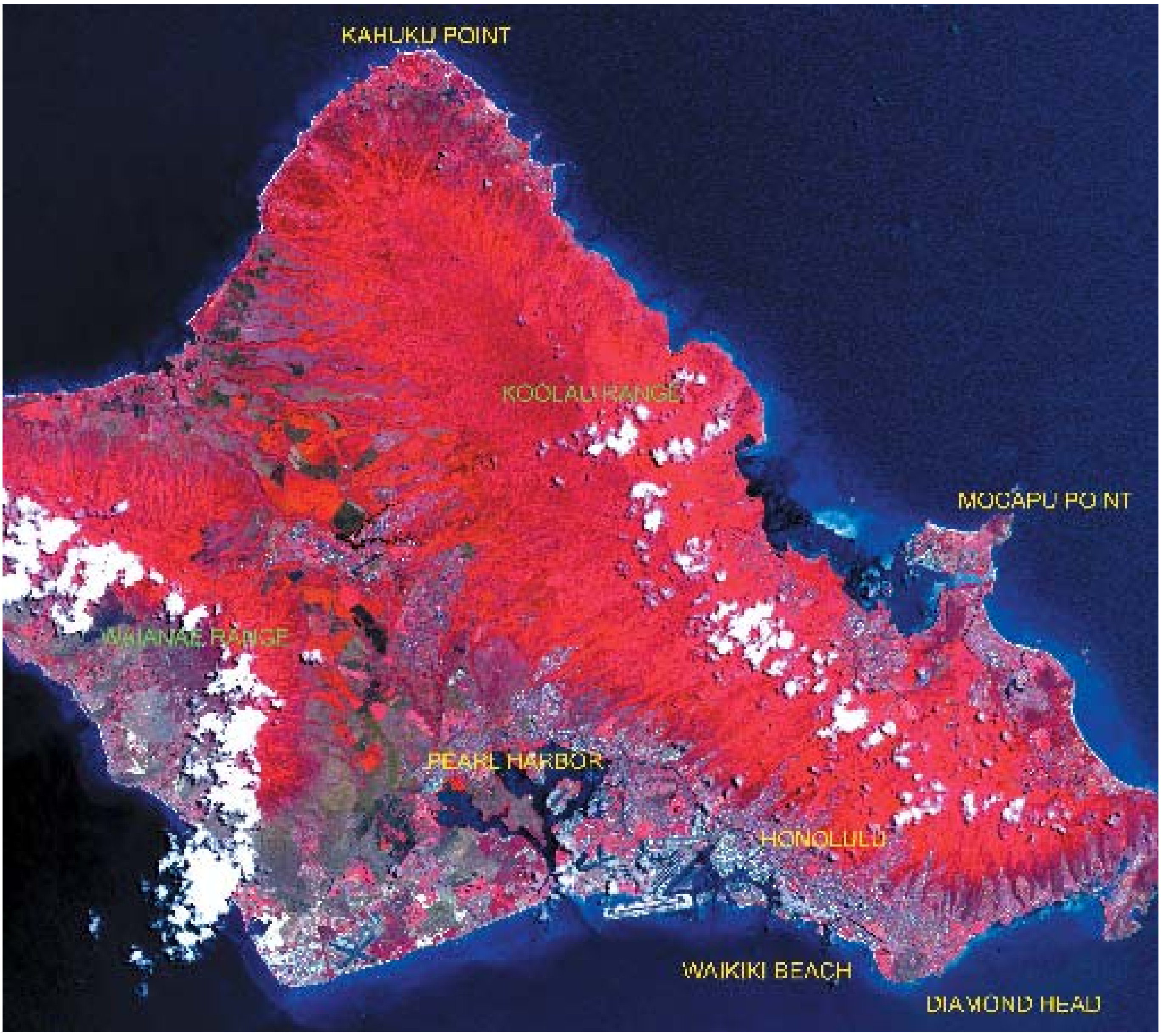
ERSDAC News
No.66
2000. 12

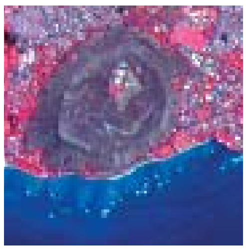
— ASTER Collection of World Geology — Oahu, Hawaii



Description

Above is a composite (R,G,B = 3,2,1) of Oahu, Hawaii, captured by ASTER VNIR on June 3, 2000. Red represents vegetation and dark blue represents the ocean. Clouds are visible in mountainous areas located along the eastern and western coasts.

Oahu has an area of about 1,600 sq km and ranks as the third largest of the Hawaiian Islands. About 75 percent of the population of the State of Hawaii live on this island. The capital city of Honolulu, the administrative and economic center of the state, is situated on the southern coast. It faces Pearl Harbor naval base to the west; Waikiki Beach, a famous tourist spot, to the south; and Diamond Head (See enlargement, Right) to the east. [Continued to page 7.]



1. ASTER Data Distribution Started

The ASTER Data Distribution Started on December 1, 2000.

ERSDAC began to distribute ASTER Data Products to users on December 1, 2000. The distribution is made in two ways depending on the user category.

for General Users	Anyone can place an order for existing (archived) data. One scene is priced at ¥9,800 (plus bank transfer charges).
for Investigators	Investigators working on joint research projects with ERSDAC can obtain ASTER Data Products at delivery cost price. For more information, go to the ASTER Joint Research Project home page: http://astweb.ersdac.or.jp/ao/

1.1 Obtaining ASTER Data Products

(1)User Registration

To order ASTER Data Products, you are first required to register as a User at ASTER GDS.

The procedure is:

- Agree to the "ASTER Data Distribution Rules"
- Post your "Application form of ASTER Data User Registration" to ERSDAC, and
- Receive the "Notification of ASTER Data User Registration" information.

Fig.1-1 IMS Top Page

Users who register will be notified of their User ID and password. When these are typed in, the authentication procedure will confirm the identity of the User and the User will be able to place an order for ASTER data products via the Web.

For User Registration, you are required to obtain detailed information from the following web site:

ERSDAC Home Page http://www.ersdac.or.jp/eng/index.E.html
ERSDAC GDS Home Page http://www.gds.aster.ersdac.or.jp

(2)Data Search (Existing Data)

Search for existing ASTER data is available on the IMS page of the ASTER GDS web site:

http://imsweb.aster.ersdac.or.jp/ims
(Figure 1-1 IMS Top Page)

Fig.1-2 Query Page

Unregistered users are not permitted to place an order for ASTER Data Products, but are allowed to perform a data search. The parameters necessary to run a query include, among others:

Type of Data Product, e.g. Level 1A, Level 1B, etc.;
Date or period of observation;
Target area (Latitude, longitude, and scope on the map); and
Maximum permissible cloud percentage.
(Figure 1-2 Query Page)

Please be aware that after you run a query it will take some time for the result to appear on your screen. A 50-scene volume of data, for example, may take up to a couple of minutes to display. The time depends on the data volume,

search criteria, target area and other factors as well as download speed.

Note: The ASTER Users Service is also providing a facsimile-based data search service.

(3)Ordering and Obtaining ASTER Data

Once you have selected the data, you should select the data (sensor) type (VNIR, SWIR or TIR), format type (HDF or CEOS format), medium (CD-ROM or 8 mm tape), and other items. Once receipt of your payment has been acknowledged, the products will be sent by post.

Any questions about ASTER Data Distribution should go to the ASTER Users Service at ERSDAC.

Tel: (81-3-) 3533-9388 (9:30AM to 5:30PM/JST, Monday to Friday)
Fax: (81-3-) 3533-9390
E-mail: user_service@aster.ersdac.or.jp

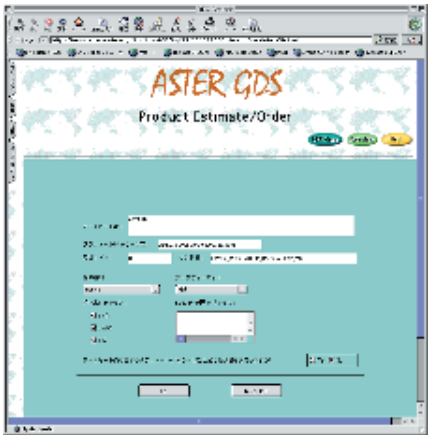


Fig.1-3 ASTER Products Order Page

2. ASTER Joint Research Program Proposals

The ASTER Joint Research Program invites study proposals to be used by researchers and organizations both in Japan and abroad that wish to use ASTER data for non-profit, peaceful purposes. Researchers selected for this Joint Research Program are permitted access to certain areas of ASTER data, free of any charges (except postal charges), and may request that specific items be observed by ASTER.

As of December 11, 2000, a total of 107 valid study proposals have been received, most in connection with geology, ecology, and vegetation (as shown in Figure 2-1), mainly by Japanese, US, and Chinese researchers (Figure 2-2). Half the places of observation so far requested are in Asia and a quarter are in Central and South America.

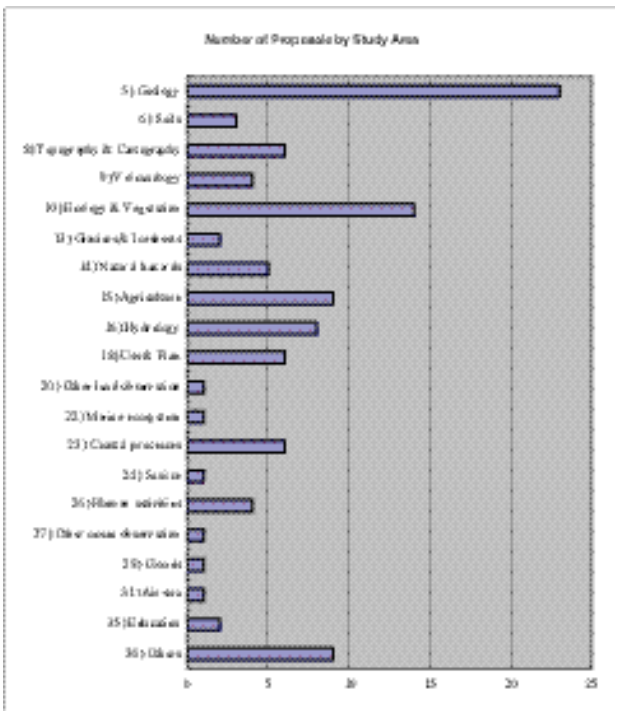


Fig. 2-1 By-study area number of proposals to the ASTER Joint Research Program (as of December 11, 2000)

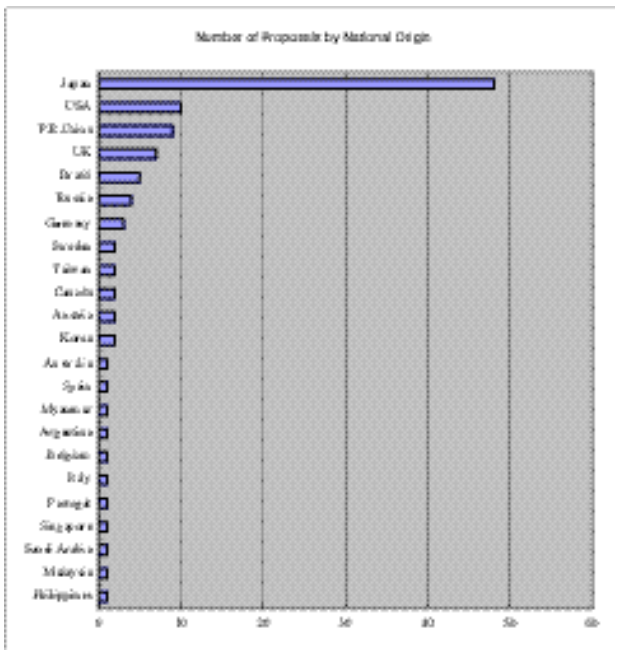


Fig.2-2 By-national origin number of proposals to the ASTER Joint Research Program (as of December 11, 2000)

3. 19th ASTER Science Team Meeting

The 19th ASTER Science Team Meeting was held October 31 through November 3 in Harveys Resort Hotel at Lake Tahoe of Nevada, U.S.A. The meeting had its main purpose of reporting ASTER data verification results and the state of missions executed for the initial checkout period as well as reviewing how ASTER data should be made public and advanced data products, verified. During the meeting, in addition to a plenary session given on the first and the final day respectively, sub-sessions were held for each working group (WG). Moreover, a tour was organized to use session intervals for the inspection of an automated water / radiation temperature observation system installed by NASA JPL at Lake Tahoe.

At the plenary session on the first day, the present status of ASTER Instruments as well as current situations and future operation programs of ASTER Ground Data System (GDS) were reported. This was followed by the report on verification results of Level-1 processing algorism to the effect that the precision of ASTER level-1 data products could now fully deserve distribution. What was further reported included ASTER observation works so far conducted, ASTER ground calibration comparison field campaign achievements, schedule for ASTER data publication, expected presentation of achievements such as before scientific societies, and so on to be finalaized by the proposal of items to be discussed at plenary sessions from Mr. Yasushi Yamaguchi, Japanese ASTER Science Team Leader, and the decision to refer the proposals to discussion at each WG. After the plenary session, sub-sessions took place for Atmosphere and Atmospheric Correction WG, discussing future verification programs and the time to release higher level data products. A subcommittee meeting was also called to deliberate ASTER Science Team Acquisition Requests (STARs).

Fig.3 Plenary Meeting

On the second and third day, sub-sessions were given for each WG to debate its verification results, problems, future policies, etc.

On the final day, at a sub-session held for Higher Level Data Products WG, present state of users' guidance was reported for the discussion of when to release Higher Level Data Products. Subsequently was held a closing plenary session, where each sub group leader reported its own group's summary. Finally, all the meetings wound up with an agreement that efforts be made to expedite future verification of higher level data products.

The 20th ASTER Science Team Meeting are expected to be held in Tokyo early in June, 2001. (Kato, Dept. of R&D)

4. ASTER Field Campaign

The Calibration Working Group, part of the EOS Science Committee conducted an ASTER field campaign from October 25 through November 9 at several US test sites to evaluate techniques for vicarious calibration of ASTER and to perform comparisons of data collected by the US and Japanese teams.

Participants were divided into two teams: The VNIR team, comprising three individuals from Japan and five from the US; and the TIR team, comprising three from Japan and four from the US. The target for the VNIR team was ground surfaces, and for the TIR team, water surfaces.

(1)Tests carried out by the VNIR team

Ivanpah Playa is located on the border between California and Nevada, 70km south of Las Vegas. The other test site is Railroad Valley, situated about 300km north of Las Vegas. These are both large playas, covered with silt of uniform composition.

Fig.4 VNIR Test at Railroad Valley

Contents of the experimental vicarious calibrations included measurement of surface reflectance (VNIR and SWIR) and polarization at the test sites. (Figure 4)

(2)Tests carried out by the TIR team

Lake Tahoe, situated about 250km northeast of San Francisco, is relatively large at 500m deep and 114 km in circumference. It is a good subject for these types of experiments, since it is located at a high altitude of 1860meters above sea level. This gives it the combined advantage of reduced atmospheric interference and a greater probability of clear weather.

Experiments which included measurement of radiation temperature at the lake's surface and its water temperature were carried out using the satellite sensor during both daytime and nighttime passes.

The data taken is planned to be analyzed by both the Japan and US Science Teams, after which the results will be compared.

To further improve satellite data quality, it is necessary to establish vicarious calibration techniques using fixed test sites and optimum coefficients for radiometric calibration. At this point, more than a year since the launch, there is a need to continue the ground calibration comparison field campaign to gain information on ASTER's status and keep its output at maximum precision. (Maekawa, Dept. of R&D)

5. Trends in Remote Sensing Technologies

— International Conference on Applied Geologic Remote Sensing, Las Vegas —

The 14th International Conference on Applied Geologic Remote Sensing was held in Las Vegas, Nevada, USA on 6-8 November, 2000. The central part of the Conference was taken up by research reports on the development of geologic applications utilizing advanced sensor data, a subject closely associated with our (ERSDAC) R&D fields. Participating were 335 people from 27 countries including 7 from Japan. The number of poster and oral presentations exceeded 150, of which oral presentations accompanied the following sessions:

1 Keynote Forum
2 New Airborne Hyperspectral Systems
3 Environmental and Hydrogeology Applications
4 Hyperspectral Remote Sensing for Mine Wastes Characterization
5 Mineral Exploration
6 Petroleum Exploration and Support Perations
7 Geological Hazards and Disaster Management
8 Geologic and Terrain Mapping Using Optical and SAR Imagery
9 MASTER Airborne Sensor: First Results
10 Innovative Orbital Sensor Applications

The central topic of every session above was on research utilizing airborne hyperspectral data. Reports covered application to mineral distribution mapping, geological mapping, environmental monitoring of abandoned mine sites, and hydrocarbon microseepage detection. Most hyperspectral research reported up to the present has described the analysis of data collected by AVIRIS, of NASA / JPL's visible to short wave length infra-red (VNIR to SWIR) hyperspectral sensor and that collected by TIMS, a thermal infra-red (TIR) multiband sensor. At the Conference, however, there were numerous reports on research targeting newly-developed and advanced sensor data such as data from commercial sensors including SEBASS, Hy Map and

Fig.5-1 ERIM Exhibition (NASA/JPL)

Probe-1, and MODIS, as well as MASTER, which was developed for ASTER simulation. Above all, data from SEBASS, the most advanced TIR hyperspectral sensor, is expected to be applied to a wide range of geological subjects.

The EOS Science Team gave a report on the ASTER initial checkout that was clearly of great interest to the participants, announcing that the instruments are operating and performing well, and that before long ASTER data will be distributed from the USGS / EROS Data Center.

During the companies' exhibition session, ASTER was clearly the satellite-mounted sensor of choice, with its data seen at the NASA/JPL, USGS/EROS, and several other stands. It is expected that an even greater volume of ASTER data will be collected before the next meeting and that many ASTER-related research reports will be presented at that time.

(Shiokawa, Research Planning Div.)

— Asian Convention for Remote Sensing (ACRS 2000) in Taipei —

Meetings for the Asian convention for Remote Sensing (ACRS2000) held at international Conventional Center in Taipei, Taiwan for 5 days on December 4-8, 2000 were attended to study the trend of remote sensing. At this convention participated by about 400 researchers from Taiwan, Japan, Thailand, and other Asian countries, a total of 210 presentations were given orally or with posters for 17 sessions; Farming and soil, water resources, numerical photogrammetry, environment, forest resources, GIS and data integration, disaster a11eviation, image processing, education, global change, land utilization, space-borne mapping and GPS, SAR/InSAR, maritime affairs, hyper-spector and data acquisition systems, AirSAR/MASTER.

At this center, poster sessions were held for ASTER (Figure 5-2), giving out Taiwanese ASTER pictures and leaflets of guidance for public distribution. Also at an SAR/InSAR session, Mr. Jerry Salvador, a Philippine MGB's researcher jointly studying with this center, presented interferometric processing results of volcanoes Mayon and Pinatubo.

July through October this Year, NASA./JPL launched an experimenta1 observation campaign ca11ed PACLIM (Pacific Rim) 2000, using AirSAR to be on board DC-8, for the Asia-Pacific region. Expected study results of this campaign included attempt-

Fig.5-2 ACRS Poster sessions

ed extraction of information such as on the density of vegetation and tree heights from mu1ti-frequency rear dispersion of AIRSAR/SIR-C (multi-band/multi polar wave [HH, HV, VV]) data to determine biomass. This should be noted as promising since it indicated possibilities of obtaining information not available for present-day satellites (optical sensors, single-band/single-polar wave SARs). The report was also interesting as a method of using PALSAR data so that mu1ti-polar waves could be obtained.

(Tsukada, Dept. of R&D)

6. Overseas joint research projects

— Landslide areas determination using Satellite data (Indonesia) —

Phased Array type L-Band Synthetic Aperture Radar (PALSAR) is planned to be launched in 2003. The data to be harvested by the PALSAR is expected to be useful for geological environmental monitoring in addition to natural resources exploration. In particular, differential interferometry technique using SAR data is reported to be able to detect surface deformations to an accuracy of centimeters. ERSDAC is pushing ahead with its plan to develop and establish a technique to help minimize damages from landslides or other geological hazards especially in volcanic area so that PALSAR data can be used in practical ways.

The island of Java, in Indonesia, frequently suffers large-scale damage due to landslides caused by volcanic sediment. It is thus important to be able to forecast or rapidly obtain detailed information on any damage after it occurs. ERSDAC, together with the Indonesian government's DEG facility, is working on the evaluation of a differential interferometric SAR technique, with the aim of applying remote sensing techniques to monitoring geological disasters. The DEG (Directorate of Environmental Geology), Ministry of Mines and Energy, which was founded in 1978, carries out R&D on environmental geology and hydrology, and is at present working on the digitalization of domestic landslide information.

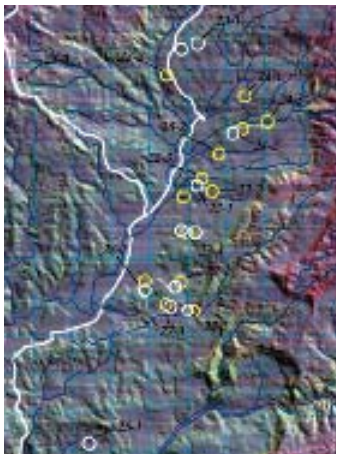


Fig.6-1 Landslides area detected using JERS-1/SAR

The Cianjur area in West Java was selected as the target of the survey since the borders of paddy fields there move by up to 50cm per year due to frequent landslides. In this three-year survey, which ran from 1997-1999, JERS-1/SAR data, characterized with good interferometric property, was used since the vegetation coverage rate is high in Indonesia.

Fig.6-2 Field survey in a landslide area

Fig.6-3 New target area, East Bandung

The survey has so far confirmed landslides in most of the target areas (circles in Figure 6-1) using the new technique (Figure 6-2). The R&D plan over the next two years is to target the East Bandung area (Figure 6-3), with the aim of successfully applying the determination technique so far developped.

(Hirose, Research Planning Div.)

— Satellite Data-Based Volcano Monitoring and Hazard Area Mapping (The Philippines) —

On November 21, 1999, an MOU was signed in Manila (the Philippines) regarding the joint research entitled "Studies of Techniques to Draw Resources / Environmental Information by Remote Sensing in the Philippines (southeast Asian archipelagic zone subject to a change)." Three organizations as partners of this joint research are the Philippine Institute of Volcanology and Seismology (PHIVOLCS), and PNOC's Energy Development Corporation (EDC).

The purpose of joint research is to cooperatively study techniques for the analyses and operation of data obtained by remote sensing in the areas of volcano monitoring and surface prone-area mapping mainly by using currently available ASTER data as well as preserved JERS-1 SAR data. The joint research also involves environmental / natural resources evaluation for the Philippines.

The Philippines is, like Japan, a volcanic country with many world famous active volcanoes such as Taal, Mayon, Pinatubo. It has, therefore, been more often hit by volcanic disasters. On the other hand, abundant geothermal resources brought by volcanic activities are widely utilized for power generation. In terms of installed capacity for power generation, the Philippines is ranked second with about 1,800MW (Japan, fifth with 554MW) only after the United States. In the Philippines, the installed capacity for power generation accounts for 23.3% of all such capacities (against some 0.2% of Japan), making geothermal energy a mainstay for fossil alternative resources (Source: "Trend of Japanese Geothermal Power Generation 1998" by the Japan Geothermal Study Society).

From the above, this research is expected to bring some good results for ASTER data-based volcano monitoring and identification of existing conditions for geothermal resources as well as JERS-1 SAR data-used extraction of volcanic activity-caused diastrophic data.

In the joint research slated for a period of three years, the southwestern part of Luzon (including Manila City, Volcano Tar, and Makiling-Banahao) is to be surveyed for this year which falls on the first research year. The field survey conducted by widely searching volcanic terrains and faults / cracks, finding outcropped hot-spring points, and investigating alteration zones and faults / cracks (Figure 6-4) was followed up by inspection of two geothermal power generation stations under operation. Explanation of and guidance for as well as materials an research areas were also available from local resident engineers in each of joint research organizations.

Survey is expected for the Bicol area in the southeastern part of Luzon (including Volcano Mayon, Tiwi, and Bacon-Manito) next year and Leyte (including Tongonan and the Kabalian mountains areas) in the final year.

Our future intention is to more closely exchange information with Philippines joint research organizations for furtherance of studies. (Yamashita, Dept. of R&D)

Fig.6-4 Field Study in the Southwestern Part of Luzon

(From cover page)

Oahu comprises two volcanoes: Waianae volcano, which was at its most active in the Tertiary period, lies in the western part of the island; and Koolau volcano, most active in the Neogene period, is situated in the eastern part. Each is a shield volcano consisting of tholeiitic basalt lava flow. They were separate entities during the volcano formation phase, but coalesced to form a single volcanic island, now Oahu, the caldera formed at the top of Koolau volcano. In the Quaternary period, magma activity increased at the southeastern edge of Koolau volcano and material was frequently ejected from its craters to form several pyroclastic cones. Among these is Diamond Head: it was created by the explosion triggered by magma coming into contact with seawater.

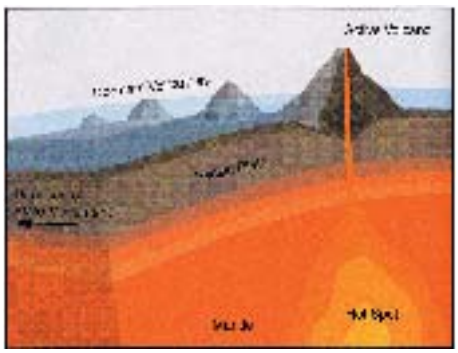


Fig.1-3 Hot Spot (Illustration), after HAWAII ATLAS & GAZETTEER, DeLorme

The Hawaiian Chain is a string of basaltic lava volcanoes, stretching more than 2,500 km from the northwest to the southeast in the central area of the North Pacific. The Hawaiian Chain is located on a typical “Hot Spot.” (See right: It is called this because some areas on the oceanic plate are hotter than neighboring areas due to magma plumes rising from underneath.) Magma plumes are generally believed to remain on the same spot, but the Pacific Plate is sliding 10 cm per year to the west-north-west. Consequently, a chain of volcanic islands, the Hawaiian chain, came into being over millions of years. Individual volcanic islands formed when Hot Spot activity in the area grew especially intense. The islands came into birth in the order of northwest to southwest i.e., Kauai, Oahu, Molokai, Maui, and Hawaii. Currently, the Loihi seamount (submarine volcano) is growing beneath the seabed. Below is a mosaic image captured by JERS-1/SAR of the Hawaiian Islands with the central parts framed. (Shiokawa, Research Planning Div.)

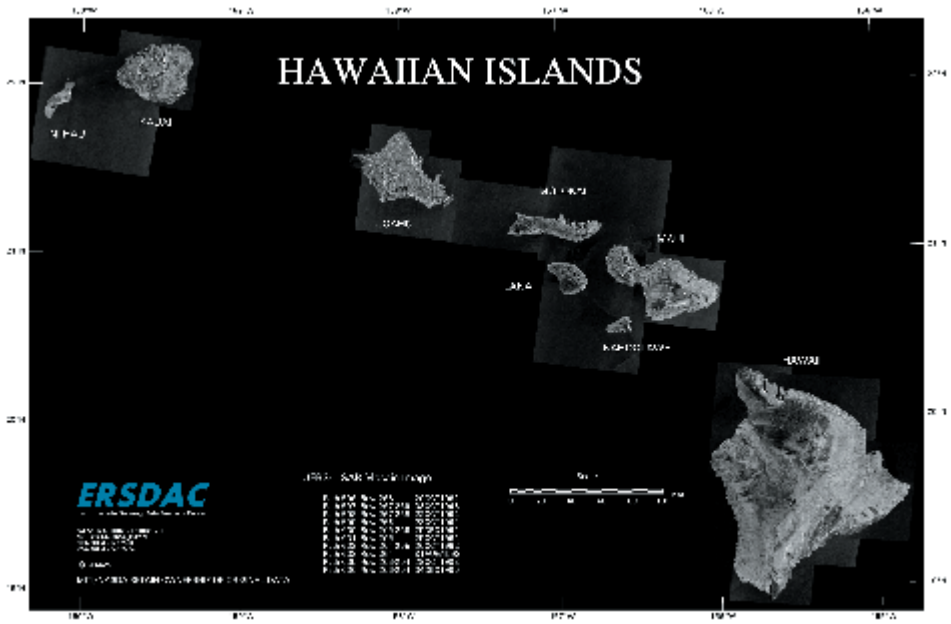


Fig.1-4 Hawaiian Islands (JERS-1/SARS mosaic)

7. PALSAR Ground Data System Critical Design Review (CDR) Meeting held

Phased Array-type L-band Synthetic Aperture Radar (PALSAR), the successor to JERS-1 SAR, is now under development for installation in ALOS, which will be launched by NASDA in 2003. PALSAR will feature much higher performance that includes higher ground resolution, a radar jet angle variable function, a multi-polarimetric mode, and a wide area observation mode which will allow one-shot observation of areas four to five times greater. The total volume of data that can be harvested will be 30-40 times that of JERS-1.

The PALSAR Ground Data System will efficiently process huge volumes of PALSAR data received by the NASDA ground station into high-quality SAR images and carry out archiving and distributing of this data. The development of this ground data system started in late 1998. Including the operative period, it is a ten-year project. The basic design was completed in 1999 and the detailed design was finalized in November 2000, just about on schedule.

The PALSAR Ground Data System Detailed Design Review Meeting was held at ERSDAC on November 28, 2000. The objectives of the meeting were to have the whole design examined, mainly from the technical viewpoint, and then shift to the next step of software production. The PALSAR Ground Data System Technical Committee members and other participants at the meeting who contributed views and recommendations later received feedback, which they endorsed, from ERSDAC.

PALSAR's detailed design was approved in the light of the review results. We are now embarking on the next stage, that of producing processing software. We will continue our development work with the aim of creating a user-friendly ground data system. (Ohkawa, Technical Dept.)

＊Remote Sensing Related News 【'Quick Bird' Launch Fails】

Moscow AP: The US Quick Bird commercial-purpose high-resolution satellite (EarthWatch Inc.), which was launched November 21 (GMT) from the Russian Plesetsk cosmodrome, failed to be injected into orbit due to the Kosmos-3M's second-stage engines stopping earlier than scheduled. The Quick Bird satellite was expected to succeed IKONOS (Space Imaging) as a commercial-purpose high-resolution satellite. EarthWatch Inc. said it plans to relaunch Quick Bird in the middle of 2001.

8. Announcement

ERSDAC Activities

Oct. 12 ●2nd General Research Committee held
Oct. 19 ●2nd Remote Sensing Editorial Handbook Committee
Oct. 30 ●Carlos G. Asato and others, Institute de Geologia y Recursons Minerales, visited
Oct. 31-Nov. 31 ●9th Aster Science Team Meeting held (Lake Tahoe, Nevada, USA)
Nov. 2 ●Paulo Ferreira, Secretario Adjunto, Secretaria de Estado do Meio Ambiente, Sao Paulo-SP, Brasil visited
Nov. 28 ●PALSAR Ground Data System Detailed Design Review Meeting held
Dec. 14 ●3rd Remote Sensing Handbook Editorial Committee

— Personnel Shifts —

Date	Name	
Oct.31	Takeo SATO	Retired
Oct.31	Akane MIYAMOTO	Retired
Nov.1	Masashi SAWA	Acting Manager, Project Management Dept.
Nov.1	Tadashi HONDA	Research Planning Div.
Nov.2	Minoru NISHIJIMA	Retired
Nov.30	Naoyuki DOI	Back to DOWA Engineering Co., Ltd.
Dec.1	Mizuhiko SHOJI	Researcher, Dept. of R&D
Dec.31	Hirofumi ETOH	Back to FUJITSU Business Systems Ltd.
Dec.31	Hideaki FUKASAWA	Back to NITTETSU Mining Co., Ltd.

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