

Japanese Aerospace Literature This month: *Japanese Spacecraft*

N94-27989 Detection of water on road surface by the polarized light (Henko ni yoru romen no nure no kanshutsu). TADASHI, KIMURA National Research Inst. for Earth Science and Disaster Prevention, Shinjo (Japan). Branch of Snow and Ice Studies. Documents available from Aeroplus Dispatch.

This report explains the working principle, structure, and performance of a new detector of water on a road surface paved with concrete by polarized light. Near the polarizing angle, reflected light from the road surface includes vertical and horizontal polarized components. Intensity difference of the two polarized lights is very small on the dry road surface. On the wet road surface, the vertical component decreases much more than horizontal component. Based on the above mentioned fact, experiments to detect water on a road surface were carried out using a rotating polarizer (41.3 rps) and a silicon pinphotodiode under the sunlight. Experimental results showed that this system could remotely detect water on the road surface over the area of a few square meters. (Author)

N94-23379 Robotic exploration of Moon and Mars. Y. MIURA Yamaguchi Univ. (Japan). Faculty of Science. Documents available from Aeroplus Dispatch.

Results from robotic explorations of the Moon and Mars are summarized. The lunar and Martian soils and rocks can be identified by comparison with the standard data derived from mass spectral patterns of the 'remote sensing Secondary Ion Mass Spectrometry' (remote SIMS). Fine grained glassy materials show more complicated spectral patterns than those of hard crystalline rocks. This type of examination can be applied to analyze amorphous glassy materials and trace element compositions of the lunar and Martian soils and rocks. Experimental results from artificial and terrestrial impact craters suggest that the high density shocked or high pressure-type shocked phases of silica or carbon minerals can coexist with the amorphous glassy phases. Therefore, sophisticated instruments such as the remote SIMS for secondary ions, X-ray analyzers for X-ray diffraction and X-ray absorption coefficient, and polarized microscopy for optical images can be applied to find and collect new shocked crystalline minerals with amorphous phases on the Moon and Mars. (ESA)

A94-25186 Laboratory test results for an airborne ASTER simulator. T. Ezaka, Y. Kannari, F. Mills, H. Watanabe, and M. Sano (JAPEX Geoscience Inst., Tokyo, Japan), S. H. Chang (Geophysical Environmental Research Corp., Millbrook, NY). Documents available from Aeroplus Dispatch.

An Airborne ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer) Simulator (AAS) is being developed to study land surface temperature and emittance in the thermal IR. Laboratory tests measured the AAS's spectral, approximate NEDT, and approximate spatial response characteristics. The spectral FWHM for most channels is smaller than 0.3 micron; the NEDT for most TIR channels is better than 0.4 K; and the nominal IFOV is 5 mrad. Flight data was collected over Cuprite and Goldfield, Nevada, and near Valencia, California, in November 1992. The silicified and opalized zones at Cuprite could be discriminated using decorrelation-stretch images. AAS decorrelation-stretch images agree, qualitatively, with data from NASA's Thermal Infrared Mapping Spectrometer (TIMS). These results indicate the AAS may be a good tool for remote sensing studies of geological materials. (Author)

A94-25183 Design challenges of ASTER in thermal infrared spectral region. T. Mackawa, O. Nishihara, Y. Aoki, K. Tsubosaka, and S. Kitamura (Fujitsu, Ltd., Kawasaki, Japan). Documents available from Aeroplus Dispatch.

The Advanced Spaceborne Thermal Emission and Reflection radiometer (ASTER) to be mounted on the US's EOS-AMI polar orbiting platform, scheduled for launch in 1998 by NASA, will be part of a remote sensing equipment complex whose purpose is to locate mineral resources and monitor the Earth's environment. ASTER consists of three optical sensors: the visible and near-IR radiometer (VNIR), the SWIR, and the thermal IR (TIR), which has five spectral bands in the thermal IR region. The TIR, which is the focus of this paper, is expected to provide high temperature and ground resolution in its acquisition of surface temperature information from the ground, oceans, and clouds. Such information will be useful in monitoring volcano activity, desertification, forestation and flora distribution, and the global climate as a whole. The TIR will also acquire information on the thermal radiation spectrum that will be useful in classifying rock formations and composition. (Author)

A94-15176 Regional noise prediction and management system using remote sensing. H. Koi, S.-I. Fujita, and I. Aoi (Environmental Pollution Control Center, Osaka, Japan), H. Tamura (Osaka Univ., Japan), K. Hiramatsu (Mukogawa Women's Univ., Hyogo, Japan). Documents available from Aeroplus Dispatch.

This paper deals with the prediction and management of regional and environmental noise using remote sensing techniques. Landsat-MSS and -TM data are used to estimate noise pollution by means of a group method of data handling. They estimate ground roughness from the proportion of the area occupied by buildings thus determining the shielding factor of noise propagation on the ground. The noise level predicted by the method presented in this paper showed a satisfactory agreement with that obtained from measurements from various other cases in urban areas. (Author)

A94-14507 Regional 3-D imaging of resistivity structure using GEMIT inversion (Geo-electromagnetic Induction Tomography). Sachio Nabetani (Hiroaki Univ., Japan). Documents available from Aeroplus Dispatch.

The GEMIT (geo-electromagnetic induction tomography) inversion method is applied to the analysis of the geophysical structure of the northeastern region of Japanese Island Arc, an active orogenic zone of the continental margin around the Northern Pacific Ocean. Several features of volcanoes, geological faults, and seismic zones detected by satellite imagery analysis are examined with reference to geophysical and prospecting data. Details of the analysis and results are presented.

A94-14503 Recent progress in geologic application of airborne and spaceborne remote sensing. H. Watanabe, F. Mills, and M. Sano (Japex Geoscience Inst., Tokyo, Japan), Tagawa, T. (Earth Resources Satellite—Data Analysis Center, Tokyo, Japan). Documents available from AIAA Technical Library.

The use of a hyper-multispectral airborne sensor (VNIR and SWIR spectral regions) to simulate Japanese ERS-1 and to investigate its potential capabilities is reported. An analysis of the results obtained indicates that hyper-multispectral data can be used not only to discriminate but also to identify lithology. The concept will be implemented in ASTER, to be launched on the EOS-AM1 platform in 1998, which will provide 5-band TIR and 6-band SWIR data.

N94-19384 Development of ISY data set, part 2 (isy deta setto no seibi). Remote Sensing Technology Center, Tokyo (Japan). 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, Ministry of Posts and Telecommunications, Tokyo (Japan). Communications Research Lab. 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)

A94-11133 Development of the database of the examples of the application of satellite data to disaster monitoring. Shinkichi Kishi (National Research Inst. for Earth Science and Disaster Prevention, Tsukuba, Japan). Documents available from Aeroplus Dispatch.

A database of the actual application examples of polar-orbiting satellite remote sensing data for disaster monitoring was developed. The database provides the name of a disaster, the objective area for analysis, the date of occurrence, and the observation date of applied data before and after the disaster, as well as satellite names, analysis methods, etc. The database describes about 40 disasters, including floods, landslides, and volcanic eruptions detected by LANDSAT, MOS, and SPOT.

N94-15001 Development of Japanese Earth Resources Satellite-1 (JERS-1) FUYO-1) and it's operational results. (Chikyuu shigen eisai 1 gou (JERS-1) no kaihatsu oyobi sono seika). National Space Development Agency, Tokyo (Japan). 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-1 (Japanese Earth Resources Satellite-1) 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-1 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. YUJOUZOU, TAKAYAMA Meteorological Research Inst., Tsukuba (Japan). Documents available from Aeroplus Dispatch.

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)

N94-14270 Warm streamers extended from Warm Core Rings (WCR's) and their role on fish migration and fishing ground formation. HIDEO TAMEISHI and TAKESHIGE SUGIMOTO (Tokyo Univ., Japan.), Japan Fisheries Information Service Center, Tokyo. Documents available from Aeroplus Dispatch.

It is recognized that the Warm Streamers (WS's) often branch out toward the north or northwest from Warm Core Rings (WCR's), in satellite thermal imageries. They become migrating paths toward the North and from offshore to nearshore. In this study, the relationship between these fine structures and fishing grounds, were investigated, using NOAA/AVHRR (Advanced Very High Resolution Radiometer) data with assistance of aircraft data and fisheries information. The obtained results are as follows: (1) NOAA/AVHRR imageries with spatial resolution of 1.1 km represent the structures of the WS's of about 10 km in width around the WCR's well; (2) by using the simultaneous aircraft data, many sardine's schools are recognized at the head of WS, in which coastal region sardine's fishing grounds are often formed; (3) it seems that WS is useful for the transfer of schools toward the coast; and (4) schools of sardine, mackerel, and other species make zonation across the front of WCR's. (Author)

N94-14269 A method for estimation of partial cloud cover within a pixel and its effect. KOUHEI ARAI, Saga Univ. (Japan). Dept. of Information Science. Documents available from Aeroplus Dispatch.

The topics covered include the following: sea surface temperature estimation of the pixel suffered from partial cloud cover, methods for estimating partial cloud cover within a pixel, and experiments with simulated data. (Author)

N94-14268 Outline of (ISY Kuroshio) observation experiment. HIRONORI MAEJIMA and HIROAKI OCHIAI (Toba Merchant Marine Coll., Japan.), TAMEISHI, HIDEO (Japan Fisheries Information Service Center, Tokyo.), National Space Development Agency, Ohashi (Japan). Earth Observation Center. Documents available from Aeroplus Dispatch.

An overview of the ISY (International Space Year) Kuroshio observation experiment conducted in Kumanonada using the data by the MOS-1 (Marine Observation Satellite-1) observation, the AXBT (Airborne Expendable Bathy Thermography), and vessel observation is presented. The observation area; the AXBT configuration; the airborne MSS (Multi Spectral Scanner) characteristics; and the data obtained by the MOS-1/VTIR (Visible and Thermal Infrared Radiometer), airborne MSS, and 3-D (Dimensional) sea temperature profile image from AXBT data are shown. (Author)

N94-14267 Tracking of change of a warm-core ring structure. DENZOU INAGAKE and AKIRA TOMOSADA Tohoku Regional Fisheries Research Lab., Miyagi (Japan). Documents available from Aeroplus Dispatch.

A warm streamer, which was observed by a hydrographic survey onboard the research vessel Soyo Maru from May 20 to 22 in 1989, was tracked by MOS-1 (Marine Observation Satellite-1) VTIR (Visible and Thermal Infrared Radiometer) images and NOAA-10/AVHRR (Advanced Very High Resolution Radiometer) images from February to August in 1989. These images presented a generation of the streamer, spiraling warm water into the Kuroshio warm core ring, and development of the ring. The warm streamer around the Kuroshio warm core ring had a structure beyond 500 m in depth with a geostrophic current structure. Also, another warm streamer was observed in the warm core ring. It can be considered that the inner streamer was taken into the warm core ring several weeks before and that the spiraling outer warm band was a new warmstreamer around the Kuroshio warm core ring. (Author)

N94-14266 On the sea truth data of the Kuroshio meander and cold eddy movement. MASATAKA HISHIDA and YUTAKA MICHIDA Maritime Safety Agency, Tokyo (Japan). Hydrographic Dept.. Documents available from Aeroplus Dispatch.

An overview of observed phenomena of the KLM (Kuroshio Large Meander), relationship of sea level difference in the Tokara Strait where the ocean condition is strongly affected by that in the ECS (East China Sea), and formation of TCW (Tanegashima Cold Water) and KLM are presented. A new schematic representation of the ocean current system in the ECS obtained by compiling the knowledge derived from satellite IR (Infrared) image data provided by the MOS-1 (Marine Observation Satellite-1) and NOAA is proposed. The quick bulletin about the ocean condition named 'Kaiyou Sokuhou', and trajectories of surface drifters, an oceanographic atlas of the Japan-China

Joint Research Program on the Kuroshio (JRK), and many other references are also proposed. The SST (Sea Surface Temperature) image in spring is useful to analyze the Kuroshio meander because TCW formation occurs, and this phenomenon will trigger the formation of the KLM. SST images from satellite show many changes of time dependent eddy movements. The satellite image data suggest that new physical ocean process or theory has to be considered. (Author)

N94-14265 Sea surface effect on the sea surface temperature estimation by satellite data. RYUJOUZOU YOKOYAMA, SUMIO TANBA, and TAKASHI SOUMA, Iwate Univ., Morioka (Japan). Dept. of Computer Science. Documents available from Aeroplus Dispatch.

By using a Sea Surface Temperature Profiler Buoy (SSTPB), the behavior of the vertical temperature profile was observed in Mutsu Bay. In the midday under clear and calm condition in summer, there occurred a large temperature difference, of at most 5 C, between the sea skin and the 1 m depth. The difference suddenly disappeared when it began to blow more than 5 m/s. The sea surface effect must be a dominant error factor in the Sea Surface Temperature (SST) estimation by satellite data other than the atmospheric effect. (Author)

N94-14264 Accuracy validation test of estimated sea surface temperature by satellite data. SUMIO TANBA, TAKASHI SOUMA, ISAO YOSHIDA, TAKASHI WATANABE, and RYUJOUZOU YOKOYAMA, Iwate Univ., Morioka (Japan). Dept. of Computer and Information Science. Documents available from Aeroplus Dispatch.

By using the sea truth data of MBAMBS (Mutsu Bay Automatic Marine Monitoring Buoy System), the accuracy of the SST (Sea Surface Temperature) estimated by the NOAA-11/AVHRR (Advanced Very High Resolution Radiometer) data was evaluated. An SST estimation function was calculated by the regression analysis based on the SWM (Split Window Method), and it provided the standard error of 0.70 C. Some match-ups were found to be exposed to strong SSE (Sea Surface Effect): that means the large temperature difference between the sea skin for the satellite detection and the 1 m depth of the buoy detection. By removing those match-ups, a regression function, whose coefficients are almost equal to those in the regression function by NOAA-9/AVHRR in Mutsu Bay, with the standard error of 0.36 C is obtained. (Author)

N94-14262 Integration of SST data sets using MOS-1 satellite data: For validation and monitoring. SHOUJI TAKEUCHI, YASUNORI NAKAYAMA, and TSUYOSHI TOMITA. Remote Sensing Technology Center, Tokyo (Japan). Documents available from Aeroplus Dispatch.

The configuration of the integrated SST (Sea Surface Temperature) data set derived from the MOS-1 (Marine Observation Satellite-1)/VTIR (Visible and Thermal Infrared Radiometer) combined with those by other MOS-1 sensors, such as MSR (Microwave Scanning Radiometer) and MESSR (Multispectral Electronic Self-Scanning Radiometer) and derived from the NOAA/AVHRR (Advanced Very High Resolution Radiometer) and sea truth data by several ocean data buoys is outlined. The results of preliminary validation using the data set are also outlined. The regional SST data set around Japan acquired by VTIR and by the combination of VTIR and AVHRR is outlined. Results of regression analysis for the MOS-1/VTIR data set and that for the VTIR and MSR combined data set are presented. The relation between SST estimate errors and the number of days from launch of the MOS-1 is shown. (Author)

N94-14261 Outline of ISY sea surface temperature data sets. KO-REHIRO MAEDA and HIRONORI MAEJIMA (National Space Development Agency, Ohashi, Japan.), Tsukuba Space Center, Ibaragi (Japan). Documents available from Aeroplus Dispatch.

Mission to Planet Earth is the main theme of International Space Year (ISY). The National Space Development Agency of Japan (NASDA) is responsible for the data sets concerning Sea Surface Temperature (SST) and Polar Ice Extent (PIE) important for global warming as a part of Earth Science and Technology (ES and T) which is one of the panels of experts for the Space Agency Forum for ISY (SAFISY). NASDA has developed various data sets using Marine Observation Satellite-1 (MOS-1)/MOS-1b and other satellite data for the aforementioned items. In this report, an outline of SST data set using MOS-1/1b data and other satellite data is presented. (Author)

N94-14259 Estimation of vegetation damage due to ash fall in Mt. Pinatubo area using MOS-1 data. GENYA SAITOU and ARLENE MEVANGELISTA (Soil Research and Development Center, Quezon City, Philippines.), JOHN A. GRACE National Inst. of Agro-Environmental Science, Ibaraki (Japan). Documents available from Aeroplus Dispatch.

An overview of the monitoring of the northern part of Luzon Island in the Philippines and estimation of vegetation damages caused by the ash falling from Mt. Pinatubo using the MOS-1 (Marine Observation Satellite-1)/MESSR (Multispectral Electronic Self-Scanning Radiometer) before and after the Mt. Pinatubo eruption is presented. In the multi-temporal analysis, the data acquired on both pre- and post-eruption were used for evaluating the extent of volcanic ash damage. Formulas used for analyses, such as radiometric correction of sun elevation, vegetation indices, and determination of the extent of damage are described. The application of satellite image analysis to natural disaster damage evaluation of ash damaged (90 to 100 percent of vegetation degraded) had attained as much as 200,000 ha in analyzing the data of three weeks after the eruption. This value decreased to about 40,000 ha, but the total of more than 30 percent damaged area still remained more than 200,000 ha at the time of four months after eruption. (Author)