convention Hall Time:May 21 15:30-17:00

Detection of chlorophyll fluorescence using the oxygen A-band

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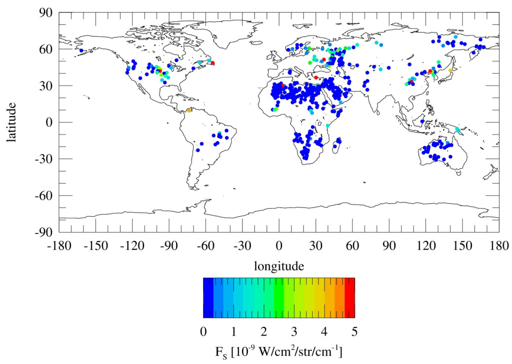
A part of solar radiation energy absorbed by plants is used for photosynthesis. The remaining energy is dissipated into heat, or emitted as fluorescence. The solar-induced chlorophyll fluorescence is directly linked to the instantaneous photosynthesis activity of plants. Therefore, global measurements of chlorophyll fluorescence from space will provide detailed information on carbon fixation. Moreover, if concentration of atmospheric carbon dioxide can be measured simultaneously with chlorophyll fluorescence, we would obtain a unique data set for better understanding of global carbon cycle.

Chlorophyll fluorescence is emitted in the wavelength range of 0.65-0.8 micron, which overlaps oxygen A-band around 0.76 micron. The radiative intensity is estimated to be 2 mW/m^2/str/nm=10^{-8} W/cm^2/str/cm^{-1} at wavelength of 0.76 micron. The TANSO-FTS on board the Japanese Greenhouse Gases Observing SATellite (GOSAT), launched successfully in January 2009, records oxygen A-band spectra with resolution of 0.2 cm^{-1}. Although the primary purpose of recording oxygen A-band spectra is to correct the effects of aerosol and cirrus on the amount of greenhouse gases such as carbon dioxide and methane measured at 1.6 and 2 micron wavelengths, they can also be used to detect chlorophyll fluorescence. In fact, the noise level of TANSO-FTS is about 2x10^{-9} W/cm^2/str/cm^{-1} in the oxygen A-band, which is lower than the intensity of chlorophyll fluorescence.

We have developed an algorithm to derive from oxygen A-band spectra radiative intensity of chlorophyll fluorescence, which is modeled as isotropic emission from the ground surface. The parameters simultaneously derived with chlorophyll fluorescence are ground albedo, surface pressure, temperature shift (deviation from meteorological data, assuming uniform in vertical direction), aerosol optical thickness, and a zero-level offset seen in GOSAT TANSO-FTS L1B spectra. The zero level offset is caused by detector signal non-linearity, and cannot be corrected by a simple filling-in method using Fraunhofer lines.

The Figure shows intensity of chlorophyll fluorescence derived from cloud-screened data during July 26-28 in 2009. The results are preliminary, and have not validated yet. Although the data are sparse, several points may be pointed out to discuss validity of out result. First of all, chlorophyll fluorescence is not detected in desert regions such as Sahara. In addition, strong emission is detected in North America, Eastern Europe, Central Africa, and Southeast Asia. The global distribution of strong fluorescence emission is consistent with the result of Joiner et al. (2011) and Frankenberg et al. (2011), who derived fluorescence emission from GOSAT spectra with a filling-in method of Fraunhofer lines. Further data analyses are now underway to obtain monthly mean and seasonal variation of chlorophyll fluorescence in global scale, as well as simultaneous retrieval of atmospheric carbon dioxide concentration.

Keywords: carbon cycle



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ACG36-P04 Room:Convention Hall Time:May 21 15:30-17:00

Database of cloud top height and its application to the tropical disturbances

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Lookup tables for estimating the cloud-top height (CTOP) and visible optical thickness of upper-tropospheric clouds by the infrared brightness temperature (TB) at 10.8 micro m (T11) and its difference from TB at 12 micro m (DT11-12) measured by geostationary satellites are developed (Hamada and Nishi 2010, JAMC). These lookup tables were constructed by regressing the cloud radar measurements by the CloudSat satellite over the infrared measurements by the Japanese geostationary multifunctional transport satellite MTSAT-1R and MTSAT-2. The CTOP of the last two years is available at http://database.rish.kyoto-u.ac.jp/arch/ctop/, and the previous data is also available at the website linked there. The data have good precision for cirrus clouds (optical depth $> \tilde{}3$) that have large DT11-12 values and are suitable for analyses of cloud systems with well-developed cirrus clouds. We made a correction for the satellite view angle and can offer the data over almost all tropical regions where the satellites can observe (20S-20N, 80E-160W for MTSAT-1R and 85E-155W for MTSAT-2).

We introduce applications of this data to tropical large-scale cloud system.

(1) We analyzed zonally elongated cloud bands extending 3000 km around ITCZ during 2007. It was first concentrated in the ITCZ, then spread meridionally into the two parallel zonal cloud bands and kept moving meridionally away. We examined detail of the separation with our CTOP data and Global Satellite Mapping of Precipitation (GSMaP; Kubota et al. 2007, IEEE Trans. Geosci. Remote Sens.) data: precipitation estimation dataset made with microwave radiometers including TRMM/TMI. In order to investigate the relation between clouds and large-scale circulation, the information of the cloud height is indispensable. We succeeded to find out that the cloud top is kept in the high altitude while moving meridionally.

(2) Cloud clusters with 1000-km scale in the tropics mainly consist of nimbostratus and cirriform clouds adjacent to cumulonimbi and their top height is very high: 12-16 km. However, the clusters with rather large TB value but having 1000-km scale are sometimes observed around the dateline in the ITCZ region. They keep their cloud top height during 1-2 days. From ordinary TB images, it is not sure whether they have thinner optical depth or they have lower cloud top. Here, we analyzed, with CTOP data, the lifecycle of such a cloud cluster of which CloudSat fortunately observed a part. CTOP estimation and CloudSat direct observation have similar top height at that part of the cluster. As our CTOP data have continuous time coverage, we traced the cluster and found that the cloud cluster kept 5-9 km top height during the lifetime over one day.

Keywords: cloud top height, MTSAT, CloudSat, IR split window

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ACG36-P05 Room:Convention Hall Time:May 21 15:30-17:00

Dataset in Center for Environmental Remote Sensing (CEReS), Chiba University

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Center for Environmental Remote Sensing (CEReS) of Chiba University was established in 1995. CEReS's task is "establishment of remote sensing technology and application for environmental studies", thus CEReS has a kind of responsibilities for satellite data archiving & releasements. I will introduce CEReS's current data archiving status. In addition, I hope to discuss requests for our center.

Keywords: satellite dataset, environment, public

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ACG36-P06 Room:Convention Hall Time:May 21 15:30-17:00

Comprehensive observations of atmospheric environment at Cape Hedo Atmosphere and Aerosol Monitoring Station

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National Institute for Environmental Studies (NIES) have operated Cape Hedo Atmosphere and Aerosol Monitoring Station (CHAAMS) in Okinawa, Japan since 2005. In CHAAMS atmospheric constituents, aerosols, and parameters related to both radiation and meteorology are measured continuously or intermittently with various collaborating universities and research / governmental organizations. An advantage of observation in Okinawa is that the influence of local pollution from mainland of Japan is suppressed to reveal the regional scale variation of atmospheric environment in East Asia. CHAAMS is one of contributing observatories in UNEP/ABC, and also served as a open platform in the research society of atmospheric environment. In this study, various observational items in CHAAMS including surface continuous monitoring, filter sampling, remote sensing are introduced and importance of maintaining such station in the atmospheric science is discussed.

Keywords: aerosols, radiation, minor constituents, East Asia, monitoring

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ACG36-P07 Room:Convention Hall Time:May 21 15:30-17:00

Long-term in-situ dataset by Phenological Eyes Network for ecological remote sensing

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It is possible to acquire the terrestrial ecosystem information on the global scale by satellites. Besides, it is important to verify satellite data affected by clouds, aerosol, etc. on ground truth. Phenological Eyes Network (PEN) is founded so as to verify satellite data on the ground observation in 2003. We get the spectrum radiation data, the automatic digital fish-eye photograph and so on at 26 PEN sites.

The spectrum radiation is measured upward and downward not only upper canopy but also under canopy for more approximate verification on the ground. The spectrum radiation data as well as satellite data can derive vegetation indices (VI), and the automatic photographs provides background information useful for interpretation of the changes of the VI from the ecological standpoint. Moreover, the photographs can detect important phenological events such as the leaf flush, autumn color, leaf fall, and snow coverage. The sky photographs can detect the cloud coverage, which is critical in the quality assessment of satellite data. Additionally, the time series analysis using digital RGB number of the photographs as well as spectrum radiation or satelite data can automatically and quantitatively detect the phenology and the other ecological events on the resolution finer than satellites.

We hope these in-situ monitoring network will contribute to establishing more accurate and comprehensive frameworks of modelling and satellite remote sensing of terrestrial ecosystem.

Keywords: terrestrial ecosystem, phenology, spectrum radiation data, ground observation, long-term, ground verification

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ACG36-P08 Room:Convention Hall Time:May 21 15:30-17:00

The DIAS data release and its cross-disciplinary usage

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For 5 years from 2006FY, by collaboration of information science technologies and various kinds of earth environmental technologies, we have constructed a data infrastructure of the Data Integration and Analysis System (DIAS). DIAS is one of a project of a global-scale integrated observation and monitoring system (the Earth Observation and Ocean Exploration System), which is a part of national basic 'Earth Observation Promotion Strategy'. In DIAS we have integrated the earth observation data, numerical model outputs, socio-economical data and information in order to create knowledge enabling us to solve earth environment problems. From 2011FY, we started 'a program of earth environment information integration and fusion'. We continue to extend and enhance the DIAS functions. As our purpose of this program, we will construct an information infrastructure by collaboration of multi-disciplinary users integrating of extreme big data in order to create new value.

From October 2010, we have released data of DIAS with 'Document-metadata', describing about dataset in English and Japanese. Anyone can use the DIAS data discovery system by accessing http://dias-dss.tkl.iis.u-tokyo.ac.jp/ddc/finder, and can download data files of 176 datasets through the system. User registration and data policy agreement is required before file download.

The data in DIAS is classified into 4 categories:
1) Numerical simulation outputs for the purpose of research,
2) Satellite data for the purpose of research,
3) Datasets created by DIAS researchers,
4) Datasets created at related projects supported by DIAS.

The main datasets are 1) model outputs of CEOP, JP10, JRA25 and K-1, 2) CEOP Satellite data, CZCS SeaWiFS Cholorophyll data, 3) Mirai CTD data, Ocean Reanalysis data, Global map of interannual response of normalized difference vegetation index (NDVI), Triton buoy data, 4) CEOP In-situ data, AWCI In-situ data, GPV data, and so on.

The DIAS has provided the computation place enabling seamless usage of these dataset for researchers participating in this project, and they have gained many research outputs combining Satellite data, numerical model outputs and In-situ data.

On the other hand, for 1.5 year data release period, there were 50 person new user registrations and data downloading 300 times. The frequent download datasets are AWCI In-situ data, Global map of interannual response of normalized difference vegetation index (NDVI), Mirai CTD data and JRA25. Interest of released data of DIAS does not always motivate user to download data. Therefore the number of top page viewing of the DIAS data discovery system is about 4,500 times, and the number of document-metadata viewing is about 12,000.

We provide to display the distribution matrix of the dataset in the DIAS data discovery system in order to enhance cross-disciplinary usage of its data by specifying the axis GCMD Science keyword, area social benefits GEOSS, the GCMD data set as a platform. We found that the vast majority of users select the cell matrix instead of input search keywords in order to search the list to find the appropriate data.

Generally, in the catalogue search of the data center, the search system often provide functions to specify, period, region and keywords to users. Users can narrow down (or exclude) the search results using facet search function. In DIAS, as for increasing the number of released datasets in future, for improving our search function, we think we should add another axis of matrix of datasets, add facet search function, and add search results ranking.

We think adding these functions are necessary for cross-disciplinary dataset search. In order to implement these functions, we need to describe many aspects of attributes of datasets. We will plan to enhance our developed document-centric metadata creation system and the data downloading functions.

Keywords: DIAS, Release of Geoscience data, cross-disciplinary usage, Satellite data, Model output data, In-situ data

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ACG36-P09 Room:Convention Hall Time:May 21 15:30-17:00

In-situ data archiving for the GEOSS/AWCI and WCRP/AMY

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This is to introduce two types of international in-situ data archive research projects which are ongoing in Asia. The one is Global Earth Observation System of Systems (GEOSS)/Asian Water Cycle Initiative (AWCI), and the other one is World Climate Research Programme (WCRP)/Asian Monsoon Years (AMY).

The objectives of GEOSS/AWCI is to develop an information system of systems for promoting the implementation of integrated water resources management (IWRM) through data integration and sharing and improvement of understanding and prediction of the water cycle variation as a basis for sound decision making of national water policies and management strategies (http://monsoon.t.u-tokyo.ac.jp/AWCI/) .

The long-term goal of WCRP/AMY is to improve Asian monsoon prediction for societal benefits through coordinated efforts to improve our understanding of Asian monsoon variability and predictability (http://www.wcrp-amy.org/).

The basis for the GEOSS/AWCI and WCRP/AMY collaborative framework is the mutual consensus among participating countries, international organizations and individual participating and partner projects that defines data sharing and exchanging policy and responsibilities for data processing, management and archiving.

The Data Integration and Analysis System (DIAS) which was launched in 2006 as part of the Earth Observation and ocean Exploration System, provides cooperative opportunities for constructing GEOSS/AWCI and WCRP/AMY data archives, and developing data integration and analysis functions (http://www.editoria.u-tokyo.ac.jp/dias/).

The purpose of this poster is to provide the introduction of the GEOSS/AWCI and WCRP/AMY and their data archiving status which used data uploading system, data quality control system and metadata registration system under the framework of DIAS.

Keywords: GEOSS/AWCI, WCRP/AMY, DIAS, in-situ data, Quality Control, Water Cycle

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ACG36-P10 Room:Convention Hall Time:May 21 15:30-17:00

Prospects for Arctic Data Archive

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Arctic Research by Japanese researchers has been carried out all the time from the last century. The result of their research includes many irreplaceable data, such as observation time series, sample, and its analysis, which each researcher got in the field. Since researcher and organization have had those data in their keeping by their way, many data has not managed and kept systematically.

Now, a new "Arctic Data archive System (ADS)" was launched on purpose to collect, manage and open some arctic data supported by Green Network of Excellence (GRENE), Rapid Change of the Arctic Climate System and its Global Influences (a tentative English title). ADS can search various keywords using metadata which are related with a one-to-one correspondence. This schema fits some format of typical Earth environment data, and we plan additional schema.

We suppose the subject of our collection as the present or the past observational data and model or simulation data. First of all we ask a participant view by questionnaires and know some potential request.

This project is supported by Green Network of Excellence (GRENE): Rapid Change of the Arctic Climate System and its Global Influences (a tentative English title).

Keywords: Arctic Research, observation, model, metadata

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ACG36-P11 Room:Convention Hall Time:May 21 15:30-17:00

The Earth Temperature Changes of the Last 110 Years and it's Relationship to the CO2 Level and Solar Activity - Methods

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[1]Nagoya Sangyo University

Firstly the authors referee the database of NASA/GISS "Surface Temperature Analysis (GISTEMP)". This database includes records of temperatures at 7364 observation points in the world (Figure 1 and 2). However, very few data were recorded to analyze the global temperatures before 1896. Then the temperatures recorded after 1896 are employed in the following calculations. At the same time, the authors utilize those at 473 observation point only. This is because these 473 observation points are located in the city whose population is no more than 1000. The other points are most likely located in urban city area where the temperatures may be influenced by heat island effect. Though the most of observation points are in such urban cities, the areas of the urban cities are about less than 1- 3 % in the world. Then it is not appropriate to utilize the records of the temperature concentrated in the urban cities. The cities whose population is no more than 1000 now would have had the less population in the last 110 years.

The global temperatures are estimated by the data at 473 observation points after 1896 as follows

1)The changes of temperature DT(i,j) of i year from the i-yeara at i point are calculated as follows

DT(i,j)=T(i,j)-T(i,j-1) (1)

2)Then the average e of the changes DTj are calculated in i year as follows

n
DTj=sum(DT(i,j))/n, here n = 473 (2)
j=1

3)Then the global temperature of Tt of i year is calculated referring 0 degree at 1896 as follows

t
Tt=sum(DT(i)) (3)
i=1896

4)Now the global temperature T(^)(t) of i year is estimated by as the 11 year running average as follows

T(^)(t)=(T(t-5)+T(t-4)+...+T(t)+...T(t+4)+T(t+5))/11 (4)

Figure 3 shows the estimated global temperatures T(^)(t) for the last 110 years. The figure also shows the change of CO2 level C(t) (not CO2 emission) and solar activity index S.A.I S(t). S(t) is estimated based on the data from SIDC. S(t) is calculated as reciprocal of period of sunspot activity DTS(t)

As shown in the figure, T(^)(t) increase after 1896, starts decreasing after 1940, start increasing after 1970 and decreeing after 2003

On the other hand, C(t) is only increasing in the last 110 years. This shows that C(t) cannot explain well the change of temperatures in the last 110 year. However, the pattern of the changes of S(t) is well accordance with that of T(^)(t) though some time delay cans exits.

The authors calculate the some indexes as follow and the results are shown in the one other paper submitted to the same symposium

tc(t)=a0+a1*C(t) (5)
ts(t)=b0+b1*S(t) (6)
T(^)(t)=Tcomp(t,u)=x*Tc(t)+(1-x)*Ts(t-u) (7)

Keywords: Global Temperature, Solar Activity, CO2 Level

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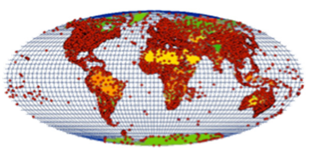
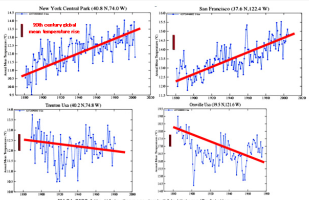


Fig.1 The temperature Database of NASA/GISS,7364 places,1896~2010



NASA GISS http://data.giss.nasa.gov/cgi-bin/gistemp/findstation.py

Fig.2 The cases of the temperature Database of NASA/GISS (Urban and rural areas of the USA)

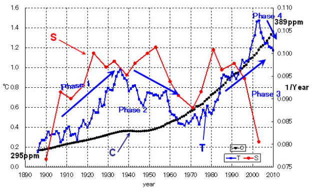


Fig.3 The CO2 Level and the solar activity and global temperature(1896~2010)

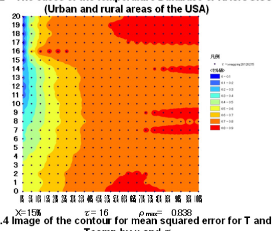


Fig.4 Image of the contour for mean squared error for T and Tcomp by x and τ