

Japanese Aerospace Literature This month: *Remote Sensing*

N94-12720 Mapping of high density area of benthic diatom in Ariake Sea. SHIROU UNO, Seikai Regional Fisheries Research Lab., Nagasaki (Japan). In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 1045-1050 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

Application of near infrared data for monitoring of a benthic diatom in a tidal area was examined in Ariake Sea, western Kyushu. CCT (computer compatible tape) count on the dense area was apparently different from that on the other area and indicated about half the value of paddy fields. Images taken by the spectral slice method using the near infrared band was effective in monitoring the high density area of a benthic diatom. For detection of the dense area, it is necessary to be at a lower tidal level. However, the dense area occupied a small portion of the tidal area at low tide. The dense area was found in the west coast and never found in the east coast of the Ariake Sea. As this tendency of distribution of dense area well coincided to that of bivalve production, the detected area in this procedure should indicate potential productivity in the tidal area.

N94-12717 Variability of the Kuroshio observed from satellite thermal imagery. TAKASHI TODA, ATSUSHI TAKEDA, and NORIHISA IMASATO, Institute of Disaster and Earth Sciences, Ibaraki (Japan). In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 1028-1033 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

A sharp front is found at the northern edge of the warmest area along the Kuroshio in each thermal image (hereafter, the 'surface Kuroshio front'). The relationship between the Kuroshio axis and the surface Kuroshio front was analyzed. It was found that the surface Kuroshio front always coincides with the Kuroshio axis in the area of the Pacific Ocean, east of Japan, whereas it tends to coincide with the northern edge of the strong flow of the Kuroshio in the East China Sea and the area of the Pacific Ocean near Japan. In other words, the relationship depends on the area. Therefore, it was ensured that the surface Kuroshio front is a good measure of the location of the Kuroshio axis. Then, the location of the surface Kuroshio front was analyzed statistically to examine the variability of the Kuroshio. The transition of the type of the Kuroshio meander in August 1990 was successfully identified. It was also found that the standard deviation of the variation in the location of the surface Kuroshio front is the smallest (less than 20 km) in the regions off Shikoku Island and Boso Peninsula, Japan; therefore, the Kuroshio path is the most stable here. (Author (NASDA)).

N94-12714 Applicability of satellite infrared data for the monitoring of coastal environments. SHINICHI SAKAI, MASAFUMI MIZUTORI, and NORIKAZU NAKASHIKI, Central Research Inst. of Electric Power Industry, Tokyo (Japan). In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 1010-1015 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

In recent years, large power stations have been constructed close to each other on the coast of Japan. The need of monitoring more widely and immediately the sea adjacent to power stations has been increasing. The satellites observation has been applied as an effective method for this purpose. The objective of this study is to estimate the applicability of the satellite data for the monitoring of coastal environments. First, the applicability of the LANDSAT/TM (Thematic Mapper) data for the monitoring of warm water discharged from power stations was examined. The distribution of the Sea Surface Temperature (SST) was estimated by the regression analysis with the field data measured with the thermometer. The measuring ratio of the available LANDSAT/TM data for the monitoring was evaluated at 57 power stations in 1987 and 1988. Second, the template method, which computes the velocity of surface water mass displacement using the temporal change of the SST distribution estimated by the NOAA/AVHRR (Advanced Very High Resolution Radiometer) data, was applied to three oceanic areas in Japan. The controversial points in applying the template method are discussed. (Author (NASDA)).

N94-12700 Properties of spectral reflectance of crown and crown structure of mangrove species in Okinawa. KAZUHIRO SATOU, DWI SETYONO, OSMAR DEMORAES, and TAKASHI HOSHI, Ryukyu Univ., Okinawa (Japan). Coll. of Agriculture. In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 922-927 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

The fundamental data of this study is spectral reflectance measurements above the crown layer of a mangrove stand with three mixed species. Several indexes related with the shape of spectral reflectance curve, and several combinations among these indexes were examined to separate mangrove species. Comparatively good results were found out as combinations of a ratio of reflectance at 850 nm divided by reflectance at 650 nm, and two gradients calculated from reflectances at 850 nm and 650 nm or 550 nm. It was considered that spectral reflectance properties of the mangrove crown related closely with the structure of crown.

N94-12715 Satellite and moored buoy observations of polar frontal system over the Yamato Rise in the Japan Sea. SEIICHI SAITOU, MASAFUMI ICHIKAWA, KOUZOU OKADA, and YUTAKA ISODA, Japan Weather Association, Tokyo. Meteorological Information Center. In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 1016-1021 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

Time series satellite infrared observations of NOAA-11 AVHRR (Advanced Very High Resolution Radiometer) were carried out around the Yamato Rise in the Japan Sea from October 1990 to January 1991. In the same period, a ocean buoy system moored over the Yamato Rise has been gathering sea surface temperature and other marine meteorological parameters. Buoy observation is useful to grasp the movement of a polar front in the Japan Sea. On the other hand, satellite observation is applied to understand spatial variabilities of the polar frontal system. As a result, movement of the polar front is connected to variabilities of SST (Sea Surface Temperature) observed by the moored buoy. A warm eddy existing on the western side of the Yamato Rise is an important phenomenon in understanding the variabilities of the polar frontal system over the Yamato Rise. (Author (NASDA)).

N94-12710 Study on air-sea interactions in the OMLET (Ocean Mixed Layer Experiment) area using satellite remote sensing. HIROSHI KAWAMURA, SHOUICHI KIZU, FUTOKI SAKAIDA, NAOTO EBUCHI, and YOSHIAKI TOBA, Tohoku Univ., Sendai (Japan). Center for Atmospheric and Oceanic Studies. In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 982-987 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

Air-sea interaction in the OMLET (Ocean Mixed Layer Experiment) area has been studied to understand mechanisms of variation of a layer in the vicinity of the ocean surface, which covers a wide area and has a time scale on the order of a day. Remote sensing data of several satellite sensors are employed for estimation of the air-sea fluxes together with in-situ observations of the OMLET. The OMLET region is investigated during April to May, 1988, when the OMLET cruise KH88-2 was performed.

N94-12702 Study of growing processes of a tombolo using an air photograph. MASAHIRO HASHIMA and YASUHIRO SUGIMORI, National Defense Medical Coll., Saitama (Japan). Dept. of Physics. In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 936-939 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

A sand spit had been developed on the coast of the volcanic island of Iwo Jima (sulfur island). The distribution of median size of this spit's sand and an air photograph are used in order to make clear the growing processes of this spit. The distribution curves of median size show the predominant maximum and minimum looks periodically, and many remarkable wavy patterns are visible in an air photograph. If such two distribution curves will be laid on, the frequency domain of these two curves can be found to coincide well with each other. The fact that these wavy patterns are overlapped so well, enables the prediction of the growing processes of this spit more clearly. (Author (NASDA)).

N94-12699 Acoustic estimation of plankton biomass. TADASHI INAGAKI, ICHIROU AOKI, and TAKEO ISHII, Tokyo Univ. (Japan). Ocean Research Inst. In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 916-921 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

The around-the-world cruise of R/V (Research Vessel) Hakuho-maru was performed by Ocean Research Institute, University of Tokyo during 130 days. Acoustic measurements at four frequencies with small organisms sampling were carried out 43 times at 19 stations. The biomass represented by settling volume was compared with acoustic volume scattering strength (SV in decibels) at each frequency. The relationship between biomass (transformed into logarithm) and SV was obtained as linear regression equations. Slopes of the regression equations for four frequencies were all close to one. There was a decreasing tendency of SV with increasing frequency. This result suggests that resonance phenomenon occurs in scattering process of the small organisms. (Author (NASDA)).

N94-12663 Worldwide map of rainfall amount over the ocean derived from passive microwave radiometer. AKIRA SHIBATA, Meteorological Research Inst., Tsukuba (Japan). In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 709-714 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

The method of retrieving liquid water content by considering water vapor content as a substitute parameter is presented. A comparison of the retrieved liquid water content is made with an amount of rain measured on the Chichijima Island. A worldwide map of liquid water content is shown for several months in 1987 and 1988. (Author (NASDA)).

N94-12703 Estimation of areal evapotranspiration using LANDSAT TM data: Kitami City, Hokkaido, Japan. KIMITERU SADO, Corporate Source: Kitami Inst. of Tech., Hokkaido (Japan). Dept. of Developmental Engineering. In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 940-945 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

The land cover classification in Kitami which covers an area of 12 by 9.5 km is done after geometric correction, and the monthly mean albedo is estimated for seven land cover categories. The monthly mean of Kitami's areal evapotranspiration (ET) is obtained by Kojima's equation in winter and by Morton's equation in other seasons. The annual change in estimated ET which reach its maximum value in July correlates reasonably well with ET in an observation field. The influence of both slope solar radiation and housing land development on ET are examined.

N94-12690 On the error characteristics of the sea surface temperature observed by satellite. SUMIO TANBA, TAKASHI SOUMA, YUKI-FUMI IWAKUMA, ISAO YOSHIDA, TAKASHI WATANABE, and RYUZO YOKOYAMA, Iwate Univ., Morioka (Japan). In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 864-867 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

The accuracy of the sea surface temperature estimated by a split-window function was validated by the total data set with 390 match-ups, which were composed of the brightness temperatures by NOAA-9/AVHRR (Advanced Very High Resolution Radiometer) and the sea surface temperature by fixed buoys in Mutsu Bay. The temporal and spatial coincidence in each match-up is within 30 minutes and one pixel resolution. The standard deviation of residues by the regression analysis was 0.59 C. By referring to the meteorological data, several match-ups having large residue were found. Those were estimated to be caused by the air-sea interaction effects. By removing the match-ups with larger errors, a selected data set with 328 match-ups was prepared and the SST (Sea Surface Temperature) estimation function was recalculated. The standard deviation of residues reduced to 0.34 C. (Author (NASDA)).

N94-12685 Satellite thermal variations of Kuroshio in relation to storm floods. SHIGEHISA NAKAMURA, Kyoto Univ., Sakyo (Japan). Oceanographic Observatory. In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 835-840 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

The sea surface thermal patterns of Kuroshio around the Shirahama Oceanographic Observatory were derived using a real time imagery of NOAA APT (Automatic Picture Transmission) system. Variations of the thermal pattern indicate variations of Kuroshio as those that have been surveyed and studied intensively in relation to weather prediction, ocean prediction, or storm floods. Interrelations of Kuroshio variations and storm floods around the tower have been studied. A simple notice about a trigger of the Kuroshio variations are given. Storms may effect the minor variations on the sea surface. Some of the episodic examples could be introduced with a descriptive notice in the scope of geophysical hydrodynamics.

N94-12682 Statistical features of mesoscale eddies at the Kuroshio front. KIYOSHI KAWASAKI, National Research Inst. of Far Seas Fisheries, Shizuoka (Japan). In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 821-823 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

Two types of mesoscale eddies are observed using NOAA AVHRR (Advanced Very High Resolution Radiometer) infrared images. The eddy propagates along the Kuroshio front at a speed about 30 miles per day. It makes it difficult to trace mesoscale eddies with only intermittently taken images. This propagation speed is several times faster than that of the small Kuroshio meander. (Author (NASDA)).

N94-12638 Observation of wave crests by satellite remote sensed data. SHIGEKI ISHIMORI and MASASHI KAWAI, Toyama National Coll. of Maritime Technology, Shinminato (Japan). In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 572-575 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

The wave-coming direction is of vital concern to ship's navigator, especially in rough seas. Wave crests and troughs are clearly visible in the satellite imagery. Some information on wave features are taken from such remotely sensed data. On 22 June 1987, LANDSAT TM (Thematic Mapper) image was taken over the coastal region of Miyagi, Japan, where storm-driven large waves were prevailing. Wave crests appear to be discontinuous and short offshore and become less broken and longer towards the shore. In this paper, the evolution of wave crests is studied by an FFT (Fast Fourier Transform) technique and inspection of computer processed images. Some interesting facts directly observed or derived from the TM images are as follows: (1) depths at which shoaling effects begin to appear can be determined; (2) lengths to which wave crest grow as they continue to move shoreward can be estimated; and (3) wave convergence zones where the wave crests are broken can be specified and monitored. (Author (NASDA)).

N94-12681 Application of NOAA AVHRR data to fisheries. HIDEO TAMEISHI, SHIN FUJITA, and KATSUYA SAITOU, Japan Fisheries Information Service Center, Tokyo. In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 814-819 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

Presently, JAFIC (Japan Fisheries Information Service Center) makes the satellite aided oceanographic condition charts with NOAA AVHRR (Advanced Very High Resolution Radiometer) data and sends these charts to fishing boats in ocean. It was shown that the NOAA AVHRR data were applicable to fishing ground forecasting, and with the use of NOAA AVHRR data or imagery, a fishing and oceanographic condition chart with fishing information about current, front, intrusion of warm or cold water, and eddies can be produced by using JAFIC image processing system. It turns out that the expert system was useful and effective for extraction of ocean conditions from sea surface temperature data. Now, according to the communication between JAFIC and fishing boats operated offshore of east Hokkaido, Japan, it is shown that fishing grounds of saury, skipjack, squid, and sardine are highly correlated with the above mentioned environment.

N94-12680 Sea surface temperature difference between NOAA/AVHRR and in-situ observation. HIROSHI ICHIKAWA, KATSUTOSHI NISHIMURA, and MASAOKI CHAEN, Kagoshima Univ. (Japan). Faculty of Fisheries. In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 808-813 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

In order to elucidate the origin of the large difference between sea surface skin temperature (Temp/Sat) estimated by MCSST (Multi-Channel Sea Surface Temperature) technique and the subsurface in-situ bulk water temperature (Temp/in-situ), the vertical gradients of water temperature near the sea surface were measured by a CTD (conductivity, temperature, and depth) meter lowerings at 18 stations across the Kuroshio in the Tokara Strait south of Japan in December 1989. The Temp/Sat were estimated by MCSST technique utilizing brightness temperature of Channel 3 and 4 of AVHRR (Advanced Very High Resolution Radiometer) on NOAA-10 together with the 18 Temp/in-situ measured at ship bottom of 5 m depth. It is found that the standard deviation of Temp/Sat from Temp/in-situ is reduced about one half by correction using the in-situ vertical gradient of temperature. The corrected temperature difference is well correlated with the heat flux from the ocean. (Author (NASDA)).

N94-12673 Evaluation of the method of geostrophic flow using NOAA-AVHRR data. MASATOSHI AKIYAMA and YASUHIRO SUGIMORI, Tokai Univ., Shizuoka (Japan). School of Marine Science and Technology. In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 768-773 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

Near surface velocities in the Kuroshio extension area are derived from a single scene of NOAA-6 AVHRR (Advanced Very High Resolution Radiometer) imagery supplementing the satellite observed SST (Sea Surface Temperature) with synchronized hydrographic observations. The geostrophic equation is approximated to derive the surface velocities. The flow field obtained is compared with GEK (Geomagnetic Electrokinetograph) current vectors and also with the geostrophic surface currents. It is found that the geostrophic approximation, used in this study, resolved the salient features of the flow patterns in this region. The fairly good agreement of the approximated geostrophic currents with the GEK and geostrophic currents supports the validity of geostrophic approximation in the regions where the surface topography can be expressed as a function of sea surface temperature. Since the AVHRR infrared images are vulnerable to cloud contamination, the availability of cloud-free sequential-image pairs sometimes occurs as a limitation to obtain surface currents using sequential-image pairs. In such cases, the method presented in this study can be considered as an option. (Author (NASDA)).

N94-12671 Sea surface temperature images of Geostationary Meteorological Satellite (GMS) and sea truth data from ferry boats. TSUTOMU CHINO, Tokyo Metropolitan Fisheries Experiment Station (Japan). In Scientific Organizing Committee of PORSEC, Proceedings of the PORSEC 1992 in Okinawa: Conference for Pacific Ocean Environments and Probing, Volume 2 pp. 757-761 (SEE N94-12635 01-42) Documents available from AIAA Technical Library.

Since May 1989, Hachijo branch of the Tokyo Metropolitan Fisheries Experiment Station has been using satellite imagery and computer technology to get sea surface temperature images of north-west Pacific Ocean to assist the fishermen at Hachijo Island. Hachijo branch can obtain the sea surface temperatures on the ferries' course along the Izu Archipelago and its eastern area within a one day time interval. It is very difficult to get information about sea surface temperatures of the western area, every day, so infrared images from Geostationary Meteorological Satellite (GMS) are useful in providing the western sea surface temperatures during the early spring when the bonito fishing starts. On March 23, 1990, the range of the temperature front on the ferries' course was from 17 to 19 C, and the position of the front in the image on the line of Izu Archipelago and its eastern area was almost equal to the position of the temperature front provided by the ferries' observations. The western temperature contour lines could be drawn as the pattern of the Kuroshio which was meandering offshore the southern mainland of Japan.