Japanese Aerospace Literature This month: *Satellite Observation*

N94-28293 Contribution of satellite observation to global change research. ATSUSHI TAKEDA, In *Science and Technology Agency*, Asia-Pacific Seminar on Global Change Research Cooperation p. 251. (SEE N94-28268 07-45). Documents available from Aeroplus Dispatch.

An overview of the contribution of satellite observation to global change research is presented. Satellite observation of the earth can make an outstanding contribution to the research of global change. Satellite observations need to be supplemented by in situ or ground truth observations. Developments in optical sensors are expected to make much improvement in the interpretation of land image. Loss due to cloud cover should be reduced by use of microwave image sensors like Synthetic Aperture Radar (SAR) which can see the earth surface through the cloud layer. Receiving stations and other ground system should also be reinforced particularly in those developing countries and regions. Improved analyzing techniques should be developed quickly to extract more information from the existing data sets and to reduce the cost and time of data processing. Coordination of world satellite programs is strongly recommended to produce effective data sets for global change research of every region over the earth surface. (Author)

N94-28273 NASDA contribution plan to Asian countries. HIROSHI KIKUCHI, In *Science and Technology Agency*, Asia-Pacific Seminar on Global Change Research Cooperation pp. 47–65. (SEE N94-28268 07-45). Documents available from Aeroplus Dispatch.

The following aspects of the National Space Development Agency of Japan's (NASDA) contribution plan to Asian countries are outlined: (1) background; (2) purpose; (3) total system, including ground station network, regional data center network, and national data center network; (4) activities, including Asian Pacific International Space Year (ISY) conference, international sub- committee of earth environmental observation, tropical ecosystem seminar, Committee for Earth Observation Satellites (CEOS) IDN, cooperative research projects with Mongolia, China, Thailand, and Australia, next generation satellite program study for Asian Pacific region; and (5) NASDA's new data policy for research and commercial purposes. This presentation is represented in viewgraphs only. (Author)

N94-28272 An oceanographical observation in the Western Pacific and international cooperations. KEI MUNEYAMA, In *Science and Technology Agency*, Asia-Pacific Seminar on Global Change Research Cooperation pp. 35–46. (SEE N94-28268 07-45). Documents available from Aeroplus Dispatch.

Outline of Kuroshio research to study the following subjects are explained: (1) the dynamical oceanography of Kuroshio; (2) the biogeochemical processes; (3) the biological activities; (4) ocean-atmosphere interaction; and (5) development of the observation system. The Japan Marine Science and Technology Center (JAMSTEC) and Badan Pengkajian dan Penerapen Teknologi (BPPT) of Indonesia started a cooperative oceanographical study in waters off Taraud to Halmahera to Irian Java in 1992. The western Pacific is not only the origin of Kuroshio but also the epicenter of El Nino. The warm water is piled up in the western Pacific to form warmpool by the trade wind prevailing in equatorial Pacific. This movement of the convection center eastward means the drought in Southeast Asia and Australia. The role of the Indonesian through-flow has been speculated for past years to be related to the evolution of the warmpool but no direct observation data concerning it's transport volume has been given. The observation of the Indonesian through-flow seems to give valuable data because it has linked directly to the several years scale phenomena such as El Nino and seasonal change such as a monsoon. The most distinctive feature is that the current flows southward at the northern part and flows northward at the southern part at the moment of observation. This result clearly shows the necessity of the seasonal observations. (Author)

N94-28271 Research activities on the meteorology over the Asia-Pacific region. MASATO MURAKAMI, In *Science and Technology Agency*, Asia-Pacific Seminar on Global Change Research Cooperation pp. 33–34. (SEE N94-28268 07-45). Documents available from Aeroplus Dispatch.

International joint research projects on the meteorology over Asia-Pacific region, such as the Tropical Ocean Global Atmosphere (TOGA), Coupled Ocean- Atmosphere Response Experiment (COARE) and the Tropical Rainfall Measuring Mission (TRMM) are outlined. Among the proposed collaboration in the late 1990's, the Global Energy and Water Cycle Experiment (GEWEX) will be the major project which requires both international and interdisciplinary collaboration. GEWEX should pursue the global scale analysis which includes the three dimensional distribution of the wind and water vapor over the ocean, the global climate of clouds and precipitation, the global ocean monitoring and the global monitoring of land and its vegetation. The GEWEX will bring an opportunity to deploy a new earth observing system by satellites in order to monitor, investigate and predict the climate changes. It will give a prototype of the future routine observation network by satellites. In the late 1990's, marine observing satellites related to the TOGA and the World Ocean Circulation Experiment (WOCE) will be realized. Japan should, cooperating with other countries to build up a satellite observation network, develop new sensors capable to observe the important components such as the water vapor, wind, precipitation and the soil moisture over the globe. (Author)

N94-28270 Cooperative research projects on satellite remote sensing for the hydrological subjects. SHINKICHI KISHI, In *Science and Technology Agency*, Asia-Pacific Seminar on Global Change Research Cooperation pp. 25–32. (SEE N94-28268 07-45). Documents available from Aeroplus Dispatch.

Subjects of the cooperative hydrological research projects on satellite remote sensing were outlined. The subjects mentioned are as follows: (1) Japanese Experiment on Asian Monsoon (JEXAM) (1989 to 1998), including studies on air-sea-land interactions and their long term variation and theoretical experimental study by numerical simulations; (2) research for the enhancement of remote sensing technology in earth observation using advanced sensor systems (1992 to 1994); (3) Japan-China Joint Study on Desertification (JC-JOSDES) (1989 to 1992), including studies on the formation of the desert and simulation study on the desertification; and (4) Japanese Pacific Climate Studies (JAPACS) (1990 to 1992), including observation in the sea ice zone and analytical studies on air-sea interaction by the use of the Marine Observation Satellite-1 (MOS-1) data and relevant data. (Author)

N94-28269 Role and activity of STA on Asian Pacific regional cooperation. YOSHIAKI TAKEUCHI, In *Asia-Pacific Seminar on Global Change Research Cooperation*, pp. 5–23. (SEE N94-28268 07-45). Documents available from Aeroplus Dispatch.

Promotion of the earth science technology and role and activities on Asian Pacific regional cooperation of the Science and Technology Agency of Japan (STA) are outlined. Topics included are as follows: (1) the National Space Development Agency of Japan (NASDA) and the Japan Marine Science and Technology Center (JAMSTEC) are massive organization for development of the infrastructure necessary for earth observation; (2) STA promotes the research projects in cooperation with other ministries and agencies; (3) STA has two kinds of funds for these research, that is, special funds for investigation and research of earth science and technology and the Special Coordination Funds for Promoting Science and Technology (SCF); (4) intergovernmental cooperation and international cooperation on STA projects; and (5) some projects associated with Asia-Pacific cooperation, such as Japanese Pacific Climate Studies (JAPACS), research program on the changes of tropical forests and their influences, Japan-China Joint Study on Desertification (JC-JOSDES), Japanese experiment on Asian monsoon, and Japanese study on the behavior of greenhouse gases and aerosols. The start of an international cooperative research program on construction of the global data set from FY (Fiscal Year) 1993 with the coordination funds is proposed. (Author)

N94-28268 Asia-Pacific Seminar on Global Change Research Cooperation. Documents available from Aeroplus Dispatch.

The following topics were discussed: earth environment, environmental monitoring, environmental quality, environmental effects, change detection, global change, earth atmosphere, earth ozonosphere, climate change, atmospheric sounding, ocean currents, air sea interactions, hydrological cycles, greenhouse effect, air pollution, water pollution, water quality, ozone depletion, vegetation index, earth resources, coastal water, sea ice, phytoplankton, biomass, resources management, land management, remote sensing, satellite observation, satellite imagery, information systems, data systems, ground station, earth terminals, image analysis, image processing, international cooperation, Asia, Pacific Ocean, project planning, and project management. For individual titles, see N94-28269 through N94-28293. (Author)

N94-27300 The Sixteenth Symposium on Coordinated Observations of the Ionosphere and the Magnetosphere in the Polar Regions: Program and abstracts (Dai 16 Kai Kyokuiki Ni Okeru Denriken Jikiken Sogo Kansoku Shinpojiumu Puroguramu). Documents available from Aeroplus Dispatch.

This symposium concerns ionosphere and magnetosphere in the polar regions based on data acquired by satellite observation, tethered rocket, atmospherics, ground observation, balloon observation, computer simulation, etc. The presentation included studies on High Frequency (HF) wave, Very Low Frequency (VLF) wave and Ultra Low Frequency (ULF) wave observation, and Pi2 cavity and global Pc5 pulsation concerning ULF wave. For phenomena relating substorm, polar cap, polar shower, aurora oval, plasma regime, Birkeland currents, plasmapheric disturbances are presented. Magnetosphere-ionosphere coupling included topics concerning observation of aurora, field-aligned potential drop structure and ion temperature. For heliosphere and magnetopause study, structure of the polar region of the outer heliosphere and solar coronal region, observation by Geophysical Tail (GEOTAIL) satellite, and stratospheric and tropospheric changes were presented. Geomagnetic storms concerning statistical study, polar cap absorption, thermosphere, airglow emission enhancements, electric field enhancements, and low-latitude aurorae were reported. There were presentations of stratospheric balloon experiments and polar patrol balloon project, phenomena relating aurorae, and future observation plans. (Author)

N94-23612 ASTER TIR subsystem and calibration. HIROKAZU OHMAE, In *NASA. Goddard Space Flight Center*, The Fifth Calibration/Data Product Validation Panel Meeting p. 24. (SEE N94-23595 06-43). Documents available from Aeroplus Dispatch.

Viewgraphs are given on the purpose of TIR, major functions, characteristics and design of various components, and calibration. The major functions

are to acquire image data on the earth's surface in thermal infrared wavelength band, using mercury cadmium telluride (HgCdTe) detectors; to convert the obtained image data into the digital data to meet the Common Signal Processor (CSP) interface, and output the signals; pointing function in cross-track direction to get the wide swath of 232 km; and to calibrate the whole TIR with the blackbody on orbit, then the amplifier and subsequent transmission units are calibrated electrically. (Derived from text)

N94-22790 Land mobile satellite propagation measurements in Japan using ETS-V satellite. NORIAKI OBARA, KENJI TANAKA, SHINICHI YAMAMOTO, and HIROMITSU WAKANA, In *JPL, Proceedings of the Third International Mobile Satellite Conference*, (IMSC 1993) pp. 313–318. (SEE N94-22735 06-32). Documents available from Aeroplus Dispatch.

Propagation characteristics of land mobile satellite communications channels have been investigated actively in recent years. Information of propagation characteristics associated with multipath fading and shadowing is required to design commercial land mobile satellite communications systems, including protocol and error correction method. CRL (Communications Research Laboratory) has carried out propagation measurements using the Engineering Test Satellite-V (ETS-V) at L band (1.5 GHz) through main roads in Japan by a medium gain antenna with an autotracking capability. This paper presents the propagation statistics obtained in this campaign. (Author)

A94-14080 Some initial results from the Yohkoh observations of solar high-temperature and high-energy phenomena. UCHIDA YUTAKA *Advances in Space Research*, (ISSN 0273-1177), Vol. 13, No. 9, Sept. 1993, pp. 205–220. 43 Refs. Documents available from Aeroplus Dispatch.

An overview of the early Yohkoh soft X-ray telescope results concerning recent findings about coronal phenomena and flares is presented. Attention is given to Yohkoh findings regarding the dynamical phenomena of the background general corona in conjunction with the active region corona. It is found that there occur injections of already heated mass from below, supplying at least a certain fraction, if not all, of the mass and energy of the active region corona. The background general corona is not an isolated quiescent entity, but appears to form a closely linked system with the active region corona. Dynamical changes in the general background corona itself, either stimulated in such a way, or spontaneously in other cases, can occur in relation to the disappearances of H-alpha dark filaments.

A94-13455 Substorm currents in the equatorial magnetotail. T. IIJIMA and M. WATANABE, (Tokyo Univ., Japan); T. A. POTEMERA and L. J. ZANETTI, (Johns Hopkins Univ., Laurel, MD); J. R. KAN and S.-I. AKASOFU, (Alaska Univ., Fairbanks) *Journal of Geophysical Research*, (ISSN 0148-0227), Vol. 98, No. A10, Oct. 1, 1993, pp. 17, 283–17, 298. 21 Refs. Documents available from Aeroplus Dispatch.

The magnetic field data acquired with the GOES 5 and GOES 6 satellites are used to determine the characteristics of magnetospheric current systems during the transition from the substorm growth phase to the expansion phase. A time- dependent change in the relative magnitude of the westward flowing azimuthal current at GOES 5 and GOES 6 is deduced throughout the substorm. The divergence of azimuthal currents is inferred from the imbalance between the westward current flowing into the cross-sectional area contained in the GOES 5 MLT meridian and flowing away from the same cross-sectional area contained in the GOES 6 MLT meridian. The presence of radial currents flowing toward or away from the earth between GOES 5 and GOES 6 is also detected. It is shown that substorm-associated field-aligned current systems are not simply due to the divergence of azimuthal currents but include additional sources, such as radial current loops.

N94-19384 Development of ISY data set, part 2 (Isy deta setto no seibi). Documents available from Aeroplus Dispatch.

This report describes the study for the data set preparation of the sea surface temperature (SST) and the polar region ice zone, and the data set preparation algorithms developed for ISY (International Space Year) activities. Preparation process of the SST data set (including the VTIR (visible and thermal infrared radiometer) data set, comparison of the data by different kinds of sensors and production of marginal data set, production of data set for evaluating the algorithm, and evaluation of the algorithms) and the polar region ice zone data set (including superposition of the MSR (microwave scanning radiometer) and VTIR images, MESSR (multispectral electronic self-scanning radiometer) and VTIR images, production of MSR mosaic images, superposition of MSR and MSS (multi-spectral scanner) images, study on superposition of MESSR and SAR (synthetic aperture radar) images, and auxiliary information overlays), and the development of algorithms for polar region ice zone data set (including the development of the algorithm for the MOS-1 (Marine Observation Satellite-1) data set, comparison evaluation of MSR data set and MSS data, and study on integrated use of SAR data and visible and near infrared data) are outlined. (Author)

N94-15894 TRMM radar. KENICHI OKAMOTO, In *JPL, Proceedings of the Third Spaceborne Imaging Radar Symposium*, pp. 119–125. (SEE N94-15886 03-32). Documents available from Aeroplus Dispatch.

The results of a conceptual design study and the performance of key components of the Bread Board Model (BBM) of the Tropical Rainfall Measuring Mission (TRMM) radar are presented. The radar, which operates at 13.8 GHz and is designed to meet TRMM mission objectives, has a minimum measurable rain rate of 0.5 mm/h with a range resolution of 250 m, a horizontal resolution of about 4 km, and a swath width of 220 km. A 128-element active phased array system is adopted to achieve contiguous scanning within the swath. The basic characteristics of BBM were confirmed by experiments. The development of EM started with the cooperation of NASDA and CRL. (Author (revised))

A94-10809 Differential angle tracking for close geostationary satellites. S. KAWASE (Communications Research Lab., Kashima, Japan) *Journal of Guidance, Control, and Dynamics*, (ISSN 0731-5090), Vol. 16, No. 6, Dec. 1993, pp. 1055–1060. 11 Refs. Documents available from Aeroplus Dispatch.

For the determination of relative motion of two satellites located in close proximity in the geostationary orbit, a method of differential angle observation from a ground station is proposed. Observability of the relative orbital elements is proved, and the determination accuracy is analyzed on the basis of a linearized two-body orbital model. Experimental pseudodifferential angle observation indicates an accuracy of a few hundred meters for the determination of relative satellite position. (Author)

N94-15555 Laser ranging application to time transfer using geodetic satellite and to other Japanese space programs. HIROO KUNIMORI, FUJINOBU TAKAHASHI, TOSHIKAZU ITABE, and ATSUSHI YAMAMOTO, (Maritime Safety Agency, Tokyo, Japan.) In *NASA. Goddard Space Flight Center*, Eighth International Workshop on Laser Ranging Instrumentation p. 9. (SEE N94-15552 03-19). Documents available from Aeroplus Dispatch.

Communications Research Laboratory (CRL) has been developing a laser time transfer system using a satellite laser ranging (SLR) system. We propose Japanese geodetic satellite 'AJISAI', launched in 1986 as a target satellite. The surface is covered not only with corner cube reflectors but also with mirrors. The mirrors are originally designed for observation of flushing solar light reflected by the separate mirrors while the satellite is spinning. In the experiment, synchronized laser pulses are transferred via specified mirror from one station to another while the satellite is up on the horizon to both stations. The system is based on the epoch timing ranging system with 40 ps ranging precision, connected together with UTC(CRL). Simulation study indicates that two stations at thousands of km distance from each other can be linked with signal strength of more than 10 photons and the distributed images of laser beam from AJISAI mirrors give many chances for two stations to link each other during a single AJISAI pass. Retro-reflector In Space for Advanced Earth Observation Satellite (ADEOS) and RendDezVous docking mission of Experimental Technology Satellite-7 (ETS-7) are briefly presented. (Author (revised))

N94-15001 Development of Japanese Earth Resources Satellite-1 (JERS-1; FUYO-1) and it's operational results (Chikyuu shigen eisei 1 gou (JERS-1) no kaihatsu oyobi sono seika). Documents available from Aeroplus Dispatch.

Various aspects of development progress from the policy decision to the launch and early orbit phase operation of the JERS-I (Japanese Earth Resources Satellite-I) are presented. The items presented are as follows: the fundamental development policy, related organizations, and the system for the development; the master schedule and the progress of the development; the outline of JERS-I including its missions, the structure and characteristics of the system, and the operation plan; satellite mission and the system design analyses; the system development, including that of subsystems and components, production and test of the system development model, the integration and test of the system PFM (Proto-Flight Model), and the modification and post-modification test of the PFM; interfaces with other programs; program control; satellite operation in the launch and early orbit operation phase and the analysis and evaluation of the operation results; and the initial examination on on-orbit failures. (Author)

N94-14271 Atmospheric correction for sea surface temperature by application of microwave dual-channel technique to VTIR data. YOUZOU TAKAYAMA, In *Science and Technology Agency*, Asia-Pacific ISY Conference, Vol. 2, pp. 317–320. (SEE N94-14209 02-43). Documents available from Aeroplus Dospatch.

Atmospheric correction for estimating sea surface temperature (SST) from VTIR data by using the IR split-window technique (11 and 12 microns) and dual- frequency microwave channels (23.8 and 31.4 GHz) are presented. Both methods have the same capability for correcting the water-vapor absorption effect to estimate SST. However, the microwave dual-frequency method bring better SST estimation than the split-window technique for VTIR data. The simulation study shows that this better estimation of SST by the microwave dual-frequency is due to a better signal-to-noise ratio for correction of atmospheric absorption than the split-window technique, in the case of VTIR observation. By using the different radiation characteristics between infrared and microwave channels, it is feasible to improve the accuracy in estimating the SST in the case of the existing dense stratospheric aerosol. (Author)