



**PUSAT REMOTE SENSING NEGARA**

KEMENTERIAN SAINS, TEKNOLOGI DAN ALAM SEKITAR

**MACRES**

**MALAYSIAN CENTRE FOR REMOTE SENSING**

MINISTRY OF SCIENCE, TECHNOLOGY AND THE ENVIRONMENT

## KANDUNGAN

LAPORAN PENGARAH	3	DIRECTOR'S REPORT
MACRES SEPINTAS LALU	5	MACRES AT A GLANCE
ORGANISASI	8	ORGANISATION
WAWASAN	10	VISION
OBJEKTIF DAN STRATEGI	11	OBJECTIVE AND STRATEGY
PERANCANGAN KORPORAT	12	CORPORATE PLANNING
PEMBANGUNAN SUMBER MANUSIA	14	HUMAN RESOURCE DEVELOPMENT
INFORMASI DAN PENERBITAN	22	INFORMATION AND PUBLICATION
PEROLEHAN DATA	30	DATA ACQUISITION
PENINGKATAN SISTEM	47	SYSTEM UPGRADING
PENYELIDIKAN DAN PEMBANGUNAN	49	RESEARCH AND DEVELOPMENT
AKTIVITI ANTARABANGSA	56	INTERNATIONAL ACTIVITIES
KEWANGAN	58	FINANCIAL
PETUNJUK PRESTASI	60	PERFOMANCE INDICATORS



NIK NASRUDDIN MAHMOOD, FRSS  
*Pengarah MACRES.*  
*Director of MACRES.*

## LAPORAN PENGARAH

## DIRECTOR'S REPORT

Bagi pihak Pusat Remote Sensing Negara, saya sangat berbesar hati membentang Laporan Tahunan berasingan yang pertama untuk tahun berakhir 31hb Disember 1994. Semenjak penubuhan MACRES pada tahun 1990 sebagai cabang remote sensing angkasa Kementerian Sains, Teknologi dan Alam Sekitar (KST&AS), pencapaian tahunan MACRES telah dilaporkan dalam Laporan Tahunan KST&AS.

Tahun 1994 adalah sangat bermakna dalam perkembangan aktiviti remote sensing angkasa di negara ini. Selaras dengan persetujuan kerajaan membina bangunan ibu pejabat baru MACRES yang dilengkapi dengan konfigurasi peralatan 'the state-of-the-art', penambahan kakitangan MACRES sehingga hampir sepuluh kali ganda dan pembinaan stesen bumi yang dijadualkan pada akhir tahun 1996, negara bersedia untuk memajukan teknologi remote sensing angkasa sebelum melangkah ke abad akan datang.

Tahun 1994 telah mencatatkan peningkatan minat dikalangan pengguna-pengguna remote sensing angkasa dan teknologi berkaitan di Malaysia yang belum pernah berlaku sebelum ini. Sebanyak 39 agensi pengguna awam dan swasta telah memohon data satelit bagi tujuan penyelenggaraan pengurusan sumber dan alam sekitar; merupakan lebih kurang 50 peratus peningkatan berbanding dengan tahun yang lepas. Ini adalah disebabkan oleh aktiviti-aktiviti promosi yang agresif oleh MACRES, di mana antara lain termasuklah melalui 'newsletter', pameran dan seminar untuk dan profesional supaya sentiasa wujud 'decision makers' dan syarahan profesional supaya sentiasa wujud kesedaran di kalangan mereka terhadap keupayaan dan perkembangan teknologi yang berlaku di seluruh dunia.

On behalf of the Malaysian Centre for Remote Sensing (MACRES) it gives me a great pleasure to present this first separate Annual Report of the centre for the year ending 31st December 1994. Since its establishment in 1990 as the space remote sensing arm of the Ministry of Science, Technology and the Environment (MOSTE), MACRES yearly performances have been incorporated under MOSTE's Annual Report.

The year 1994 marked a significant milestone in the advancement of space remote sensing activities in the country. With the government's approval for the construction of MACRES' new headquarters to be facilitated with the-state-of-the-art equipment configuration; the upgrading of MACRES staff strength to nearly ten fold and the establishment of a satellite ground receiving station scheduled for end 1996, the country is set to climb greater heights in the use of space remote sensing technology for national development before the turn of the century.

1994 has indeed witnessed unprecedeted interest from Malaysian users community in space remote sensing and related technologies. Some 39 user agencies of both private and governmental have requested for satellite data for resource and environmental management, representing about 50% increase compared to the previous year. This is attributable to effective promotional activities undertaken by MACRES through, among others, newsletters, exhibitions and seminars addressed to the decision makers and professionals so as to continuously keep them aware on the potential of the technology and the development occurring worldwide.

Untuk membolehkan pemindahan teknologi dari luar negara ke Malaysia, MACRES menjalankan projek kerjasama dengan 'European Space Agency', 'Canadian Centre for Remote Sensing', 'Swedish Space Corporation', Universiti Peking, 'National Space Development Agency of Japan dan Universiti New South Wales, Australia. Kebanyakan projek-projek kerjasama tersebut telah dilaksanakan dengan penyertaan aktif beberapa agensi pengguna yang berkaitan. Saya dengan sukacitanya memaklumkan bahawa penyertaan agensi-agensi berkenaan dalam aktiviti-aktiviti seperti ini adalah amat menggalakkan.

To effect continuous technology transfer from abroad to Malaysia, MACRES undertook collaborative projects with the European Space Agency, Canadian Centre for Remote Sensing, Swedish Space Corporation, Peking University, National Space Development Agency of Japan and the University of New South Wales, Australia. A major feature of these collaboration projects is that they are undertaken with the participation of relevant user agencies in the country. I am glad to report that participation from these agencies in such activities had been very encouraging indeed.

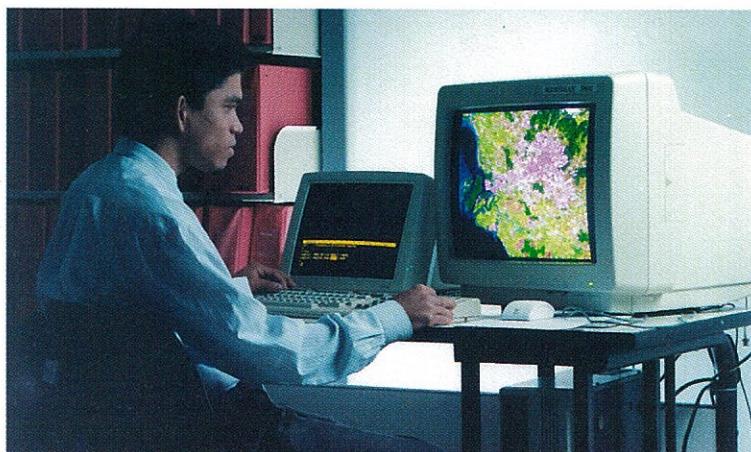
Nik Nasruddin Mahmood, FRSS  
**Pengarah MACRES**  
Director of MACRES

# MACRES sepintas lalu.....

## MACRES at a glance.....



*Pejabat Lama MACRES  
MACRES Original Office*

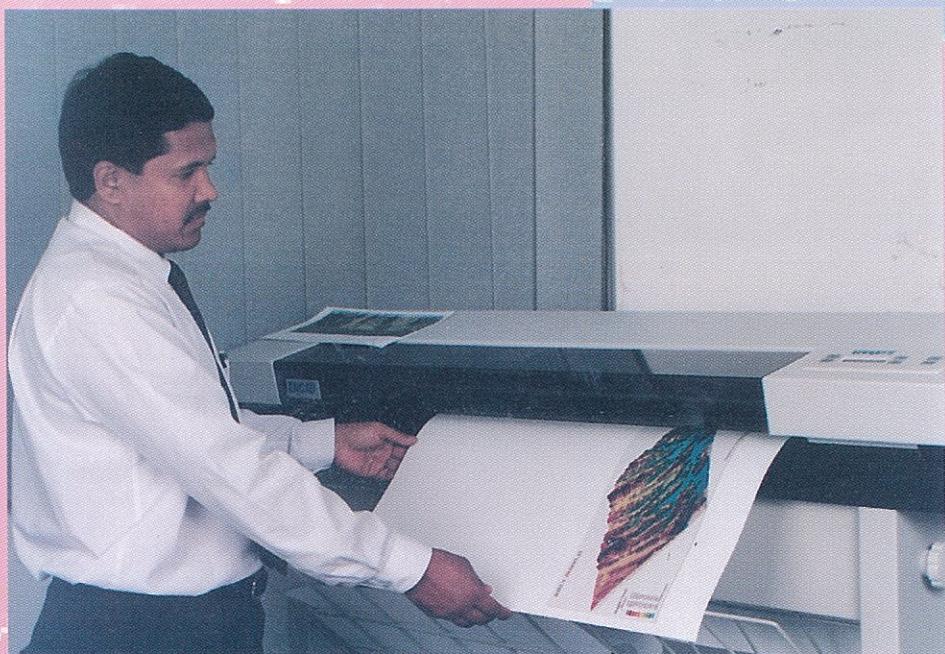


*Stesen Kerja Pemprosesan Imej  
Image Processing Workstation.*



*Stesen Kerja GIS  
GIS Workstation.*

Penganalisa Prokomp  
Procomp Analiser.



Pencetak Novajet  
Novajet Printer.



Pelabuhan Kelang  
Port Kelang



Sungai Kelang  
Kelang River



Paya Gambut dan Semak Samun  
Peat Swamp and Shrub



Paya Bakau  
Mangrove

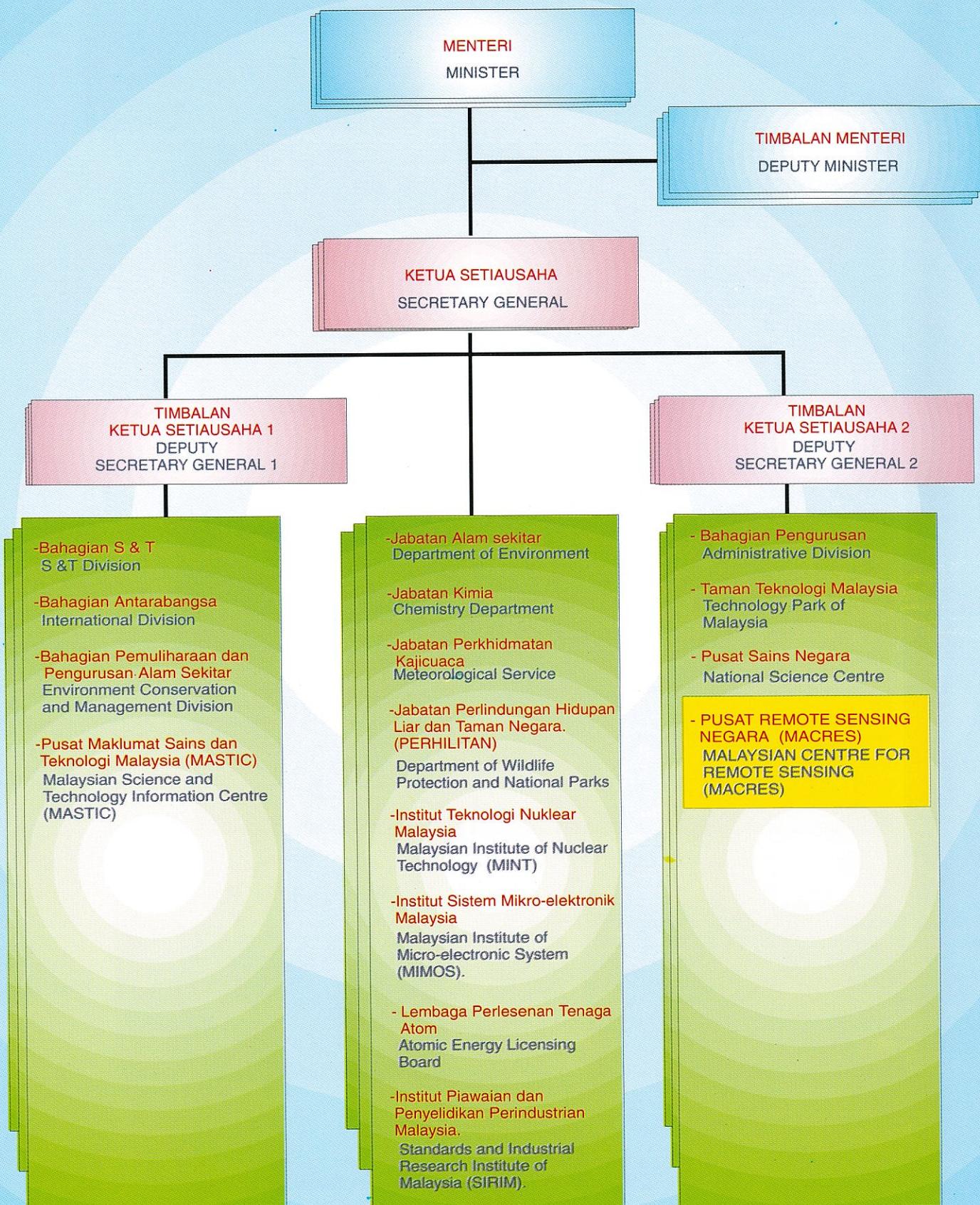


Tanaman Campuran  
Mixed Vegetation

Imej Satelit dan Permukaan Sebenar Lembah Kelang  
Satellite Image and Ground Truth of Lembah Kelang

## STRUKTUR ORGANISASI KEMENTERIAN SAINS, TEKNOLOGI DAN ALAM SEKITAR

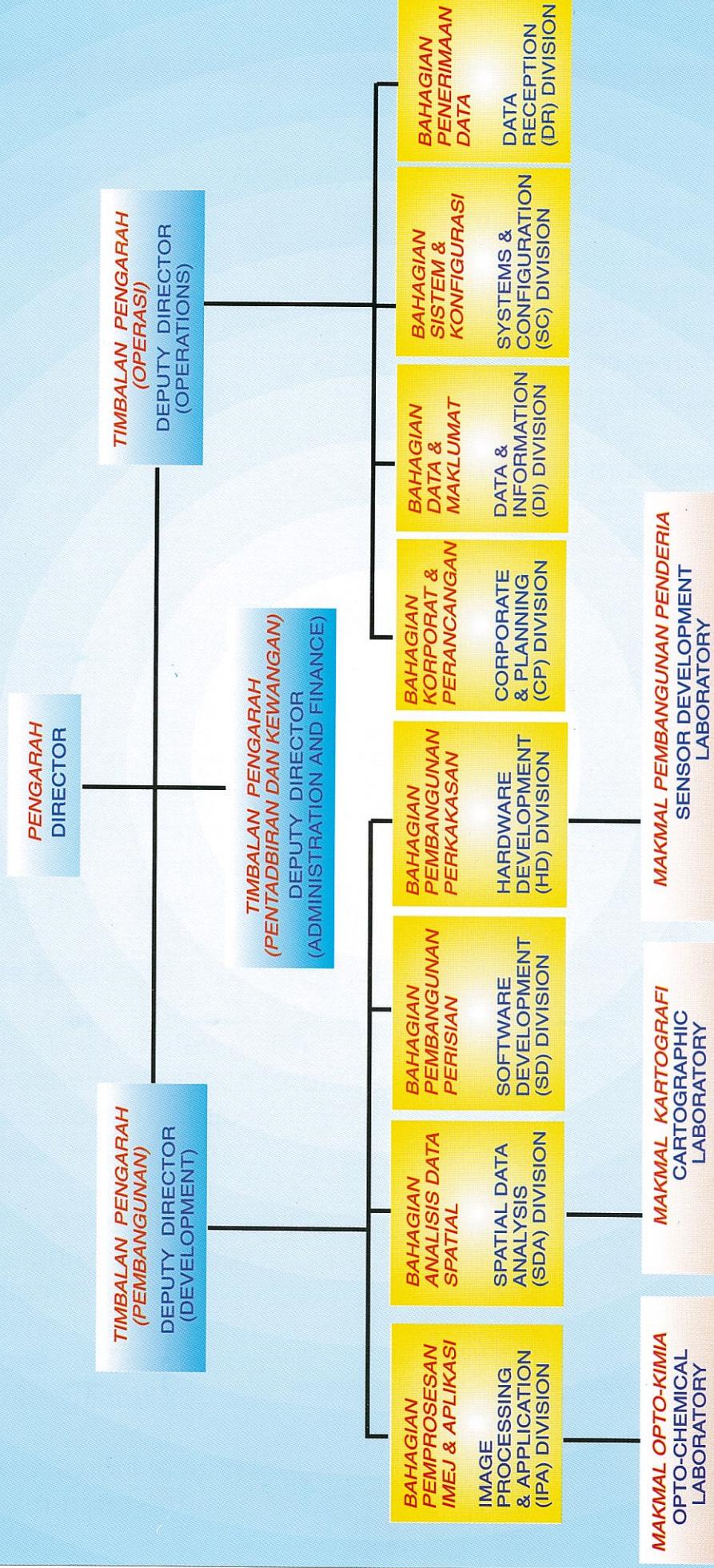
### ORGANISATION STRUCTURE MINISTRY OF SCIENCE, TECHNOLOGY AND THE ENVIRONMENT



# ORGANISASI

# ORGANISATION

## STRUKTUR ORGANISASI MACRES ORGANISATIONAL STRUCTURE OF MACRES



Wawasan MACRES ialah untuk menjadi peneraju dalam bidang remote sensing angkasa dan teknologi berkaitan dan menggerak negara ke arah kecemerlangan antarabangsa dalam bidang ini.

### MACRES berusaha kearah:-

Mencapai tahap berdikari di peringkat nasional dan kecemerlangan antarabangsa dalam bidang remote sensing angkasa dan teknologi berkaitan.

Mengoperasi penggunaan remote sensing angkasa dan teknologi berkaitan bagi tujuan pengurusan sumber asli dan alam sekitar dan perancangan strategik negara.

Membantu industri tempatan bersaing dalam pasaran terbuka.

MACRES' vision is to be a leader in the field of space remote sensing and related technologies and to lead the nation to international excellence in these areas.

### MACRES strives to:-

Attain national self-reliance and international excellence in the field of space remote sensing and related technologies.

Operationalize the use of space remote sensing and related technologies for effective natural resource and environmental management, and strategic planning of the nation.

Support local industry to compete in the open market place.

## OBJEKTIF dan STRATEGI

## OBJECTIVE and STRATEGY

### OBJEKTIF MACRES

Untuk membangun dan menggunakan teknologi remote sensing angkasa dan teknologi yang berkaitan serta mempromosikan penggunaannya dalam pengurusan sumber alam sekitar dan perancangan strategik negara.

### STRATEGI

- Membangun tenaga pakar dan terlatih dalam segmen-segmen teknologi terpilih.
- Membangun infrastruktur dan memperolehi peralatan serta kelengkapan yang bersesuaian.
- Memperolehi data remote sensing bagi memenuhi keperluan negara.
- Mempergiat aktiviti penyelidikan dan pembangunan teknologi remote sensing angkasa dan teknologi yang berkaitan bagi menyokong aplikasinya dalam bidang-bidang yang berkaitan.
- Mempromosi dan membantu industri tempatan dalam penggunaan teknologi remote sensing angkasa dan teknologi berkaitan bagi tujuan pembangunan.

### OBJECTIVE OF MACRES

To develop and utilize space remote sensing and related technologies and to promote their application for resource and environmental management, and strategic planning of the country.

### STRATEGIES

- Develop sufficient skill and trained manpower in selected segment of the technologies.
- Develop appropriate infrastructure and acquire relevant equipment and facilities.
- Acquire relevant remotely sensed data to meet national requirements.
- Intensify research and development activities in space remote sensing and related technologies, in order to support their operational applications.
- Promote and support the participation of local industry in the use of space remote sensing and related technologies for development.

## PERANCANGAN KORPORAT

### CORPORATE PLANNING

MACRES is making plans towards self-financing some of its activities with the final objective of full corporatisation of the centre in the near future. Revenue for MACRES are expected to be generated through four main activities, namely: (i) consultancy services, (ii) data services, (iii) contract research and (iv) training and human resource development activities.

In preparing for the above corporatisation, current efforts are geared towards acquiring the relevant infrastructure. This includes the construction of MACRES permanent office and a satellite ground receiving station for real time satellite data reception. MACRES is also striving towards having full complement of qualified and trained scientists and engineers in selected areas of specialisation. A high priority is given towards creating a highly dedicated and able professionals in MACRES in order to lead the nation in areas of space technology applications for development.

Progress in the construction of MACRES' new building which is planned for completion in 1996 is on schedule. To-date a detailed architectural plan and specifications of the building have been completed.

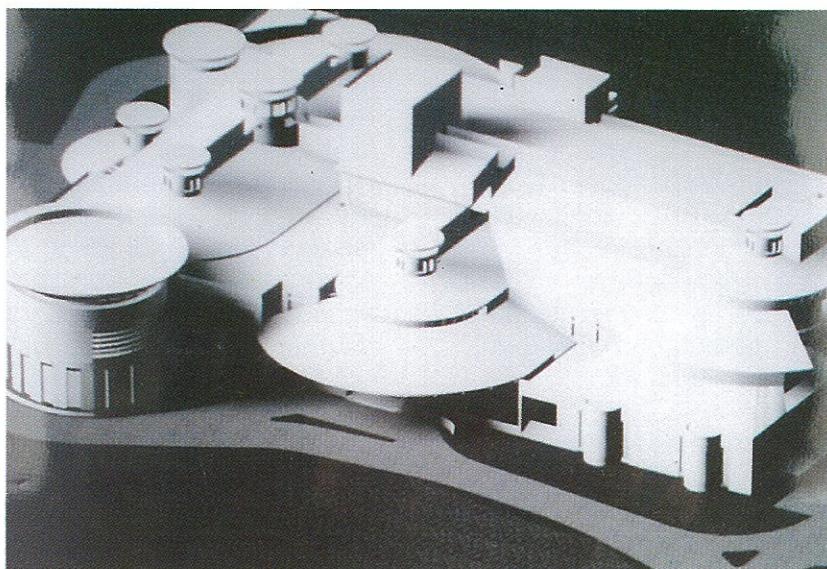
MACRES sedang membuat perancangan bagi membiayai sendiri sebahagian dari aktiviti-aktivitinya dengan matlamat akhir untuk pengkorporatan sepenuhnya pusat ini di masa hadapan. Pendapatan korporat bagi MACRES dijangka akan dijanakan melalui empat aktiviti utama iaitu; (i) perkhidmatan perundingan, (ii) perkhidmatan data, (iii) penyelidikan kontrak, dan (iv) aktiviti-aktiviti latihan dan pembangunan tenaga manusia.

Usaha-usaha semasa kearah pengkorporatan ditumpukan kepada pembangunan infrastruktur yang diperlukan. Ini termasuklah pembangunan bangunan pejabat baru MACRES dan sebuah stesen bumi bagi penerimaan data-data satelit terkini. MACRES juga berusaha kearah mewujudkan ahli sains dan jurutera profesional yang berkelayakan dan terlatih dalam bidang-bidang kepakaran yang terpilih. Tumpuan adalah diberikan kepada pengwujudan profesional yang berkebolehan dan berdedikasi tinggi di MACRES bagi menerajui negara dalam bidang aplikasi teknologi angkasa untuk pembangunan.

Kemajuan dalam pembinaan bangunan baru MACRES yang dijadualkan siap pada tahun 1996 adalah mengikut jadual. Sehingga kini pelan rekabentuk yang terperinci dan spesifikasi bangunan telahpun disiapkan.

Bahagian Korporat dan Perancangan yang telah diwujudkan adalah dipertanggungjawabkan bagi merangka pelan dan objektif pengkorporatan MACRES. Selain dari perancangan bagi pembangunan infrastruktur dan tenaga manusia, bahagian ini juga telah dipertanggungjawab untuk mewujudkan persekitaran dan imej korporat yang bersesuaian bagi MACRES.

The Corporate and Planning Division set up within MACRES's organizational structure is especially tasked to plan the corporatisation objective of the centre. In addition to the planning for infrastructure and manpower development, the division is also discharged with the responsibility to create proper corporate atmosphere and image MACRES.



*Bangunan baru MACRES mengikut impresi arkitek  
Architectural impression of MACRES's new building*

## PEMBANGUNAN SUMBER MANUSIA

### HUMAN RESOURCE DEVELOPMENT

Pusat Remote Sensing Negara (MACRES) adalah pusat baru yang ditubuhkan di bawah Kementerian Sains, Teknologi dan Alam Sekitar pada tahun 1989 dengan hanya 17 orang kakitangan sementara. Berikutan dengan kelulusan kerajaan terhadap program penambahan tenaga manusianya. Pada masa ini MACRES sedang memproses pengambilan 150 kakitangan tetap. Sehingga akhir tahun 1994, kakitangan MACRES telah meningkat kepada 70 orang di mana 41 daripadanya adalah pegawai penyelidik pelbagai bidang seperti pertanian, perhutanan, geografi, geologi, marin, geofizik, fizik, kejuruteraan elektrik, ukur tanah, alam sekitar, matematik dan sains komputer.

Dalam usaha untuk melatih dan meningkatkan pengetahuan kakitangan selaras dengan perkembangan teknologi semasa, MACRES melaksanakan program pembangunan tenaga manusia melalui penyertaan dalam forum-forum dan institusi-institusi latihan yang berwibawa di dalam dan di luar negara. Program ini telah dimulakan semenjak tahun 1990. Maklumat lanjut mengenai aktiviti-aktiviti bagi tahun 1994 ditunjukkan pada mukasurat 18 dan 19.

MACRES juga menganjurkan kursus-kursus latihan, bengkel dan seminar secara berterusan kepada agensi-agensi pengguna di negara ini. Sebanyak enam kursus yang disenaraikan pada mukasurat 20 telah dianjurkan oleh MACRES dalam tahun 1994.

Malaysian Centre for Remote Sensing (MACRES) is a relatively new centre of excellent established in the Ministry of Science, Technology and the Environment in 1989 initially manned by only 17 temporary personnel. Subsequent to obtaining approval for its human resource expansion programme, MACRES is currently in the process of recruiting 150 permanent personnel. Till the end of 1994, the personnel has increased to 70, of which 41 are research officers in varied disciplines such as agriculture, forestry, geography, geology, marine, geophysics, physics, computer science, electrical engineering, land survey, environment and mathematics.

In its efforts to train and continuously upgrade the knowledge of the staff to keep abreast with changing technology, MACRES pursued with its human resource development programme by participating in established fora and training institutions both at home and abroad. This programme started in 1990. Details of activities for year 1994 are given in pages 18 and 19.

MACRES also continuously organised courses, seminars and workshops for user agencies in the country. A total of six courses, listed on page 20 were organized by MACRES in 1994.

Selain itu, sebanyak lima pameran dan tiga seminar 'ad-hoc' oleh penceramah pakar jemputan yang disenaraikan pada mukasurat 22 dan 23 telah dianjurkan oleh MACRES. MACRES juga telah membentang 14 kertas teknikal di seminar dalam dan luar negara (mukasurat 23-24).

Satu lagi komponen penting aktiviti pembangunan sumber manusia di MACRES ialah menjalankan penyelidikan usahasama dengan pakar-pakar luar negara untuk tujuan pemindahan teknologi dan mempercepatkan negara berdikari dalam remote sensing dan teknologi-teknologi lain yang berkaitan.

In addition, a total of five exhibitions and three ad-hoc seminars given by expert guest speakers were conducted by MACRES. These are listed on pages 22 and 23. MACRES also made 14 technical presentations at seminars inside and outside the country (pages 23-24).

Another component of human resource development activities of MACRES is the implementation of joint research projects with foreign experts for transfer of technology and to expedite achieving national self-reliance in space remote sensing and related technologies.



Mesyuarat ke 7 'ASEAN Experts Group on Remote Sensing', Kuala Lumpur  
7th Meeting of ASEAN Experts Group on Remote Sensing, Kuala Lumpur



Bengkel Serantau GlobeSAR, Bangkok  
Regional GLobeSAR Workshop, Bangkok

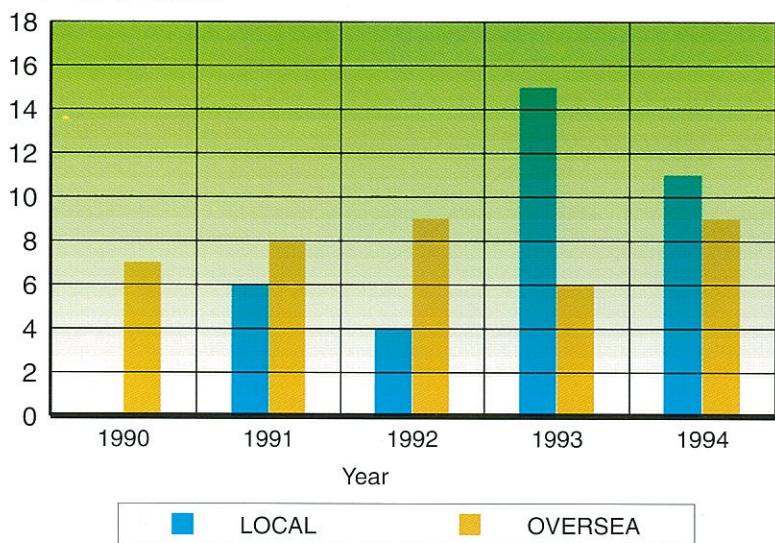


*Latihan Serantau EC-Asean, Yogyakarta, Indonesia  
EC-Asean Regional Training, Yogyakarta, Indonesia*



*Seminar Remote Sensing Serantau dalam pengurusan Ekosistem Tropika, Kuching, Sarawak  
Regional Remote Sensing Seminar on Tropical Ecosystem Management., Kuching, Sarawak*

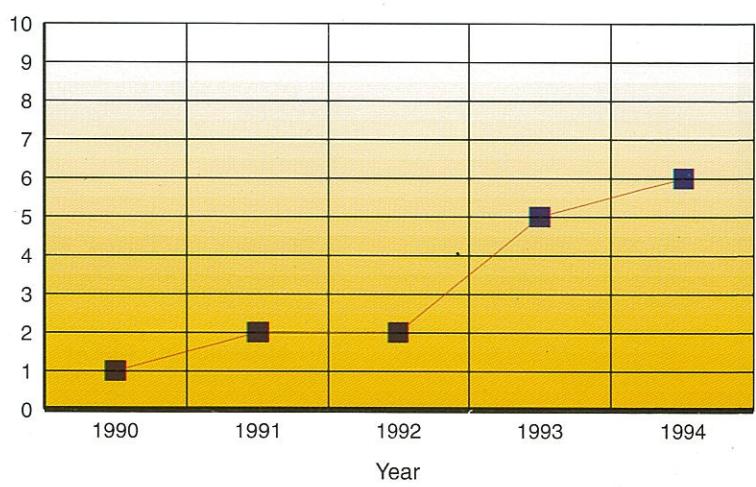
Number of courses



Kursus yang disertai oleh MACRES.  
Courses participated by MACRES.

Seminar anjuran MACRES.  
Seminars organised by MACRES

Number of seminars



**Kursus/Seminar/Simposium/ Mesyuarat Antarabangsa yang disertai MACRES**  
**International Courses/Seminars/Symposiums/ Meetings participated by MACRES**

NAME	COURSE/SEMINAR/SYMPHOSIUM	VENUE	DATE
Nik Nasruddin Mahmood (Keynote Speaker)	Seminar on Remote Sensing/GIS Technology: Status and Potential.	Kuala Lumpur	22-23 February 1994
Nik Nasruddin Mahmood (Country Representative)	Consultative Group Meeting of Senior Experts Preparatory to the Ministerial Level Conference on Space Applications for Development in the Asia-Pacific Region	Bangkok, Thailand	1-4th March 1994
Nik Nasruddin Mahmood (Country Focal Point)	Meeting of Directors of the National Remote Sensing Centres and Tenth Session of the Intergovernmental Consultative Committee (ICC) on the UN-ESCAP Regional Remote Sensing Programme (RRSP)	Tehran, Iran	22-26 May 1994
Nik Nasruddin Mahmood (Board Member)	Advisory Board Meeting on EC/ESA-ASEAN Cooperation on Remote Sensing	Manila, Philipines	30 June-1st July 1994
Adnan Haji Ismail (Participant)	The Integration of Remote Sensing and GIS for Land-Use Mapping	Yogyakarta, Indonesia	22 Aug-22 Oct 1994
Nik Nasruddin Mahmood (Resource Person) Mazlani bt Muhammad (Participant)	Seminar Third ISY Regional Remote Sensing on Tropical Ecosystem Management	Bali, Indonesia	23-28 August 1994
Loh Kok Fook (Speaker)	UN Workshop on Enhancing Social, Economic and Environmental Security Through Space Technology	Graz, Austria	12-15 Sept 1994
Nik Nasruddin Mahmood (Leader of Senior Officers Meeting)	Conference on Space Application for Development in ESCAP Region	Beijing, China	19-24 Sept. 1994
Nik Nasruddin Mahmood (Chairman)	7th Meeting of ASEAN Experts Group on Remote Sensing	Kuala Lumpur	21-23 July 1994
Nik Nasruddin Mahmood (Chairman)	National Seminar for Decision Makers on 'Potential Applications of ERS-1 Microwave Remote Sensing in Malaysia	Kuala Lumpur	1 Sept 1994

bersambung/continued

Jasmi Abd. Talib (Participant)	UN/CHINA/ESA Workshop on Microwave Remote Sensing Application	Beijing, China	14-18 Sept 1994
Nik Nasruddin Mahmood (Country Representative)	Second Session of Asian-Pacific Regional Space Agency Forum	Tokyo, Japan	31 Oct - 1 Nov 1994
Ibrahim Selamat Jamilah Ismail Noorhaidah Arifin (Participant)	EC-Asean Regional Training : ' ERS-1 SAR Applications for Land-use and Coastal Zones Monitoring	Yogyakarta, Indonesia	27 Oct - 5 Nov 1994
Nik Nasruddin Mahmood (Country Representative)	15th Asian Conference on Remote Sensing	Bangalore, India	17-23 Nov 1994
Zuraimi bin Sulaiman (Participant)	Regional Seminar on Integrated Application of Remote Sensing and GIS for Land and Water Resources Management	Bangalore, India	16-19 Nov 1994
Mazlani bt Muhammad (Participant)	International Training Course on Application of Remote Sensing and GIS in Managing Tropical Forest and Conserving Natural Resources in Southeast Asia	Bogor, Indonesia	15 Nov - 11 Dec 1994
Adnan Hajj Ismail(Speaker) Shahruddin Ahmad Jasmi A.Talib Saiful Bahari Abu Bakar (Participant)	Regional Globesar Workshop	Bangkok, Thailand	28 Nov - 2 Dec 1994
Loh Kok Fok (Speaker)	First Adeos Symposium	Kyoto, Japan	11-15 Dec 1994

## Kursus-kursus anjuran MACRES

### Courses organized by MACRES

1994

4-13 April : Bengkel Remote Sensing bagi Aplikasi Perbandaran di MACRES, Kuala Lumpur

10-17 Mei: Bengkel Globesar: Pemprosesan SAR dan Ekstrak Informasi bagi tujuan Latihan Perisian PCI EASI/PACE dan Earth View di MACRES, Kuala Lumpur

1-6 Ogos: Bengkel Remote Sensing bagi Aplikasi Marin di MACRES, Kuala Lumpur.

1 September: Seminar 'Decision Makers' mengenai Aplikasi Gelombang Mikro Remote Sensing di Malaysia, Kuala Lumpur.

2-12 September: Latihan Serantau EC-Asean mengenai Aplikasi ERS-1 SAR untuk Pengesahan Zon Pantai Kuala Lumpur

12-16 Disember: Seminar 'Decision Makers' mengenai Aplikasi Remote Sensing dan Sistem Maklumat Geografi, Langkawi, Kedah

1994

4-13 April 1994: National Workshop On Remote Sensing for Urban Applications, Kuala Lumpur, (MACRES).

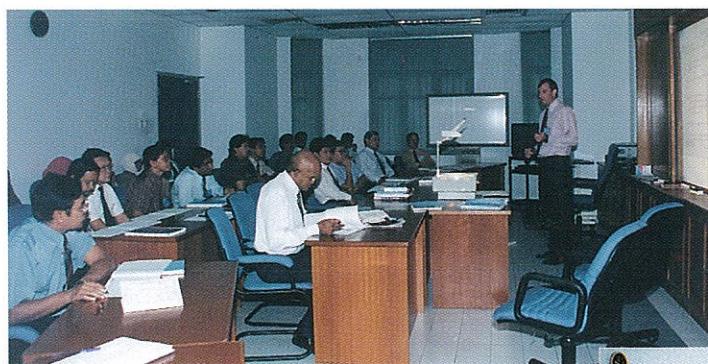
10-17 May: National Globesar Workshop on SAR Processing and Information Extraction Workshop for PCI EASI/PACE and Earth View Software Training, Kuala Lumpur, (MACRES).

1-6 August: National Workshop On Remote Sensing for Marine Applications, Kuala Lumpur, (MACRES).

1 September: National Seminar for Decision Makers on Potential Application of Microwave Remote Sensing in Malaysia, Kuala Lumpur

2-12 September: EC-Asean Regional Training on ERS-1 SAR Applications for Coastal Zones Monitoring, Kuala Lumpur

12-16 December: National Seminar for Decision Makers on Applications of Remote Sensing and Geo-information System, Langkawi, Kedah



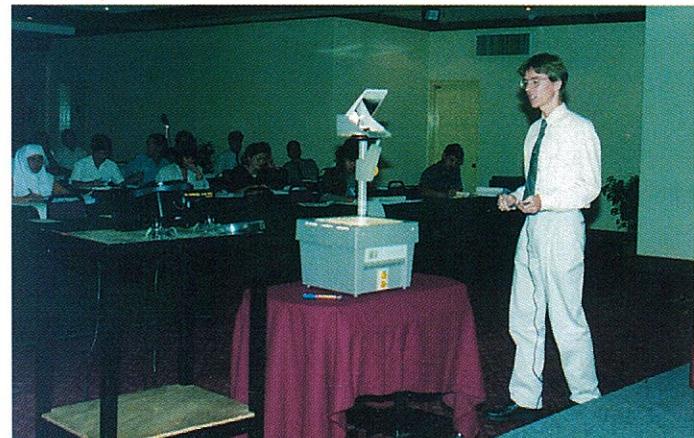
Bengkel Remote Sensing untuk Aplikasi Marin  
Workshop on Remote Sensing for Marine Applications

Bengkel Remote Sensing untuk Aplikasi Perbandaran  
Workshop on Remote Sensing for Urban Applications





Bengkel GlobeSAR Nasional, Kuala Lumpur  
National GlobeSAR Workshop, Kuala Lumpur



Latihan Serantau EC-Asean, Kuala Lumpur  
EC-Asean Regional Training, Kuala Lumpur



Seminar "Decision Makers", Langkawi  
Seminar for Decision Makers, Langkawi

## INFORMASI DAN PENERBITAN

## INFORMATION AND PUBLICATION

Semenjak penubuhannya pada 1990, MACRES telah menjadi pengurus Kumpulan Kerja Penerbitan dan Penyebaran Maklumat di bawah Jawatankuasa Remote Sensing Kebangsaan/Nasional. Kumpulan ini yang dianggotai oleh sebelas agensi pengguna adalah bertanggungjawab dalam penyebaran maklumat bagi mendedahkan pengguna remote sensing di Malaysia dengan perkembangan terbaru dalam bidang remote sensing dan teknologi berkaitan di dalam dan luar negara.

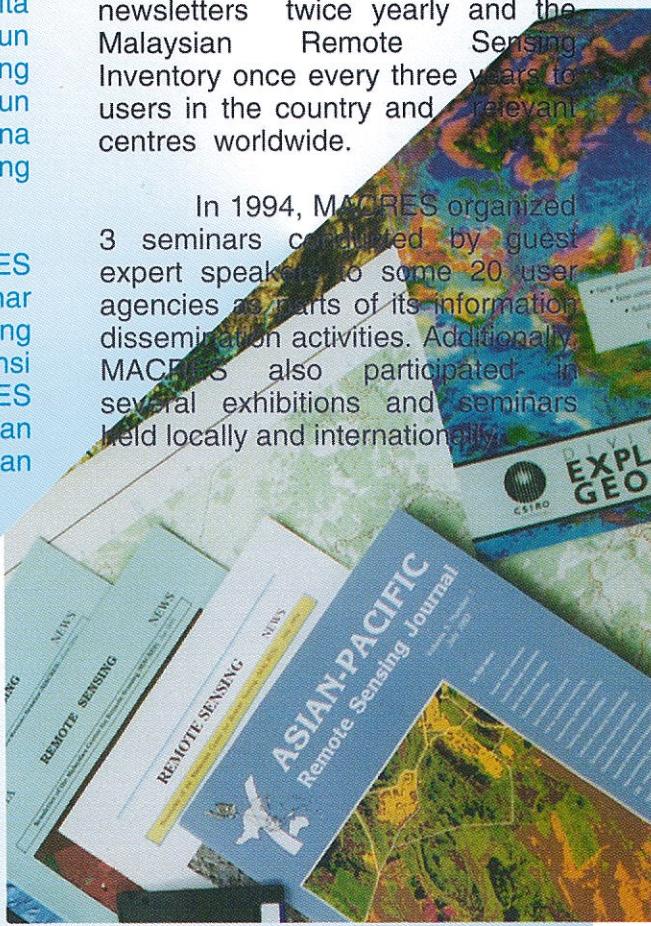
Di bawah rangka-kerja ini, MACRES bertanggungjawab dalam penerbitan dan pengedaran Berita Remote Sensing dua kali setahun dan Inventori Remote Sensing Malaysia sekali setiap tiga tahun kepada semua pengguna-pengguna di Malaysia dan pusat-pusat yang berkaitan di luar negara.

Dalam tahun 1994, MACRES telah menganjurkan 3 seminar penceramah pakar jemputan yang telah disertai oleh kira-kira 20 agensi pengguna. Di samping itu, MACRES telah juga mengambil bahagian dalam beberapa pameran dan seminar di dalam dan luar negara.

Since its establishment in 1990, MACRES has been the chairman of the Working Group on Information Dissemination and Publication under auspices of the National Remote Sensing Committee. The Committee, comprising of eleven user agencies, is responsible for information dissemination to the remote sensing users in Malaysia to keep them abreast with the latest development in remote sensing and related technologies both at national and international levels.

Under the above framework, MACRES is committed to publish and distribute remote sensing newsletters twice yearly and the Malaysian Remote Sensing Inventory once every three years to users in the country and relevant centres worldwide.

In 1994, MACRES organized 3 seminars conducted by guest expert speakers to some 20 user agencies as parts of its information dissemination activities. Additionally, MACRES also participated in several exhibitions and seminars held locally and internationally.



## Pameran / Exhibition

Pameran sempena Minggu Sains pada September 1991 di Subang Parade, Subang Jaya, Selangor

Science Week Exhibition on September 1991 at Subang Parade, Subang Jaya, Selangor

Pameran 'Spaceweek 1992' pada 18 Julai 1992 di MPPJ, Selangor

Spaceweek 1992 Exhibition on 18th July at MPPJ, Selangor



Pameran Teknologi Maklumat Antarabangsa (ITX) ke 6 pada 11-14 Ogos 1994 di PWTC, Kuala Lumpur

6th International Information Technology (ITX) Exhibition on 11-14th August 1994 at Putra World Trade Centre, Kuala Lumpur

Geografi Rantau Asean pada 25-28 Oktober 1994 di Universiti Malaya, Kuala Lumpur

Geography of The ASEAN Region Exhibition on 25-28th October 1994 at University of Malaya, Kuala Lumpur

Pameran sempena Hari Q KemSains pada 10hb November 1994 di MINT, Bangi, Selangor

Ministry of Science, Technology and the Environment's Quality Day Exhibition on 10th November 1994 at MINT, Bangi, Selangor

### **Seminar oleh Pakar Jemputan**

Seminars by Guest Expert - speakers

1. 'Potential of ERS-1 Applications' on 28th March 1994 by Mike Wooding, EC-ESA Representative.
2. 'ADEOS 2 Programme' on 29th August 1994 by Mr. Harushima, Mr. Yoshifumi Yasuoka and Mr. Ishida; from NASDA, Japan.
3. 'Radar Backscatter Modelling' on 19th December 1994 by Dr. Chuah Heng Teik and Mr. Ewe Hong Tat from University of Malaya

### **Pembentangan Teknikal / Penerbitan**

Technical Presentations / Publications

Mahmood, N.N. (1994). Remote Sensing/GIS Technology: Status and Potential in Malaysia. Keynote address at the Seminar on Remote Sensing/GIS: Status and Potential, Kuala Lumpur, 22-23 February 1994.

Mahmood N.N (1994). Soil Erosion Risk Assessment Using Remote Sensing and GIS Technique. A paper presented at the Decision Makers Seminar on Application of Remote Sensing and Geo-information System, Langkawi, 12-16 December 1994.

Mahmood N.N. (1994). Environmental Monitoring of the Hydro Electric Project area of Bakun, Sarawak using Satellite Remote Sensing Technique presented at the Decision Makers Seminar, Langkawi, 12-16 December 1994.

Mahmood, N.N (1994). Implementation of National Remote Sensing Programme: A Malaysian Model presented at the National Seminar for Decision Makers on 'Potential Applications of ERS-1 in Malaysia', 1 September 1994.

Mahmood, N.N (1994). Recent Developments in Space Applications in Malaysia. Second Session of Asia-Pacific Regional Space Agency Forum (APRSAF), Tokyo, Japan. 31st October - 2 November 1994

Mahmood, N.N (1994). Space Applications in Malaysia. Ministerial Conference on Space Applications for Development in ESCAP Region, Beijing, China. 19-24 September 1994

K.F. Loh (1994). Remote Sensing Application In Malaysia. Annual General Meeting of International Hydrological Institute (National Committee), Department of Drainage and Irrigation Malaysia, 12 April 1994.

K.F. Loh (1994). Satellite Remote Sensing Technology: Its Status and Use in Malaysia. Current Issues of Science and Technology 1994, Malaysian Scientist Committee, Petaling Jaya, May, 1994.

continued/bersambung...

K.F. Loh, Ku Mohd Noh and Laili Nordin (1994). Complementary Nature of SAR and Optical Data for Land Cover Mapping. Malaysian Decision Makers Seminar on the Potential Applications of ERS-1 Microwave Remote Sensing Data in Malaysia, Kuala Lumpur, Malaysia, 1 September 1994.

K.F.Loh (1994). Integration of Space Remote Sensing and Geographic Information System for Resources Management. National Land Information System (NALIS) Symposium, Kuala Lumpur, Malaysia, 14-16 November 1994.

K.F. Loh (1994). Development of Methodology to Monitor Tropical Forest Land Cover Change. First ADEOS Symposium, Kyoto, Japan, 5-10 December, 1994.

K.F. Loh (1994). Land-use/Cover Mapping of the State of Selangor Malaysia. Decision Makers Seminar on Applications of Remote Sensing and Geo-information System, Langkawi, Malaysia, 12-16 December, 1994.

Adnan H. I., Shahruddin A and Jasmi A.T(1994)., Landcover Classification Using Airborne SAR: A Preliminary Study of Muda-Merbok, Kedah, Peninsular Malaysia, Proceeding of Regional Globesar Workshop, Bangkok, Thailand, 28 November - 2 December 1994

Jasmi Ab. Talib and Adnan H.I (1994)., GlobeSAR Project in Malaysia presented at the Regional GlobeSAR Seminar, Bangkok, Thailand. 28 Nov - 2 Dec 1994.

## Pelawat ke MACRES

### Visitors to MACRES

Lawatan ke MACRES dari dalam dan luar negara semakin bertambah dari tahun ke tahun. Ini mencerminkan peningkatan minat terhadap peranan MACRES sebagai pusat penyelarasan aktiviti remote sensing angkasa di negara ini. Objektif keseluruhan pelawat-pelawat yang datang adalah untuk memperolehi maklumat mengenai perlaksanaan Program Remote Sensing Nasional, aktiviti dan peralatan di MACRES dan juga untuk mewujudkan projek-projek kerjasama.

Sementara itu, pelawat-pelawat dari luar negara sangat berminat untuk mewujudkan projek kerjasama dua hala. pelawat-pelawat tempatan pula berusaha mendapatkan perkhidmatan perunding dari MACRES, atau pemindahan teknologi melalui penyertaan dalam latihan jangka pendek.

Dalam tahun 1994, MACRES telah menerima 40 lawatan termasuk Yang Berhormat Menteri Sains, Teknologi dan Latihan Vokasional Zambia pada 9 Oktober, Timbalan Menteri Pertanian dan Perhutanan, LAO PDR, pada 10 Jun dan Ketua Pengarah Pusat Penyelidikan United Kingdom pada 11 Mac.

Senarai pelawat-pelawat dalam tahun 1994 diberikan pada mukasurat 27 dan 29.

Visits to MACRES from local and foreign institutions have in recent years increased, reflecting a growing interest in MACRES role as the coordinating centre for space remote sensing activities in the country. The overall objective of these visitors are to understand the implementation of the National Remote Sensing Programme, to have first hand knowledge of the activities and facilities available at MACRES, and to solicit joint projects.

While foreign guests are particularly interested in generating joint research projects, the locals normally seek consultancy services from MACRES or technology transfer through short term on-the-job training arrangements.

The year 1994 has witnessed 40 visits at MACRES, which among others include the Honourable Minister of Science, Technology and Vocational of Zambia on 9 October, the Deputy Minister of Agriculture and Forestry LAO PDR, on 10 June and the Director General of Research Centre of United Kingdom on 11 March.

List of visitors to MACRES in 1994 is given on pages 27-29.

## Senarai pelawat / Visitors' list

### FEBRUARI

21hb - En. Tom Delaney dari Litton Itek Optical System

21hb - En. Ravi K. Bhola dari GDE System Incorporation, San Diego

### MAC

7hb - Anatoli Romanos dari Perwakilan Ketua Pengarah Perdagangan Russia

9hb - Keirth Muirhead dari Serco, Eropah

11hb - Sir John Cadogan, Ketua Pengarah Pusat Penyelidikan UK

21hb - Mike Wooding, Andy Batts dan Robert Brown dari RSAC, UK

22hb - Lo Sayu Willgemrein from Canada Centre for Remote Sensing

30hb - Kasinathan Kengaiah dari Institut Pengurusan Hutan ASEAN (AIFM), Gerer M. Austria from Department of Environment and Natural Resources, Philipines, Imam Nuryanto, MOF Jakarta and Thongchai Charuppat, Royal Forest Department, Bangkok, Thailand

30hb - Dr. Suvit Ongsamwang dan En. Tongchai Charuppat dari Royal Forest Department, Bangkok, Thailand

30 hb - Mahmud Haji Yusof dari Jabatan Perhutanan, Brunei

30hb - Lawatan sambil belajar dari MINDEF, Jalan Padang Tembak, Kuala Lumpur.

### APRIL

11hb - En Graham Bashpd and En Bill Harvey dari AUSLIG, Jabatan Perkhidmatan Pentadbiran Australia

14hb - Pelajar Politeknik Sultan Ahmad Shah, Kuantan

30hb - Delegasi Kumpulan Kerja Teknikal AIFM (Ibu Pejabat Perhutanan, Kuala Lumpur)

### MEI

4hb. Prof Jan J. Nossin dari ITC, Netherland

### FEBRUARY

21st - Mr. R.Tom Delaney from Litton Itek Optical System

21st - Mr Ravi K. Bhola from GDE System Incorporation, San Diego

### MARCH

7th - Anatoli Romanos from Director General Trade Representative of Russia

9th - Keith Muirhead from Serco, Europe

11th - Sir John Cadogan, Director General of Research Centre in UK

21st - Mr. Mike Wooding, Mr. Andy Batts and Mr Robert Brown from Remote Sensing Application Centre (RSAC), UK

22nd - Lo Sayu Willgemrein from Canada Centre for Remote Sensing

30th - Kasinathan Kengaiah from ASEAN Institute of Forest Management (AIFM), Gerer M. Austria from Department of Environment and Natural Resources Philipines, Imam Nuryanto from MOF Jakarta and Thongchai Charuppat from Royal Forest Department, Bangkok, Thailand.

30th - Dr. Suvit Ongsamwang and Mr. Tongchai Charuppat from Royal Forest Department, Bangkok, Thailand

30th - Mahmud Haji Yusof from Forestry Department, Brunei

30th - Study Tour from MINDEF, Jalan Padang Tembak, Kuala Lumpur

### APRIL

11th - Mr Graham Bashpd and Mr Bill Harvey from AUSLIG, Department of Administrative Services Australia.

14th - Students of Sultan Ahmad Shah Polytechnic, Kuantan

30th - Delegation of AIFM Technical Work Group (Forestry Headquarters, Kuala Lumpur)

### MAY

4th - Prof Jan J. Nossin from International Institute for Aerospace Survey and Earth Sciences (ITC), Netherlands

**JUN**  
10hb - Pegawai dari Kementerian Pertanian dan Perhutanan, LAO PDR, Vientianne

28hb - En Marc Wride dari V.D. Marketing, ENTERA Information Technology

**JULAI**  
12hb - Bjorn Kjerfve, Jabatan Sains Laut, Universiti South Carolina, Columbia, USA

15hb - Nyuha Hielhema dan Irma K. Imdeur, Sains Politik, Universiti Amsterdam, Netherlands

19hb - En. Frank Jones dari British High Commission

23hb  
Greg A. Elms dari Sales Director Asia Pacific Radarsat International Inc.

Solis Jose G. dari Administrator, NAMRIA

Dr. Paibul Ruangsiri - Pengarah, Jabatan Remote Sensing, NRCT

Dr. Mahdi Kartasasmita, Pemangku Pengerusi Remote Sensing, Lembaga Penerbangan dan Antariksa Nasional (LAPAN), Indonesia

En Yues Bechacq, Pengarah Pengurusan, SPOT Asia

En Paul Trezise, Pengurus ACRES

En. Kazuo Ohta, Pembantu Jurutera Kanan, NASDA, Japan

En. Katsuhito Hayashi, NASDA, Bangkok Office

En. Grant Wilson dari SPOT Asia

En Kwoh Leong Keong dan En. Lim Hock dari Universiti Kebangsaan Singapura

En. Suvit Vibulsresth dari NRCT, Bangkok

Dr. Kaew Nualchawee dari AIT, Bangkok

**JUNE**  
10th - Officer from the Ministry of Agriculture and Forestry, LAO PDR, Vientiane

28th - Mr Marc Wride from V.D. Marketing, ENTENA Information Technology

**JULY**  
12th - Bjorn Kjerfve, Marine Science Dept. University of South Carolina, Columbia, USA

15th - Nyuha Hielhema and Irma K. Imdeur, Political Science, The University of Amsterdam, Netherlands

19th - Mr. Frank Jones from British High Commission

23rd  
Greg A. Elms from Sales Director Asia Pacific Radarsat International Inc.

Solis Jose G. from Administrator, Department of Environment and Natural Resources National Mapping and Resource Information Authority (NAMRIA)

Dr. Paibul Ruangsiri - Director of Remote Sensing Division, National Research Council of Thailand (NRCT)

Dr. Mahdi Kartasasmita, Acting De. Chairman For Remote Sensing, Indonesian National Institute of Aeronautics & Space (LAPAN)

Me Yues Bechacq, Managing director, SPOT Asia

Mr. Paul Trezise, Manager, Australian Centre for Remote Sensing(ACRES)

Mr. Kazuo Ohta, Associate Senior Engineer, National Space Development Agency of Japan (NASDA), Japan

Mr. Katsuhito Hayashi, NASDA, Bangkok Office

Mr. Grant Wilson from SPOT Asia

Mr. Kwoh Leong Keong and Mr. Lim Hock from National University of Singapore

Mr Suvit Vibulsresth from National research Council of Thailand (NRCT), Bangkok

Dr. Kaew Nualchawee from Asian Institute of Technology (AIT), Bangkok



## OGOS

6hb - En Ozzie Sawicki dan En Karl Panicnin dari Mc Donald Dettwiller, Vancouver, Canada

8hb - Dr. M. Runkel dari FAO Remote Sensing Centre, Rome, Italy

9hb - Dr. Raly Walsh, Jabatan Geografi University College of Swansea, UK

29hb - En Haruhisa, En. Yoshifumi Yasuoka dan En Chu Ishida from NASDA, Japan

## SEPTEMBER

5hb - Philip A. Gomez dari Arthur D. Little

9hb - Peserta Latihan Serantau EC-ASEAN

## OKTOBER

11hb - TYT Gabriel K. Maka, Menteri Sains, Teknologi dan Latihan Vokasional, Zambia dan Samson C. Banda, Koordinator Penyelidikan Kanan, Kaunsel Penyelidikan Saintifik Kebangsaan, Zambia

21hb - Lars Bjerkesco, Pengarah, Swedish Space Corporation, Kiruna Sweden

25hb - Pegawai-pegawai Universiti Prince Songkla, S. Thailand

## NOVEMBER

16hb - R.E. Tack dan Chierre Engel, Radarsat International, Filipina

## DISEMBER

1hb - Kozai Katsutoshi, Universiti Kobe, Mercantile Marine

## AUGUST

6th - Mr. Ozzie Sawicki and Mr Karl Panicnin from Mac Donald Dettwiller, Vancouver, Canada

8th - Dr. M. Runkel from Food and Agriculture Organisation of the United Nation (FAO) Remote Sensing Centre, Rome, Italy

9th - Dr. Raly Walsh, Dept. of Geography, University College of Swansea, UK

29th Mr. Haruhisa, Mr. Yoshifumi Yasuoka and Mr. Ishida from NASDA, Japan

## SEPTEMBER

5th - Philip A. Gomez from Arthur D. Little

9th -Participants of EC-ASEAN Regional Training

## OCTOBER

11th- Honourable Gabriel K. Maka, Minister of Science, Technology and Vocational Training, Zambia and Samson C. Banda, Senior Research Coordinator, National Council for Scientific Research, Zambia

21th - Lars Bjerkesco, Director, Swedish Space Corporation, Kiruna Sweden

25th - Officers of Prince Songkla University, S. Thailand

## NOVEMBER

16th - R.E. Tack and Chierre Engel, Radarsat International, Philipine.

## DECEMBER

1st - Kozai Katsutoshi, Kobe University, Mercantile Marine



## PEROLEHAN DATA

## DATA ACQUISITION

Dalam usaha untuk mengemaskinikan arkib data satelit nasional, MACRES sentiasa berusaha bagi mendapatkan data-data yang terkini dari berbagai jenis satelit remote sensing. Data-data tersebut ialah Landsat TM, SPOT, SAR pesawat dan JERS-1. Kesemua data-data tersebut diperolehi dari National Research Council of Thailand (NRCT) untuk Landsat TM, SPOT Image, Perancis melalui anak syarikatnya SPOT Asia Pte. Ltd., Singapura untuk data SPOT, Remote Sensing Technology Center, Japan (RESTEC) bagi data SAR JERS-1 dan data SAR pesawat dari PETRONAS, Malaysia. Kos perolehan tahun 1994 untuk data-data tersebut berjumlah RM 1,330,301.03.

Jenis data dan bilangan scene yang telah diperolehi disepanjang tahun 1994 ditunjukkan dalam jadual di bawah. Senarai perolehan data Landsat TM dan SPOT yang ada di MACRES ditunjukkan dalam muka surat 36 hingga 46. Pengguna boleh membeli data-data tersebut melalui Bahagian Data dan Informasi, MACRES.

Endeavouring to update national satellite data archive, MACRES continuously took steps to acquire the latest data from different existing remote sensing satellites. These include Landsat TM, SPOT, JERS-1 and airborne SAR data. The data were acquired from National Research Council of Thailand (NRCT) for Landsat TM, SPOT Image, of France via its subsidiary of SPOT Asia Pte. Ltd, Singapore for SPOT and Remote Sensing Technology Centre, Japan (RESTEC) for JERS-1 SAR. In addition, airborne SAR were also acquired from PETRONAS, Malaysia. The total cost spent for data in 1994 was RM 1,330,301.00.

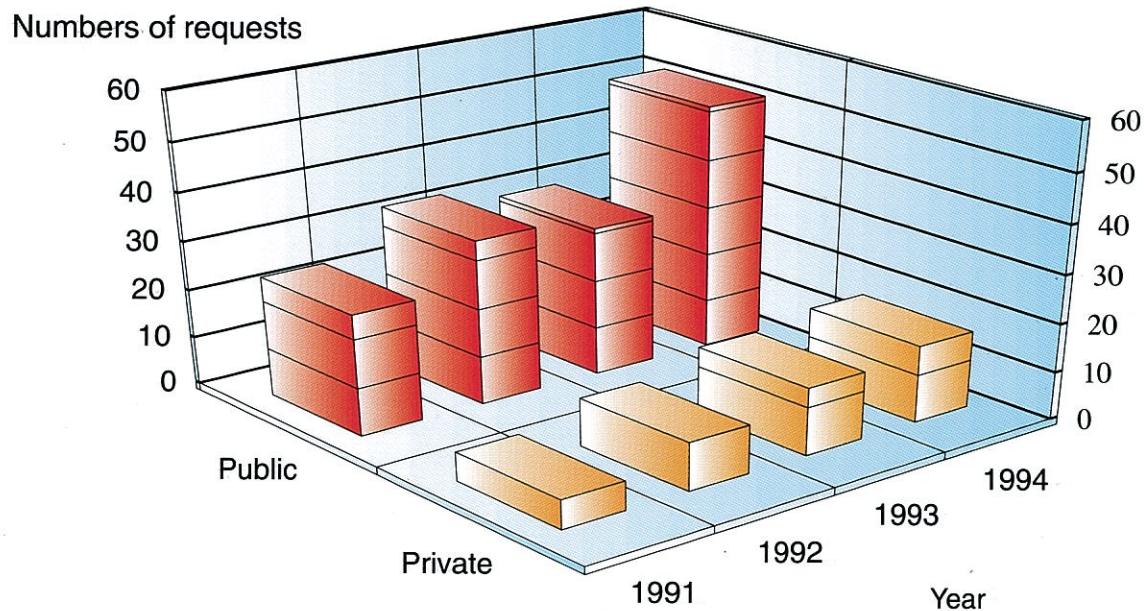
The types of data and number of scenes acquired during the year are given in the table below. Landsat TM and SPOT data thus far acquired and available in MACRES archive are shown on page 36 to 46. Users may purchase these data via the Data and Information Division of MACRES.

Data types	Number of Acquisition
Landsat TM	75 scenes for Malaysian and neighbouring areas.
SPOT	52 scenes of Malaysia which comprises 31 scenes multispectral (XS) and 21 scenes panchromatic (P).
JERS-1 SAR	24 scenes of Malaysia
Airborne SAR	positive print mosaic with scale 1:50,000, 135 sheets for Sabah 191 sheets for Sarawak  'Image strip' prints with scale 1:100,000 218 sheets for Sabah

## Perkhidmatan Data Data Services

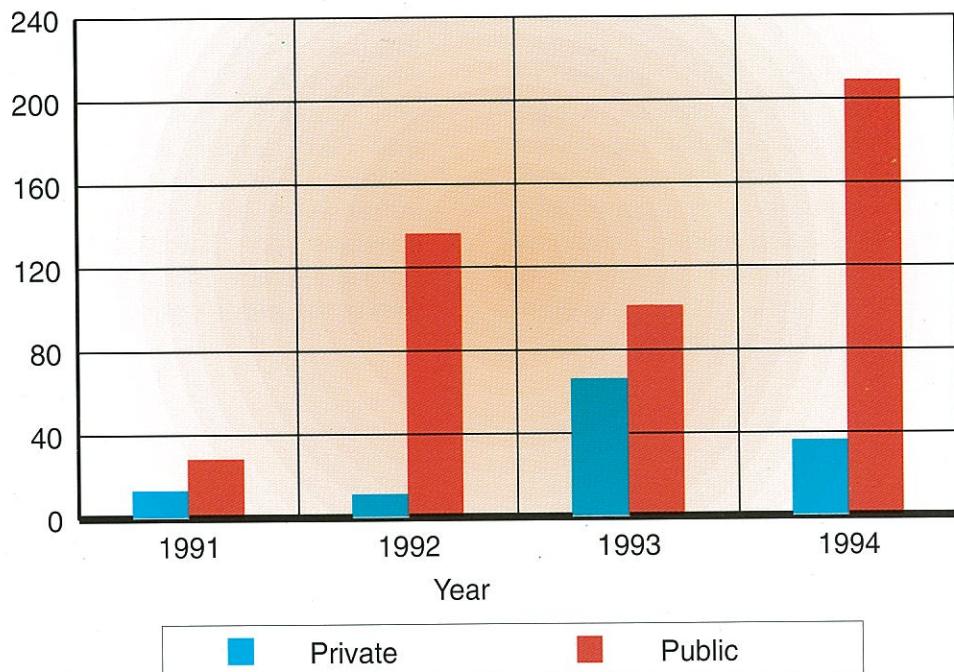
Di sepanjang tahun 1994 sejumlah RM 245,538.00 telah diperolehi oleh MACRES melalui penjualan produk-produk tambah nilai. Dari jualan ni sebanyak RM 123,718.00 diperolehi dari penjualan produk cetak kekal manakala RM 121,820.00 dari data digital. Jumlah perolehan tersebut menunjukkan peningkatan 47% berbanding dengan tahun sebelumnya. Jumlah permohonan pengguna juga menunjukkan peningkatan sebanyak 49% dalam tempoh yang sama.

For the year 1994, an income of RM 245,538.00 was recorded by MACRES through the selling of value-added data products. Out of this figure, RM 123,718.00 was obtained from the hardcopy product and RM 121,820.00 was from the digital product. This sale figure indicates an increase of 47% compared to that of the previous year. The total number of requests from the users has also increased by 49% during the same period.



Bilangan Pengguna Mengikut Sektor Perkhidmatan untuk Tahun 1991-1994  
Number of Users by Sectors for Year 1991-1994

RM ( x 1000)



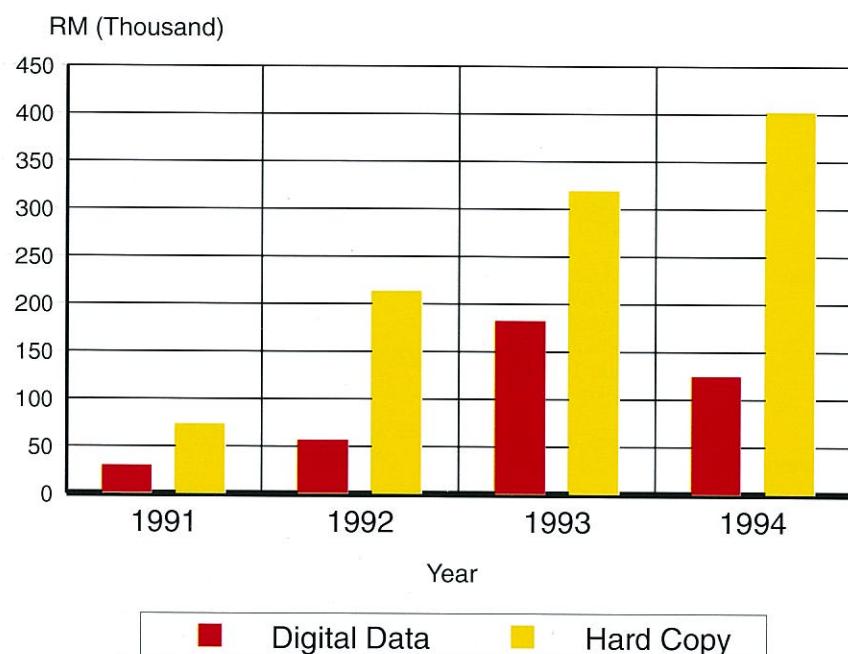
Pendapatan dari Perkhidmatan Data bagi tempoh 1991-1994  
Income for the year 1991-1994 from Data Services

Data satelit juga telah diedarkan kepada 27 agensi pengguna dari sektor kerajaan dan 12 agensi pengguna dari sektor swasta. Ini menunjukkan peningkatan yang jelas dalam penggunaan data satelit di negara semenjak tahun 1991.

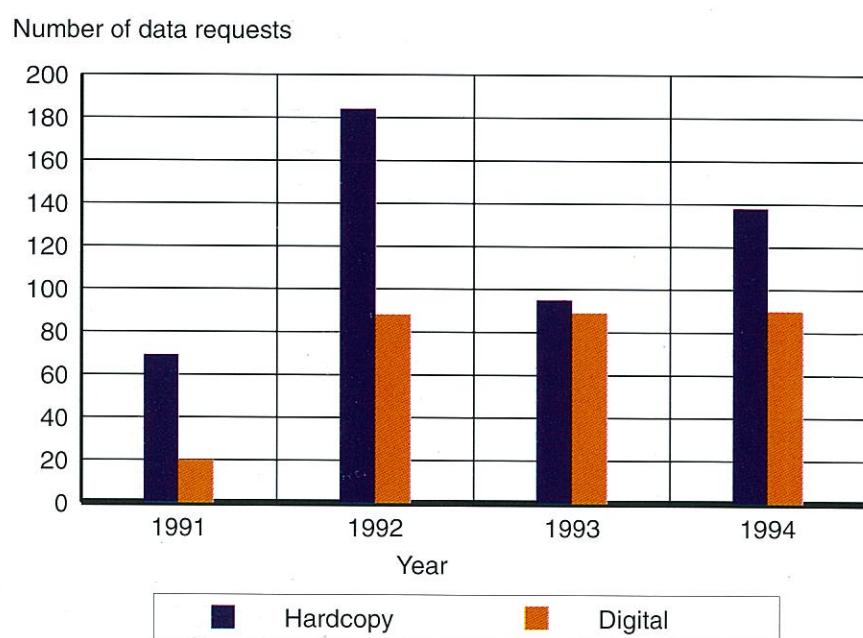
Di samping perkhidmatan penjualan data kepada agensi-agensi pengguna, MACRES turut menyumbang data kepada pelajar-pelajar universiti secara percuma.

Satellite data were distributed to 27 user agencies in the government sector and 12 in the private sector in 1994. This reflects a significant increase in the use of satellite data in the country since 1991.

Beside sale to the user agencies, MACRES also made available data to university students for research purposes at no cost.



Pendapatan Data Digital dan Cetak Kekal untuk Tahun 1991-1994  
Income of Digital and Hard Copy Data for Year 1991-1994



Permintaan Data Tahun 1991-1994  
Request for Data for Year 1991-1994

## AGENSI PENGGUNA / USER AGENCIES

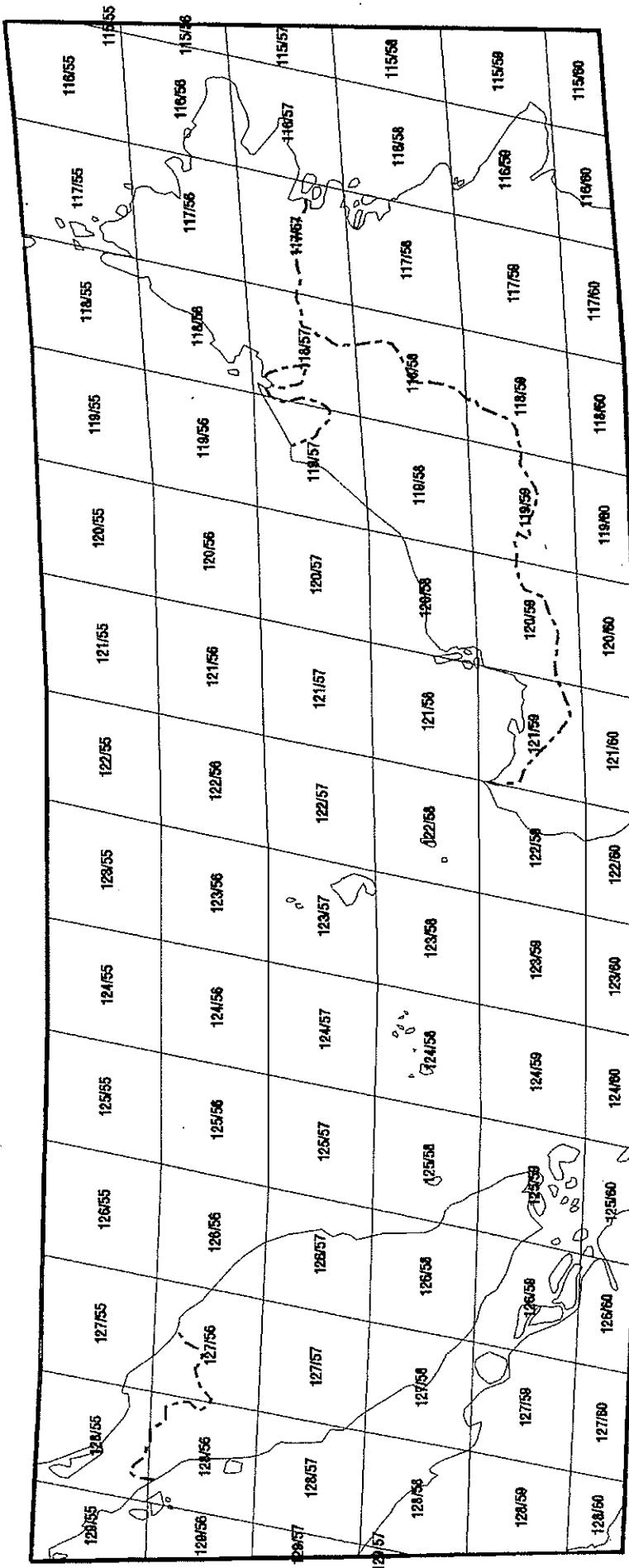
### AGENSI KERAJAAN / PUBLIC AGENCIES

1. Jabatan Perikanan Sabah	-Data Digital (CCT) TM & SPOT -Cetak Kekal SPOT	19. Jabatan Kejuruteraan Perladangan Universiti Pertanian Malaysia.	-Data Digital (CCT) TM.
2. Markas TUDM MINDEF	-Data Digital (CCT)	20. Persatuan Pencinta Alam	-Cetak Kekal TM & SPOT
3. Universiti Sains Malaysia	-Data Digital (CCT) TM & SPOT	21. Jabatan Geografi Universiti Malaya	-Data Digital (Floppy Disk) TM & SPOT.
4. Universiti Teknologi Malaysia (Projek ASEAN-EC/ESA)	-Menggunakan sistem IMS-Meridian untuk menukar data ERS-1format CCT 6250 bpi kepada 1600 bpi. -Cetak Kekal TM	22. Institut Kerjaraya Malaysia (IKRAM)	-Data Digital (CCT) TM.
5. Jabatan Geologi Universiti Kebangsaan Malaysia	-Data Digital & Cetak Kekal TM dan Calcomp paper SPOT.	23. IPT, Universiti Malaya	-Cetak Kekal Calcomp (Paper) TM.
6. Fakulti Perikanan & Sains Samudera Universiti Pertanian Malaysia.	-Data Digital TM & SPOT	24. Jabatan Perhutanan Negeri Selangor.	-Data Digital (CCT) TM & SPOT.
7. Risik 4 MINDEF	-Cetak Kekal SPOT	25. Y.B. Menteri Sains, Teknologi & Alam Sekitar.	-Cetak Kekal Kawasan Sarikei & Meradong, Sarawak.
8. Jabatan Perikanan Malaysia	-Data Digital (CCT) SPOT	26. Institut Teknologi Mara (ITM) Shah Alam.	-Data Digital (Floppy Disk) TM.
9. Jabatan Perhutanan Sabah	-Data Digital (CCT) TM	27. Institut Penyelidikan Perikanan Pulau Pinang.	-Data Digital (CCT) TM -Cetak Kekal Calcomp (Paper) TM.
10. Jabatan Pertanian	-Penggunaan IMS-Meridian untuk menukar format CCT BIL kepada BSQ.		
11. Jabatan Geologi Universiti Malaya.	-Data Digital (Floppy Disk)		
12. Jabatan Perancang Bandar & Desa Pahang	-Cetak Kekal SPOT Calcomp (Paper & transpirasi)		
13. Pusat Penyelidikan Ikan Air Tawar Melaka	-Cetak Kekal SPOT Calcomp (Paper & transpirasi) TM.		
14. Jabatan Muzium	-Cetak Kekal & Calcomp paper , TM.		
15. Jabatan Kajibumi	-Cetak Kekal TM, menukar format data Landsat TM kepada format IDRISI, dan -Data Digital (CCT) TM.		
16. Institut Penyelidikan Perhutanan (FRIM)	-Cetak Kekal 543 & overlay sempadan Kawasan Hulu Terengganu -Data Digital TM 128/56 & 127/58 -Data Digital (Floppy Disk) TM		
17. Jabatan Perhutanan Semenanjung Malaysia	-Cetak Kekal Calcomp (paper) Semenanjung Malaysia -Cetak Kekal TM -Data Digital (CCT) TM		
18 Universiti Teknologi Malaysia	-Data Digital CCT TM & SPOT.		

### AGENSI SWASTA / PRIVATE AGENCIES

1. Petronas	-Cetak Kekal TM
2. Pustaka Cipta Sdn. Bhd.	-Cetak kekal Calcomp (Paper) TM.
3. Lankhorst Environment Services Sdn. Bhd.	-Cetak Kekal Calcomp (Paper & Transparency) TM.
4. Iris Environmental System (M) Sdn. Bhd.	-Cetak Kekal TM -Calcomp (Paper) TM.
5. Juantara Consultant Sdn. Bhd.	-Cetak kekal TM. -Cetak Kekal Calcomp (Paper) TM.
6. Syed Muhammad, Hooi & Binnie Sdn. Bhd.	-Data Digital TM & SPOT Cetak Kekal TM & SPOT.
7. Engineering & Environmental Consultant Sdn. Bhd.	-Cetak Kekal Calcomp (Paper) TM.
8. Europasia Engineering Services Sdn. Bhd.	-Cetak Kekal Calcomp (Paper) TM.
9. Vista Development Sdn. Bhd.	-Data Digital (CCT) TM.
10. Erinco Sdn. Bhd.	-Cetak Kekal Calcomp (Paper) TM.
11. Projass Engineering Consortium	-Cetak Kekal TM.
12. Sarawak Shell Bhd.	-Cetak Kekal TM.

## INDEX FOR LANSAT 4 & 5 COVERAGE OVER MALAYSIA



QUADRILATERAL FRAMES WITH RESPECT TO WRS (PATH/ROW)

SATELLITE REMOTE SENSING DATA ARCHIVED AT MACRES

LANDSAT DATA

Platform	: LANDSAT 4,5	Sensor	: TM (30M)
Source Agency	: NRCT	Source Format	: LGSOWG
Data Storage Format	: BIL	Storage Media	: CCT
Density	: 6250 BPI	Product Type	: BULK

No.	Coverage (Path/Row)	Location (Major Town)	Acquisition Date	Cloud Cover
1.	116/56	Lahad Datu	03/08/91 28/01/93 24/06/94	0000 2030 0311
2.	116/57	Semporna	18/06/92 28/01/93 05/04/94 24/06/94	1000 0001 3222 1011
3.	117/55	Pitas	11/07/92 14/07/93 18/08/94	2300 7727 1112
4.	117/56	Sandakan	29/10/91 15/06/94	1112 0112
	117/56 - Q1	Sigindai	12/06/93	3469
	117/56 - Q4	Batu Puteh	03/07/89 21/09/89	N.A. N.A.
5.	117/57	Batu Punggul	06/01/94	2261
	117/57 - Q1	Batu Punggul	31/10/92	1736
6.	118/55	Kudat	16/04/93 13/01/94	2100 0001
	118/55 - Q4	Kudat	18/04/88 02/07/92	1300 2311 0002
7.	118/56	Kota Kinabalu	18/04/88 14/06/91 03/06/93	0000 5637
	118/56 - Q3	Pulau Labuan	16/04/93	0146
8.	118/57	Long Pa Sia	01/03/88 04/09/92 24/07/94 09/08/94	2422 1312 2515 3446
	118/57 - Q1 - Q3	Lawas G. Murud	13/01/94 13/01/94	1949 1949
9.	118/58	L.Tebangan	01/03/88 28/03/92	2212 1412
10.	118/59	Longnawan	01/03/88	2242
	118/59 - Q1	Longnawan	20/09/92	3999
11.	119/54	Terumbu Laksamana	29/10/92	1101
12.	119/55	Permatang Ubi	19/03/92	0000
13.	119/56	Permatang Penyu	22/03/93	2001

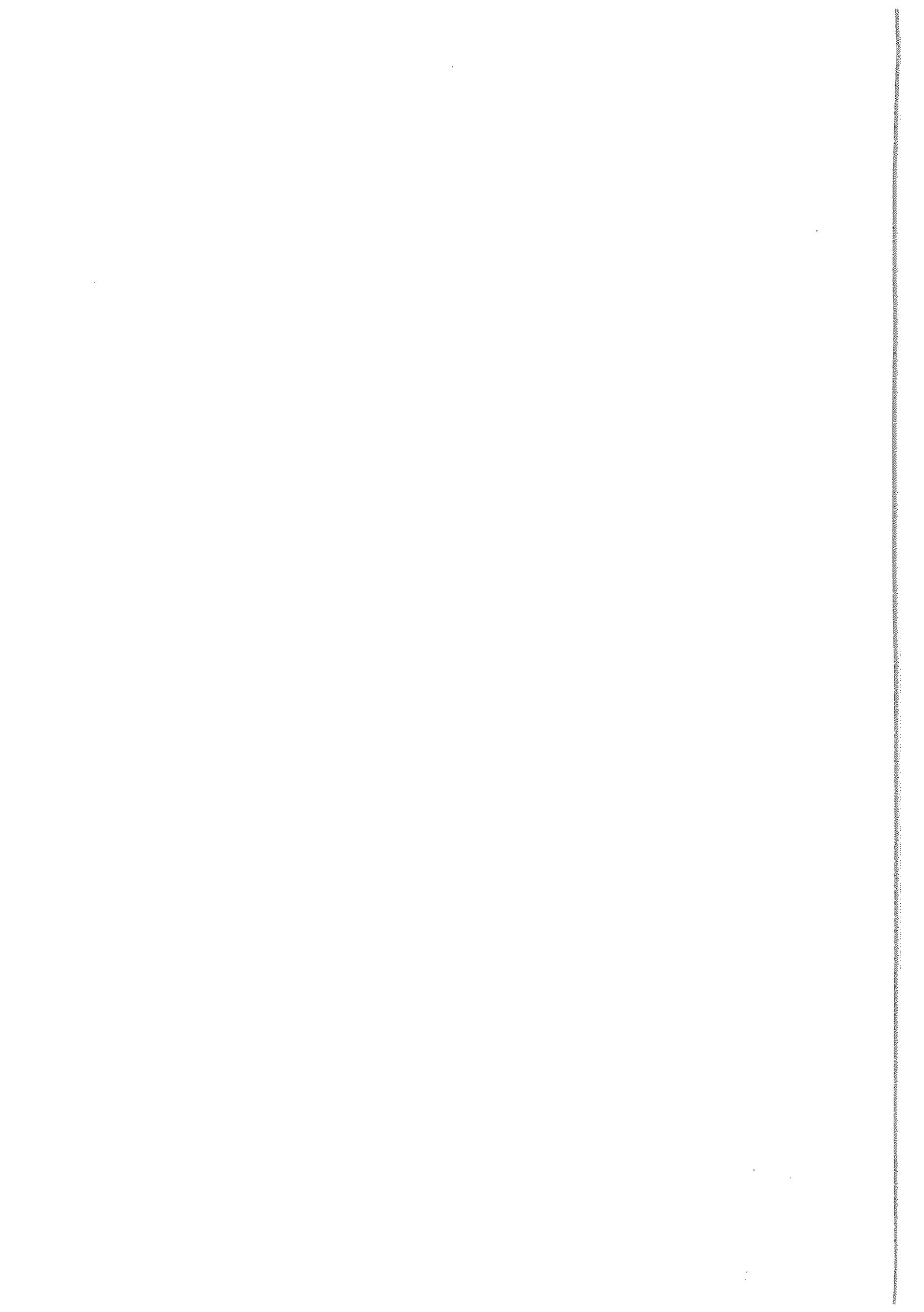
14.	119/57	Miri	14/07/88 21/12/88 25/07/92 09/05/93 31/07/94	7441 4345 1112 6521 1150
15.	119/58	Bintulu	14/07/88 18/06/90 18/04/91 25/07/92 31/07/94	1148 4222 0123 0033 3200
16.	119/59	Kapit	18/06/90 24/08/91 25/07/92 31/07/94	2235 4101 3221 0002
17.	120/55	P. Layang-layang	11/04/92	1220
18.	120/57		22/07/94	1000
19.	120/58	Sibu	25/10/88 28/08/90 04/08/93 20/06/94	2021 2102 1132 2111
20.	120/59	Sri Aman	25/10/88 16/09/91 20/06/94	2137 0002 0013
21.	121/58	Tg. Sirik	31/01/93 19/02/94	4162 1111
	121/58 - Q4	Tg. Sirik	23/07/92	9591
22.	121/59	Kuching	25/05/88 29/06/89 21/06/92 08/04/94	4346 2100 1130 0000
	121/59 - Q1	Kuching	11/08/93	3344
	- Q3	Kg. Padawan	11/08/93	3344
23.	122/59	Tg. Datu	10/06/91 14/05/93	1110 4020
24.	125/58	Mersing	17/04/93 04/04/94	0000 3241
	125/58 - Q3	Mersing	25/06/89 01/04/90 15/06/91 03/07/92	4737 N.A. 0010 1535
25.	125/59	J. Bahru	03/04/88 11/03/91	N.A. N.A.
	125/59 - Q1	J. Bahru	28/06/90	1125
26.	126/56	K. Terengganu	02/07/89 14/08/93 22/02/94	N.A. 1213 2211
	126/56 - Q1	P. Redang	09/08/91	0202
	126/56 - Q3	K. Terengganu	31/07/88 09/08/91	3410 1112

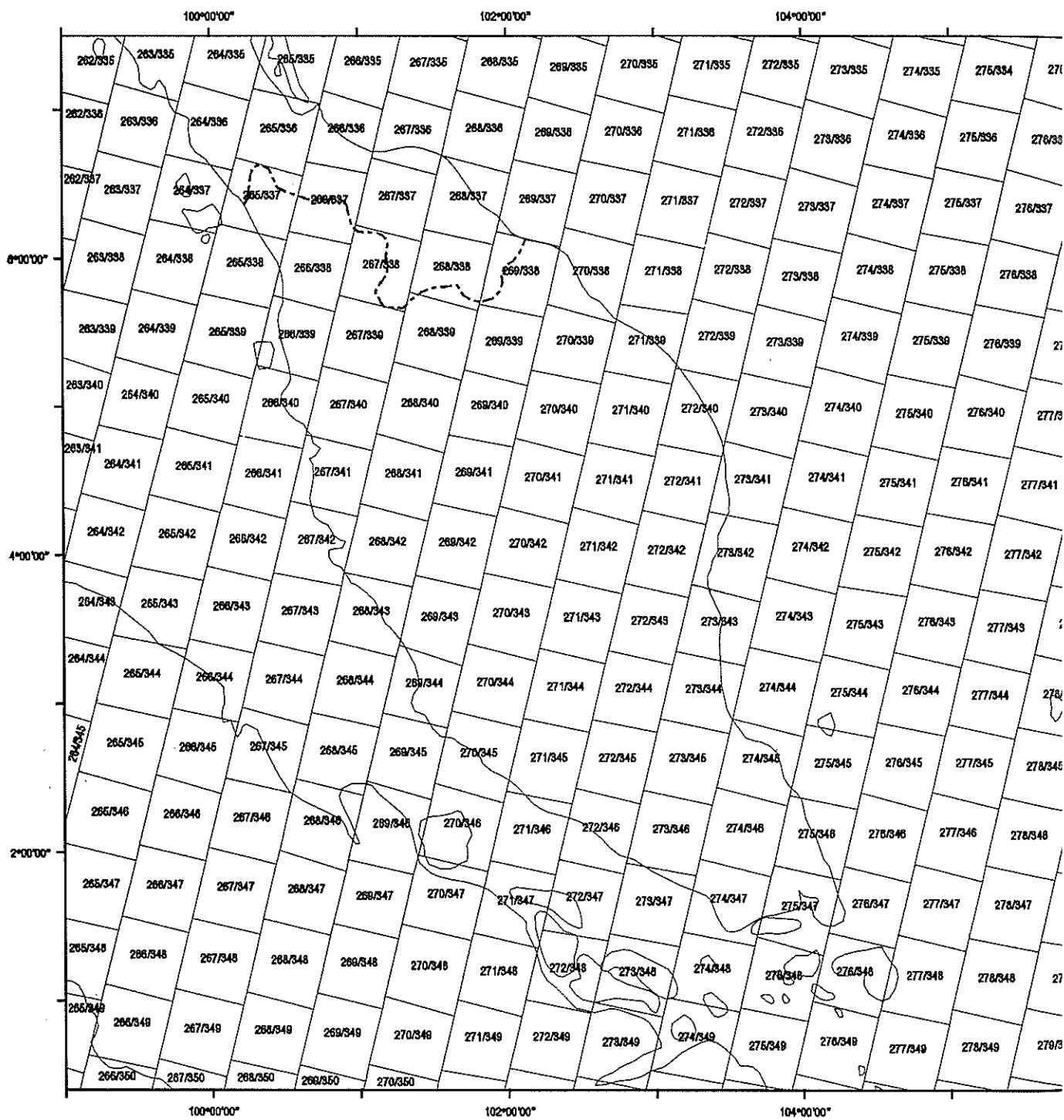
27.	126/57	Kuantan	31/07/88 16/06/89 02/07/89 14/02/91 30/06/94	0100 0140 2150 0100 1020
28.	126/58	Gemas	22/12/88 02/07/89 07/09/90	1616 7125 0021
	126/58 - Q2	Pekan	31/07/88	0014
	126/58 - Q4	Labis	16/06/89 11/06/93	1222 4143
29.	126/59	Batu Pahat	25/10/88 22/12/88 22/02/94	N.A. 2224 4154
	126/59 - Q2	Batu Pahat	14/02/91	1111
30.	127/55	Narathiwat	20/07/93 02/04/94	8500 2422
31.	127/56	Kota Bahru	17/08/88 15/02/89 20/04/89 06/03/90 20/07/93 02/04/94	0011 2717 1054 0111 0015 0100
	127/56 - Q2	Kota Bahru	17/07/92	0145
	127/56 - Q3	T. Temenggor	13/02/88	4334
32.	127/57	Ipooh	15/02/89 07/06/89 16/12/89 23/04/90 21/02/91 26/02/93 07/07/94	2717 3612 5636 1201 0200 1304 4152
	127/57 - Q4	Raub	15/06/89	N.A.
33.	127/58	Kuala Lumpur	13/02/88 17/04/88 15/02/89 06/03/90 29/08/90 03/12/90 21/02/91 26/02/93 02/04/94	N.A. 1511 5181 2310 7877 1140 0060 0150 1350
34.	128/55	Songkhla	26/03/89 24/07/92 20/02/94	N.A. 3121 0020
35.	128/56	Pulau Pinang	20/02/88 22/02/89 10/03/89 30/01/92 01/02/93 20/02/94	3601 0130 N.A. 0000 0010 0011
	128/56 - Q4	Butterworth	12/02/91	0010

---

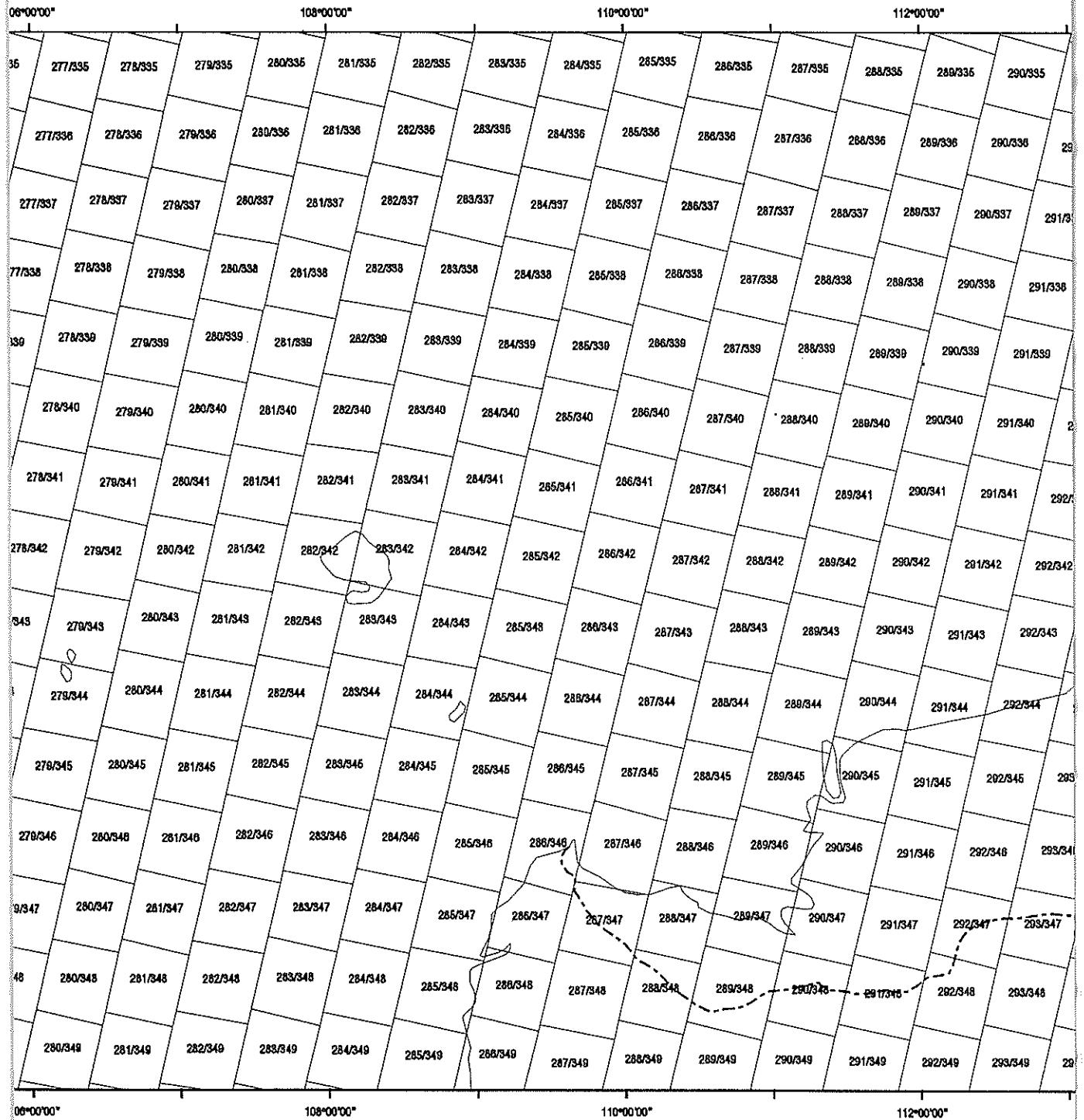
36.	128/57	Taiping	05/01/89 12/08/93 24//03/94	3288 2121 6052
	128/57 - Q2	Taiping	26/12/90	3051
37.	129/55	P. Terutau	08/02/93 10/01/94	0310 0400
38.	129/56	-	07/01/93 27/02/94	0031 0011
39.	123/52	Vietnam	16/05/91	N.A.
40.	123/53	Vietnam	08/06/88	0000

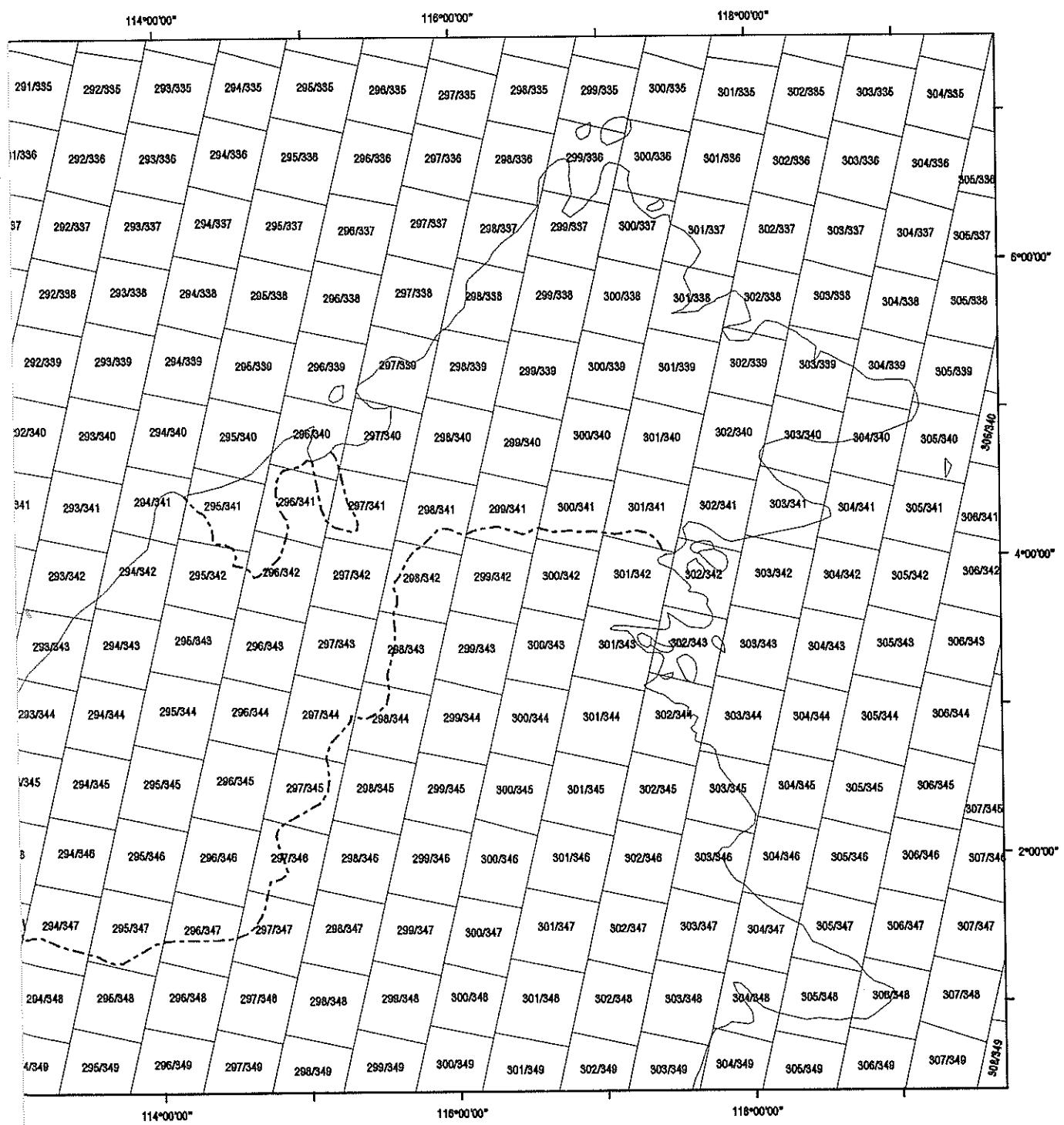
---





# INDEX FOR SPOT - 1 & 2 COVERAGE OVER MALAYSIA





## SPOT DATA

Platform : SPOT-1, SPOT-2  
 Source Agency : NRCT, SSC, SPOTIMAGE  
 Data Storage Format : BIL  
 Density : 6250 BPI

Sensor : MLA  
 Source Format : LGSOWG  
 Storage Media : CCT  
 Product Type : BULK

No.	Coverage (K/J)	Location (Major town)	Acquisition Date	Cloud Cover
1.	264/337	P. Langkawi	28/02/87 25/02/91 17/01/93	N.A. N.A. BDBCBBCBB
2.	264/338	P.D. Bunting	28/02/87 25/02/91 17/01/93	N.A. N.A. BBCBCDEEE
3.	265/337	Kangar	17/02/87 09/02/89	0000 0200
4.	265/338	Kuala Kedah	17/02/87 25/12/88 11/01/93	0000 0000 BBABAAAAA
5.	265/339	George Town	11/01/93	AAAAAAABA
6.	266/337	Sintok	27/03/90	0000
7.	266/338	Alor Setar	03/03/88 18/01/90	0000 0000
8.	266/339	Butterworth	28/02/87 03/03/88 06/08/88 08/03/91 21/03/92 25/01/94	0000 0000 0011 0010 ABBBBBBB AAABABAB
9.	266/340	Parit Buntar	03/03/88 08/03/91 21/03/92 01/02/93 25/01/94	2041 0000 CBBBBBBB ABAACBDC ABABABBA
10.	267/337	Yala	27/03/90	1100
11.	267/338	Betong	23/11/89 27/03/90	2502 0000
12.	267/339	Gerik	04/02/89 23/11/89 03/11/90 24/01/92	0000 0101 0100 BCABBBCB
13.	267/340	T. Cenderoh	23/11/89 03/01/90	0101 0000
14.	267/341	Beruas	23/11/89 01/12/93	0110 1000
15.	267/342	Lumut	29/03/88 23/11/89 12/05/92 20/02/94	1100 0099 BCBBABAA BBBBBBBB
16.	268/338	G. Ulu Merah	28/03/89	N.A.

17.	268/339	T. Temenggor	28/03/89 23/11/89	N.A. N.A.
18.	268/340	Gunung Gerah	23/11/89	2808
19.	268/342	Teluk Intan	25/06/91 07/06/92	1100 CBBBBBBB
20.	268/343	Sabak Bernam	25/06/91 07/06/92	0000 BBABAABA
21.	269/337		10/03/90	0100
22.	269/338	Kota Bharu	14/06/89 06/03/90	0000 0100
23.	269/339	Jeli	14/06/89	0000
24.	269/340	Gua Musang	14/06/89	0000
25.	269/342	Kg. K. Sia	10/06/91	N.A.
26.	269/343	Tanjung Malim	03/07/87 10/06/91	0000 0101
27.	269/344	Shah Alam & Kelang	02/01/87 30/01/89 26/02/91 12/03/92 24/12/94	0100 0001 0100 ABBBBBAA BBBBBBBB
28.	269/345	Morib	26/02/91 12/03/92	0000 AAAAAAA
29.	270/338	Bachok	30/07/86 26/06/88	0100 0000
30.	270/339	Jertih	20/07/86	N.A.
31.	270/340	Kg. Kabang	20/08/92	BCBBBBBB
32.	270/343	Bentung	10/01/91	N.A.
33.	270/344	Kuala Lumpur	26/12/90 30/12/90 08/03/91 15/06/91	1100 0101 N.A. 1000
34.	270/345	Port Dickson	30/12/88 14/02/90 26/02/91 20/01/92 12/03/92	0000 0000 0100 AAAAAABA ABABABAA
35.	271/338	P. Perhentian	08/04/94 28/04/94	DDBCACBB CDCDCBC
36.	271/339	Kg. Rahmat	20/08/86 01/04/93	0011 BBBBBBCB
37.	271/344	Kg. Jawi	15/02/89	0101
38.	271/345	Tampin	15/02/89	1001
39.	271/346		17/02/93	ABABAABB
40.	272/339	Kuala Terengganu	25/02/94	CEBDCCCC
41.	272/340		21/09/94	BABBBCCC

42.	272/341	Kg. Gadung	13/04/90 19/08/93	1010 0010
43.	272/342	Sg. Lembing	03/10/88 25/02/94	0000 ABABABAA
44.	272/343		25/02/94	AABBBABB
45.	273/340	P. Tenggul	25/02/94	CECEDECC
46.	273/341	K. Paka	09/06/86 25/02/94	0000 CCCCBCCB
47.	273/342	Cerating	03/04/89 15/12/93	0101 BBBBBABA
48.	273/343	Pekan	20/07/86 03/04/89 15/12/93	0000 0010 BABABBBB
49.	273/344	Nenasi	19/06/86	N.A.
50.	273/347	Tg. Laboh	28/03/92	BCABAAAA
51.	274/345	K. Pontian	31/07/86	0010
52.	275/344	P. Tioman	15/06/94	CDCDBCBC
53.	275/345	P. Tioman	15/06/94	BDBDBCBC
54.	275/346	Jemaluang	08/05/86 15/06/94	0100 CCCCCDD
55.	275/347	Johor Bahru	19/06/86 06/08/89 04/03/91 04/06/94	0110 0011 0201 CCCBBBC
56.	276/345		14/12/94	BBBBBBCC
57.	276/347		20/12/93	BDBBBBBB
58.	286/346	Tg. Datu	12/06/90	0000
59.	287/346	P. Talang Besar	08/06/91	0000
60.	287/347	Landu Besar	11/08/86	0000
61.	288/347	Kuching	11/08/86	0000
62.	288/348	Tebedu	11/08/86	0011
63.	291/338		13/03/95	BAAABABA
64.	292/335	P. Layang-layang	09/02/93	CCCCCC
65.	292/336	Terumbu Semarang	04/02/93	CBBACBBB
66.	292/337	Terumbu Semarang	10/04/94	BBCBCCCB
67.	292/338	-	14/03/94	BBBBBBBB
68.	292/339	-	10/01/93	0100
69.	292/340	Beting Merpati	10/01/93	0011
70.	293/335	Permatang Ubi	10/04/94	ABABABBB

71.	293/336	-	14/01/93	0010
72.	294/342	K. Sibuti	20/09/90	0010
73.	295/341	Seria	03/08/88	0011
74.	295/347	Melatai	20/06/87	0000
75.	296/339	P. Labuan	29/10/86 17/01/94	0001 BBAAAAAA
76.	296/340		17/01/94	AAAAABCC
77.	297/339	Kuala Penyu	25/04/94	ABBCBBBC
78.	297/340	Sipitang	22/04/90	0101
79.	298/337		31/12/92 31/12/92(S)	ABABAAAA
80.	298/338	Kota Kinabalu	09/03/92	ABABABBC
81.	298/339	Papar	23/07/86	0010
82.	299/335	Tg. Siagut	25/05/87 07/08/92 20/10/94	0101 CCCCCCBC BBBBBABC
83.	299/336	Kudat	20/05/87 07/08/92 15/07/94	0001 CCBBBBBB 0000
84.	299/337	Kota Marudu	28/08/86	0011
85.	299/338		25/02/94	0001
86.	299/341	Pensiangan	19/06/90	0000
87.	300/336	P. Malawali	20/05/87	0100
88.	300/337	Simpangan	28/08/86 10/10/94	0000 BCBBBCBB
89.	301/341	Kalabakan	17/04/88	0101
90.	301/342	Alang	03/05/88	1000
91.	302/342	Tawau	23/02/90 31/01/93	1010 BBBBBBCB
92.	303/341	Kunak	31/10/89	0011
93.	303/342	Inderasabah	12/12/89	0001
94.	304/341	Semporna	06/01/93	BBBBBBBC
95.	304/342	P. Sipadan	06/01/93	BCBDBDBE
96.	305/340	Tg. Labian	13/08/92	BBBBBBBB

## SPOT DATA

Platform : SPOT-1, SPOT-2  
 Source Agency : NRCT, SPOTIMAGE  
 Data Storage Format : BIL  
 Density : 6250 BPI

Sensor : PLA  
 Source Format : LGSOWG  
 Storage Media : CCT  
 Product Type : BULK

No.	Coverage (K/J)	Location (Major town)	Acquisition Date	Cloud Cover
1.	264/337	P. Langkawi	19/02/94	AAAAAAA
2.	265/337	Kangar	24/02/94	AAAAACBB
3.	265/338		24/01/94	AAAAAAA
4.	265/339		30/01/91	0000
5.	266/337	Sintok	17/02/87 04/05/91 17/02/93	0000 0000 0000
6.	266/338	Alor Setar	03/03/88 21/02/91 19/01/94	2001 0000 DDCDDBBBB
7.	266/339	Butterworth	03/03/88 04/02/91 05/02/91 17/02/93 19/01/94	0000 0000 0000 0000 BBBBBBBB
8.	266/340	Parit Buntar	03/03/88 17/02/93	2031 0001
9.	267/337		17/02/93	0000
10.	267/339		10/02/91	0000
11.	267/340		21/02/91	0000
12.	267/342	Lumut	29/03/88	0101
13.	268/338	G. Ulu Merah	28/03/89	N.A.
14.	268/339	T. Temenggor	28/03/89 10/02/91	N.A. 0000
15.	268/341	Ipoh	11/02/88	0000
16.	269/338	Kota Bharu	14/06/89 20/02/94	0000 BABAAAAA
17.	269/339	Jeli	14/06/89 20/02/94	0000 AAAABBBC
18.	269/340	Gua Musang	14/06/89	0000
19.	269/343	Tg. Malim	23/04/94	BDBCBCBB
20.	269/344	Shah Alam & Kelang	24/08/87 26/12/90 23/04/94	0000 1100 BBBBBCBC
21.	270/344	Kuala Lumpur	30/12/90	0101
22.	270/345	Port Dickson	30/12/88 14/02/90 02/04/94	0000 0000 BBBBBBAA

23.	271/339	Kg. Rahmat	07/08/88	0000
24.	271/340	Tasik Kenyir	07/08/88	0110
25.	271/343	Temerloh	13/10/88	1100
26.	271/345	Tampin	15/02/89 02/04/94	1001 CCACBBBA
27.	271/346	Melaka	15/02/89 02/04/94	0000 AAAAAAABB
28.	272/340	Marang	20/02/94	CDBCBCAB
29.	272/341		13/04/90	0000
30.	273/342	Cerating	03/10/88 03/05/94	0000 BBBBBBCDC
31.	273/343	Pekan	03/04/89	0010
32.	275/346	Jemaluang	08/05/86	0100
33.	275/347	Johor Bahru	08/05/86 06/08/89 04/06/94	0011 0011 DDCCBCBC
34.	288/347	Kuching	08/09/91	0020
35.	294/342		24/03/93	0000
36.	295/340	Tutong	23/08/89	0001
37.	296/339	P. Labuan	17/01/94	BBAAAAAA
38	296/340	Bandar Seri Begawan	23/08/89 17/01/94	0010 AAAAABCC
39.	296/341		17/06/94	BBCCCCDC
40.	298/341	Maligan	23/07/89	0101
41.	298/343	Pa Dali	23/07/89	0002
42.	302/342	Tawau	05/07/90	0000

## PENINGKATAN SYSTEM

### SYSTEMS UPGRADING

Kemudahan yang terdapat di MACRES adalah dirangka khas bagi membolehkan integrasi Sistem Pemprosesan Imej (IPS) dan GIS. Kemudahan MACRES boleh dibahagikan kepada empat komponen utama; iaitu IPS, GIS, Komputer Mikro IPS dan GIS dan Makmal Foto bagi tujuan pengeluaran produk salinan kekal yang berkualiti tinggi.

Kesemua komponen kemudahan di atas kecuali makmal foto dihubungkan dengan sistem rangkaian komputer, yang mana membolehkan data dari satu sistem dihantar kepada sistem data raster ke vektor dan sebaliknya.

IPS dan perisian pembetulan geometri (GICS) menggunakan hos komputer Mikrovax II. Perisian ini menerima input data mentah satelit, data analog yang ditukarkan dalam bentuk digital oleh sistem pengimbas dan juga data RADAR melalui perisian Generalized Synthetic Aperture RADAR (GSAR).

MACRES juga mengoperasikan beberapa perisian komputermikro dan mini seperti MICSIS, ErgoVista and PCI. Perisian ini digunakan terutamanya untuk menganalisa dan mendapatkan maklumat pemetaan dari data SAR (Synthetic Aperture Radar). Perisian IPS lain yang menggunakan komputer mikro adalah meridian PC yang dihubungkan dengan komputer DEC Mikro Vax II bagi kemudahan pemindahan fail dari sistem Meridian ke komputer peribadi atau ke dalam disket.

Antara perisian IPS lain yang terdapat di MACRES adalah S-Geos and SHARK yang dimuatkan di dalam stesen kerja Sun Sparl 10. Perisian ini digunakan untuk menganalisa data RADAR dan NOAA bagi tujuan aplikasi kaji cuaca dan alam sekitar.

Facilities installed at MACRES are configured specifically to integrate image processing and GIS. These consist of four major components; Image Processing System (IPS), GIS, PC-based facilities for image processing and GIS and a remote sensing photo laboratory for high quality hardcopy outputs.

Except for the photo laboratory, all these components are linked via networking system, thus making it possible for transferring the data from one system to another or transformed from raster to vector or vice versa.

The IPS, which uses Meridian Software and a Geocoded Image Correction System (GICS), runs on Microvax II. Other than raw satellite data, the system also accepts scanned, and converted analog-to-digital data. Raw RADAR data is also accepted by using Generalized Synthetic Aperture RADAR (GSAR) software.

MACRES also operates a number of micro and mini-based IPS softwares such as MICSIS, ErgoVista and PCI. They are currently being used mainly to analyze and classify Synthetic Aperture RADAR (SAR) data. The other micro-based IPS software is Meridian PC and it is connected to DEC Micro Vax II. This software is used for file transfer from Meridian system in DEC Micro Vax II to personal computers on floppy disks.

S-Geos and Shark are the other available IPS Softwares which are installed on Sun Spark 10. These Softwares are used to analyze RADAR and NOAA data for meteorological and environmental applications.

MACRES akan terus mempertingkatkan kemudahan remote sensing bagi memenuhi keperluan penyelidikannya dan bagi memenuhi permintaan pengguna yang semakin meningkat dan bertambah canggih teknologi ini.

Kemudahan perkakasan dan perisian komputer adalah penting untuk perlaksanaan program remote sensing nasional yang diselaraskan oleh MACRES. Oleh itu, MACRES akan terus mempertingkatkan kemudahan ini bagi mencapai objektif yang telah ditetapkan.

Walaubagaimanapun peningkatan peralatan tidak begitu pesat dijalankan dalam tahun 1994 kerana MACRES perlu berpindah bagi membolehkan pembinaan pejabat baru di tapak pejabat sekarang. Peralatan yang telah dibeli termasuklah sebuah pencetak 'Novajet', 'Direct Projector' dan 'Photo Colour Reversal Processor'.

MACRES will continue to upgrade remote sensing facilities to meet its own research needs as well as to keep abreast with the increase and more sophisticated demand of the technology from users.

Availability of sophisticated hardware and software facilities are to facilitate the implementation of national remote sensing programmes which is being coordinated by MACRES. MACRES will therefore continue to upgrade this facilities in order to achieve the set objectives .

However, due to MACRES' plan to shift its office to make way for the construction of its new headquarters on the same site, acquisition of new equipment in 1994 was limited to minimal. These include the purchase of a Novajet printer, a Direct Projector and a Photo Colour Reversal Processor.

## PENYELIDIKAN DAN PEMBANGUNAN

## RESEARCH AND DEVELOPMENT

Di bawah program penyelidikan dan pembangunan, MACRES telah dipertanggungjawab melaksanakan tiga aktiviti utama iaitu, projek penyelidikan di bawah mekanisma IRPA, projek pembangunan di bawah Program Remote Sensing Nasional (NRSP) dan projek aplikasi dua hala dengan negara luar.

### PROJEK IRPA

Tiga Projek IRPA iaitu pemetaan zon-agroekologi, pemetaan geologi dan penubuhan pengkalan data sumber alam sekitar yang telah bermula pada tahun 1992, berjalan mengikut jadual. Sehingga kini, peta-peta litupan bumi, jenis tanah, fisiografi dan foto geologi telah dihasilkan melalui data satelit. Peta-peta ini bersama dengan data lain merupakan asas kepada pengwujudan pangkalan data sumber alam sekitar.

Projek pembangunan bagi tahun 1994 di bawah NRSP pula tertumpu kepada (i) pembangunan peralatan, (ii) pembangunan tenaga manusia terlatih dan mahir, (iii) perolehan data satelit bagi memenuhi keperluan penggunaan di Malaysia dan (iv) pembinaan bangunan baru MACRES.

Dari segi pembangunan tenaga manusia yang terlatih dan mahir dalam bidang remote sensing dan teknologi berkaitan, MACRES telah menganjurkan beberapa aktiviti dalam tahun 1994 yang mana pencapaiannya telah melebihi sasaran yang ditetapkan.

Under research and development programme, MACRES is committed to implement three major activities - research projects envisaged under the IRPA mechanism, development projects under the National Remote Sensing Program (NRSP) and bilateral application projects with foreign partners.

### IRPA PROJECT

Three projects - agro-ecological zone mapping, geological mapping and establishment of an environmental resource database, that began in 1992, proceeded on schedule. To date, the land cover, soil, physiography and photo-geology maps were generated from satellite data. These maps together with the other data have provided the basis for establishing the environmental resource data base.

In 1994 development projects under the NRSP were centred on (i) acquisition of equipment, (ii) development of skilled and trained manpower in the country, (iii) acquisition of satellite data to fulfill the needs of users in the country and (iv) construction of MACRES's new building.

MACRES has conducted several activities to further develop skilled and trained manpower in remote sensing and related technologies in the country. The achievements attained in 1994 exceeded what was targeted for.

Tiga bengkel yang melibatkan pemindahan teknologi kepada beberapa agensi pengguna telah diadakan di Kuala Lumpur iaitu dua berkaitan aplikasi remote sensing dalam bidang marin dan perbandaran yang dijalankan bersama Universiti New South Wales, Australia dan Universiti Peking, China, masing-masing pada 4-13hb April dan 1-6hb Ogos 1994. Manakala bengkel prinsip asas radar pula telah dijalankan bersama Canadian Centre for Remote Sensing pada 10-17hb Mei, 1994. Selain itu, bengkel mengenai aplikasi ERS-1 dalam bidang oseanografi juga telah diadakan bersama Kesatuan Eropah pada 2-12hb September 1994 di Kuala Lumpur untuk 24 peserta ASEAN.

Dua seminar 'decision makers' telah juga diadakan bagi memberi pendedahan yang sewajarnya mengenai remote sensing dan teknologi berkaitan kepada 'decision makers' di Malaysia. Seminar tersebut ialah 'Potensi Aplikasi ERS-1 Remote Sensing Gelombang Mikro di Malaysia' yang telah diadakan bersama Kesatuan Eropah pada 1 September 1994 di Kuala Lumpur dan 'Aplikasi Remote Sensing dan Sistem Geoinformasi' dijalankan bersama ITC, Netherlands pada 12-16 Disember, 1994 di Langkawi

Three training workshops to effect a transfer of technology to relevant user agencies were organised in Kuala Lumpur - two on remote sensing for marine and urban applications conducted jointly with the University of New South Wales, Australia and Peking University, China on 4-13th April and 1-6th August, 1994 respectively, and one on basic radar principles with Canadian experts on 10-17th May, 1994. Additionally, a training workshop on 'ERS-1 Applications for Oceanography' was also organised with the European Union for 24 selected ASEAN participants on 2-12th September, 1994 in Kuala Lumpur.

Two decision makers seminars to provide adequate exposures to Malaysian decision makers in remote sensing and related technologies were also organised - "Potentials of ERS-1 Microwave Remote Sensing Applications in Malaysia" with the European Union on 1 September, 1994 in Kuala Lumpur and "Applications of Remote Sensing and Geoinformation Systems" with ITC, Netherlands on 12-16 December, 1994 in Langkawi.



*Seminar 'Decision Makers', Kuala Lumpur  
Decision Makers Seminar,  
Kuala Lumpur*



*Seminar 'Decision Makers', Langkawi  
Decision Makers Seminar, Langkawi*

## PROJEK DUA HALA

Projek dua hala bersama negara luar telah dimulakan semenjak penubuhan MACRES pada tahun 1990 (Jadual 1)

Pada masa ini, MACRES menjalankan projek usahasama dengan 'European Space Agency' (ESA), 'Swedish Space Corporation' (SSC), 'University of Peking, China' (UP), 'Canadian Centre for Remote Sensing' (CCRS) dan 'National Space Development Agency of Japan' (NASDA). Projek-projek tersebut ialah (i) "Complementary Nature of SAR and Optical Data for Land Cover Mapping", (ii) "Environmental Studies", (iii) "GlobeSAR", dan (v) "Land Cover Characterisation in a Tropical Environment Using JERS-1 Data".

## BILATERAL PROJECTS

Bilateral projects with foreign partners started since the establishment of MACRES in 1990 (Table 1)

MACRES is currently undertaking collaborative projects with the European Space Agency (ESA), Swedish Space Corporation (SSC), University of Peking, China (UP), Canadian Centre for Remote Sensing (CCRS) and the National Space Development Agency of Japan (NASDA). These projects are (i) Complementary Nature of SAR and Optical Data for Land Cover Mapping, (ii) Environmental Studies, (iii) GlobeSAR, and (v) Land Cover Characterisation in a Tropical Environment Using JERS-1 Data.

*Jadual 1: Projek dua hala MACRES dengan negara luar.  
Table 1: Bilateral project between MACRES and foreign country.*

Country	1990	1991	1992	1993	1994
Australia	9	cont.	completed 3	-	-
China	-	1	continued	completed	1
Sweden	-	1	continued	continued	completed
Japan	-	-	-	2	continued
Europe	-	-	-	2	continued
Canada	-	-	-	6	continued

Projek ESA, iaitu 'Complementary Nature of SAR and Optical Data for Land Cover Mapping' tidak dapat dilaksanakan mengikut jadual disebabkan kelewatan penerimaan data ERS-1 dan pemasangan stesen kerja di MACRES. Hasil penyelidikan awal projek ini telah dibentangkan dalam seminar 'National Decision Makers' pada 1 September, 1994 di Kuala Lumpur.

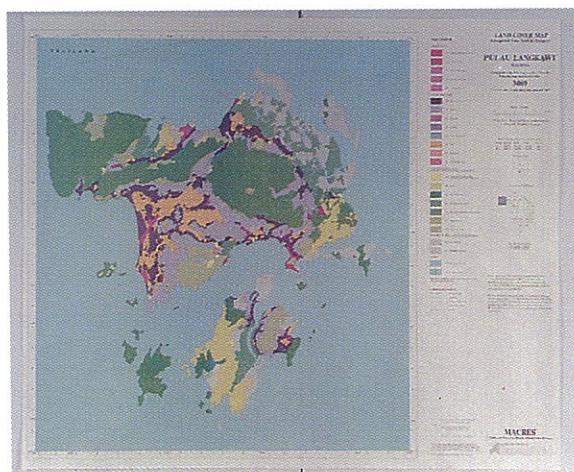
The ESA Project entitled 'Complementary Nature of SAR and Optical Data for Land Cover Mapping' is behind schedule in its implementation due to the delayed delivery of relevant ERS-1 data and installation of the workstation at MACRES. Preliminary findings of the project have been presented at the 'National Decision Makers Seminar' held on 1 September 1994 in Kuala Lumpur.



*Kumpulan Kerja Projek  
Members of the Project Team*

Projek kajian alam sekitar bersama SSC di Kedah dan Selangor telah siap pada tahun 1993. Projek ini telah menghasilkan peta-peta litupan tanah, foto-geologi, cerun dan hidrologi dari data satelit. Dalam tahun 1994, kedua-dua peta litupan/guna tanah dan foto-geologi telah dicetak dan diedarkan kepada agensi-agensi pengguna di Malaysia.

A joint project with SSC on environmental studies in Kedah and Selangor was completed in 1993. The project has generated land cover, photo-geology, slope and hydrological image derived maps. Both the Land cover/use and photo-geology maps have been printed and circulated to relevant user agencies in Malaysia in 1994.



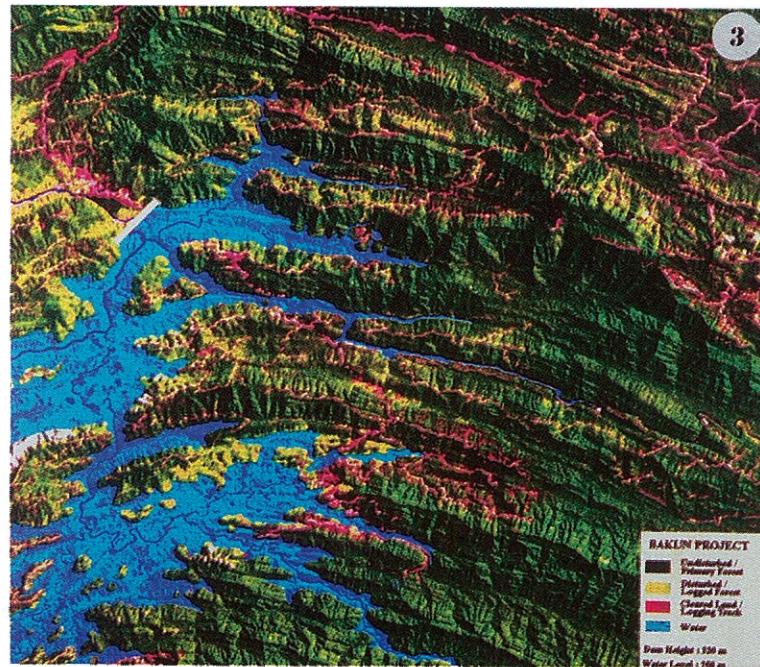
*Peta Foto-Geologi Langkawi  
Photo-Geology Map of Langkawi*

Kerjasama dengan Universiti Beijing dalam tahun 1993 telah menghasilkan perisian MICSIS bagi tujuan penilaian risiko hakisan tanah. Pada tahun 1994, perisian ini telah dipertingkatkan bagi menjalankan pemodelan hidrologi Projek Empangan Bakun.

Cooperation with University of Beijing has resulted in the development of the MICSIS software for soil-erosion risk assessment in 1993. The same software was refined to accommodate for hydrological modelling in the Bakun Dam Project

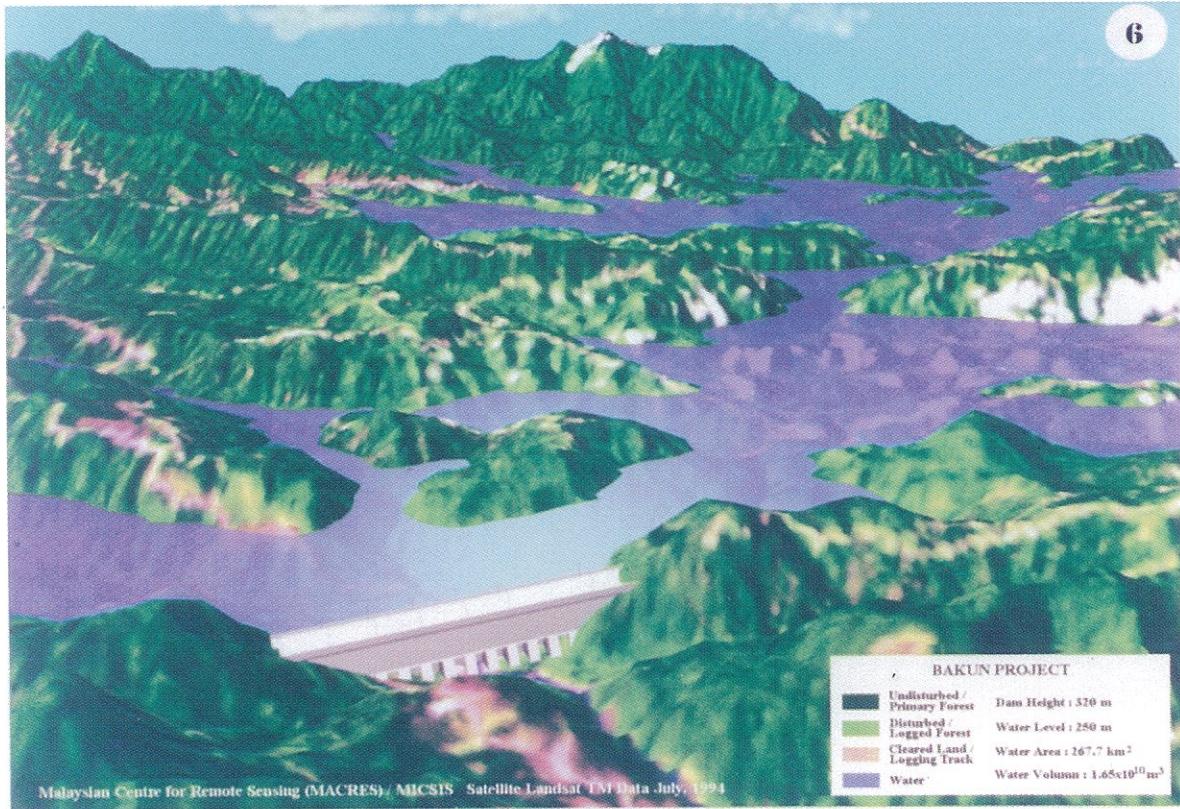


**Bakun - Pandangan 2D**  
2D View of Bakun (Landsat TM)



**Bakun - Pandangan 2D (dengan paras air)**  
2D View of Bakun (with water level).

6



Pandangan jarak dekat Simulasi Empangan Bakun  
Close-up of the Simulated Bakun Dam

Perlaksanaan Projek GlobeSAR bersama CCRS pula adalah mengikut jadual. Dalam tahun 1993 data 'Airborne SAR' yang merangkumi 5 kawasan terpilih di Malaysia telah diperolehi. Bengkel berkaitan prinsip SAR yang melibatkan empat orang pakar dari Kanada telah dianjurkan oleh MACRES pada bulan Mac 1994. Hasil penyelidikan awal projek telah dibentangkan di dalam seminar 'Regional GlobeSAR' pada 1-3 Disember 1994 di Bangkok, Thailand.

Bagi projek bersama NASDA, iaitu Penilaian Ketepatan Geometrik dan Geocoding Data Optikal dan SAR tidak dapat dimulakan dalam tahun 1993 kerana terdapat masalah teknikal pada satelit JERS-1. NASDA pula tidak dapat membekalkan data JERS-1 ke MAORES pada tahun 1994.

MACRES juga telah merintis projek 'Land Cover Characterisation in a Tropical Environment Using JERS-1 Data' bersama NASDA sepanjang tempoh 1994-1996. Negeri Kedah dan Johor telah dipilih sebagai kawasan kajian. Kajian di Kedah telah bermula pada bulan April 1994.

Implementation of the GlobeSAR project with CCRS was on schedule. In 1993 airborne SAR data were acquired over 5 selected site areas in Malaysia. A workshop on SAR principles involving 4 Canadian experts was organised at MACRES in March, 1994. Some preliminary findings of the project were presented in GlobeSAR Regional Training Seminar on 1-3 December, 1994 at Bangkok, Thailand.

The project with NASDA - Geometric Accuracy Assessment and Geocoding of Optical and SAR Data did not get off the ground in 1993 due to technical problems encountered on board the satellite. JERS-1 data was also not delivered to MACRES by NASDA in 1994.

MACRES has also initiated a project titled 'Land Cover Characterisation in a Tropical Environment Using JERS-1 data' for the period 1994-1996 with NASDA. The states of Kedah and Johore were selected for the project. Implementation of the project started in Kedah in April, 1994.

## AKTIVITI ANTARABANGSA

### INTERNATIONAL ACTIVITIES

Mesyuarat yang disertai MACRES dalam tahun 1994 termasuklah: (i) 'Meeting of Directors of National Remote Sensing Centres and Tenth Session of the Intergovernmental Consultative Committee on the UN-ESCAP Regional Remote Sensing Program' di Teheran, Iran pada 22-26 Mei 1994, (ii) 'Meeting of the Seventh ASEAN Experts Group in Remote Sensing' di Kuala Lumpur pada 21-23 Julai 1994, (iii) '3rd International Space Year Seminar on Regional Remote Sensing on Tropical Ecosystem' di Bali, Indonesia pada 23-28 Ogos 1994, (iv) 'UN Workshop on Enhancing Social, Economic and Environmental Security Through Space Technology' di Austria pada 12-15 September 1994, (v) 'Ministerial Conference on Space Applications for Development in the Asia Pacific Region' di Beijing, China pada 21-24 September 1994, (vi) 'ASIAN Conference on Remote Sensing' di Bangalore, India pada 17-23 November 1994, dan (vii) 'First ADEOS Symposium' di Kyoto, Jepun pada 5-11 Disember 1994.

International meeting and seminars participated by MACRES in 1994 includes; (i) The Meeting of Directors of National Remote Sensing Centres and Tenth Session of the Intergovernmental Consultative Committee on the UN-ESCAP Regional Remote Sensing Program at Teheran, Iran on 22-26 May, 1994, (ii) Meeting of the Seventh ASEAN Experts Group in Remote Sensing in Kuala Lumpur on 21-23 July 1994, (iii) 3rd International Space Year Seminar on Regional Remote Sensing on Tropical Ecosystem held in Bali, Indonesia on 23-28 August 1994, (iv) UN Workshop on Enhancing Social, Economic and Environmental Security Through Space Technology held in Austria on 12-15 September 1994, (v) Ministerial Conference on Space Applications for Development in the Asia Pacific Region in Beijing, China on 21-24 September 1994, (vi) ASIAN Conference on Remote Sensing in Bangalore, India on 17-23 November 1994, and (vii) The First ADEOS Symposium in Kyoto, Japan on 5-11 December 1994.



Persidangan Peringkat Menteri bagi tujuan Aplikasi Angkasa di Beijing, China  
Ministerial Conference on Space Applications in Beijing, China

MACRES telah juga menyertai beberapa bengkel antarabangsa seperti: (i) 'Workshop on the Integrated Use for Landuse Mapping and Planning' di Yogyakarta, Indonesia pada 22 Ogos - 22 Oktober 1994, (ii) 'UN/CHINA/ESA Workshop on Microwave Remote Sensing Applications' di Beijing, China pada 14-18 September 1994, dan (iii) 'The EC-ASEAN Regional Training on ERS-1 SAR Applications for Landuse and Coastal Zones Monitoring' di Yogyakarta, Indonesia pada 27 Oktober - 5 November 1994.

MACRES also participated in the following training workshops organised internationally: (i) Workshop on the Integrated Use of Remote Sensing and GIS for Landuse Mapping and Planning at Yogyakarta, Indonesia on 22 August - 22 October 1994, (ii) UN/CHINA/ESA Workshop on Microwave Remote Sensing Applications at Beijing, China on 14-18 September, 1994, and (iii) The EC-ASEAN Regional Training on ERS-1 SAR Applications for Landuse and Coastal Zones Monitoring at Yogyakarta, Indonesia on 27 October - 5 November 1994.



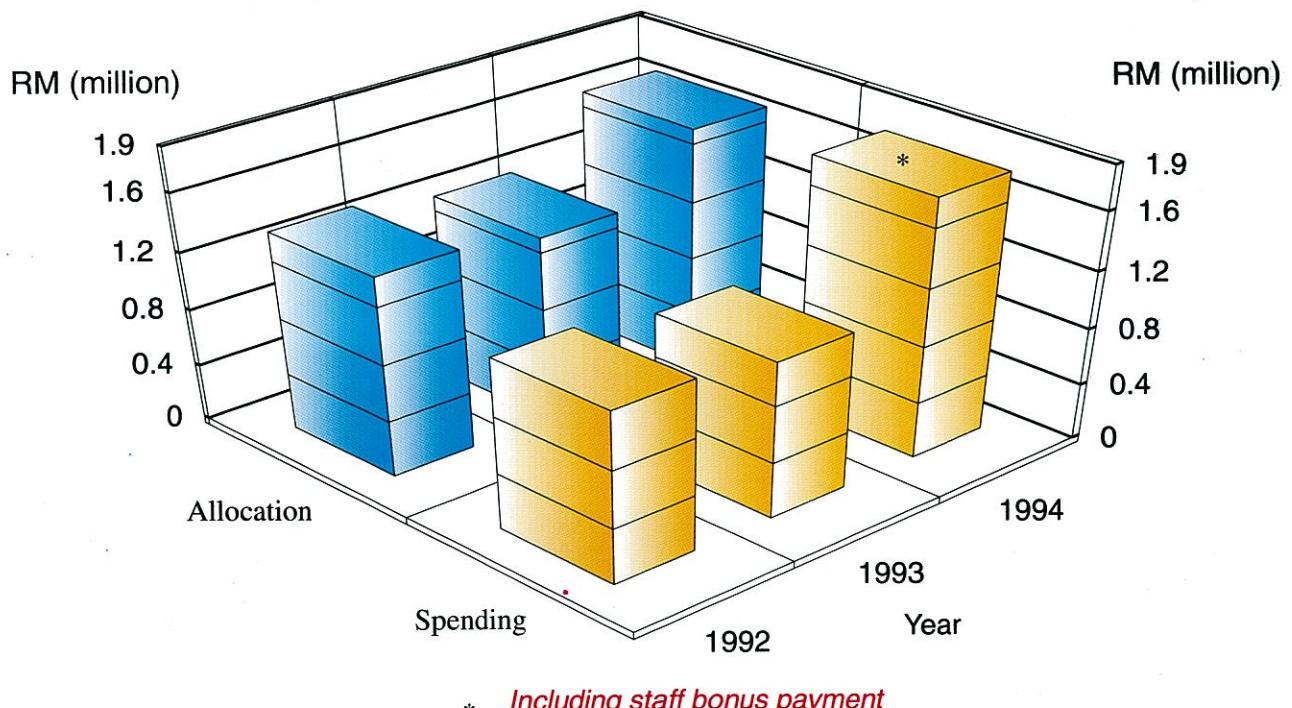
*Perwakilan Malaysia diketuai oleh Yang Berhormat Menteri Sains, Teknologi dan Alam Sekitar di Persidangan Peringkat Menteri dalam bidang Aplikasi Angkasa bagi tujuan pembangunan di Beijing, China*  
*Malaysian Delegation headed by The Honourable Minister of Science, Technology and the Environment at Ministerial Conference on Space Applications for development in Beijing, China*

Bagi tahun 1994, MACRES telah memperolehi peruntukan sebanyak RM 1,724,100.00 bagi tujuan mengurus dan sejumlah RM 6,182,700.00 bagi tujuan penyelidikan dan pembangunan

Perbelanjaan mengurus sejumlah RM 1,785,840.00 (104%) telah melebihi peruntukan. Ini disebabkan oleh pembayaran bonus kepada kakitangan yang tidak dimasukkan ke dalam belanjawan 1994.

In 1994, MACRES was allocated a budget of RM 1,724,100.00 for operating expenditure and RM 6,182,700.00 for research and development.

Operating expenses amounted to RM 1,785,840.00 (104%) exceeded the budget because of the payment of bonus, which was not budgeted for at the beginning of the fiscal year.



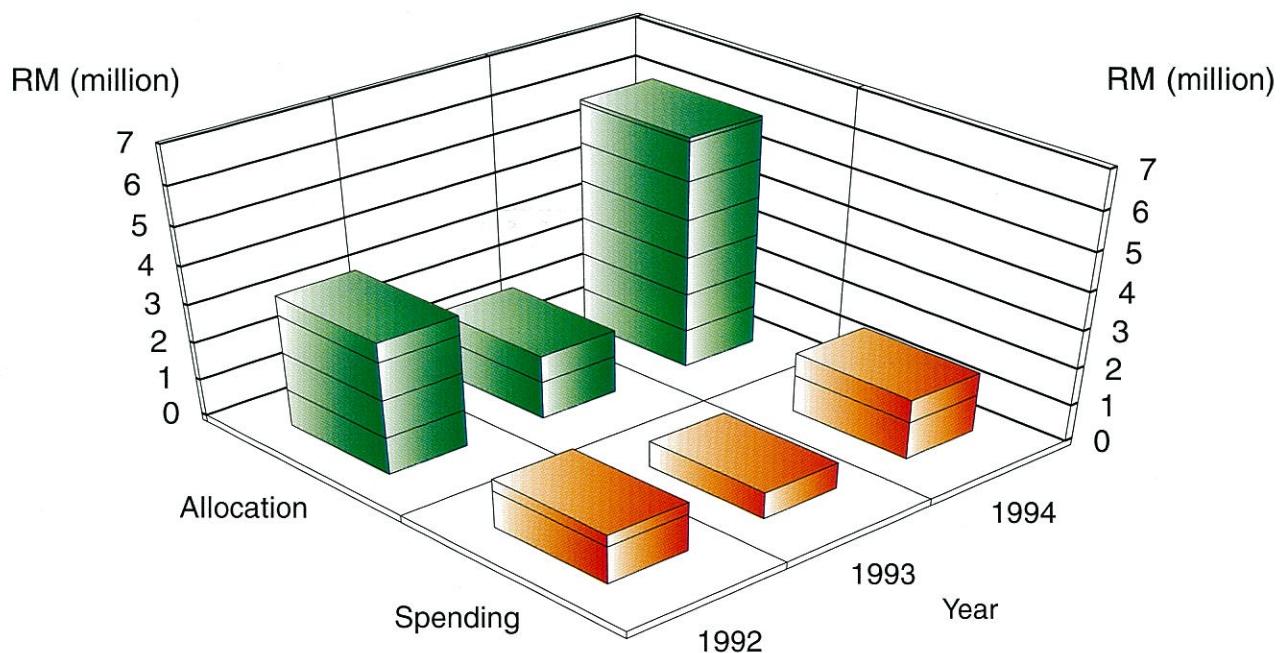
*Perbelanjaan Mengurus (Semasa dan Dasar Baru) dari Tahun 1992-1994  
Operating Expenditure (Current and New Policy) for 1992-1994*

Perbelanjaan pembangunan sebanyak RM 1,866,984.00 (30%) pula adalah jauh lebih rendah daripada yang disasarkan disebabkan kelewatan pentadbiran dalam pembinaan bangunan baru MACRES.

Pendapatan MACRES bagi tahun 1994 (RM 144,578.00) adalah diperolehi melalui penjualan data satelit kepada agensi pengguna di dalam kedua-dua sektor kerajaan dan swasta serta bayaran yang diterima melalui pengajuran kursus-kursus jangka pendek oleh MACRES (RM 16,800.00)

Development expenditure at RM 1,866,984.00 (30%) was far below expectation due mainly to the administrative delay in the construction of MACRES' new building.

Revenue generated in 1994 was from the sales of satellite data to both public and private user agencies (RM 144,578.00) as well as the fees collected (RM16,800.00) from participants of short term courses conducted by MACRES.



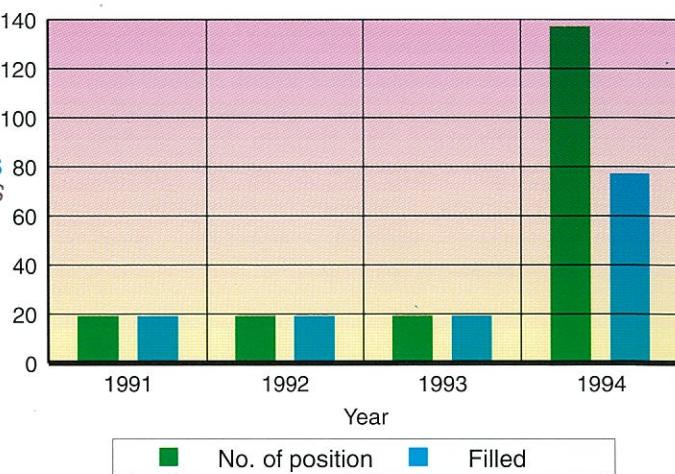
*Kemajuan Perbelanjaan Pembangunan Program Remote Sensing Nasional.  
Expenditure Progress of National Remote Sensing Programme for 1992-1994*

## PETUNJUK PENCAPAIAN

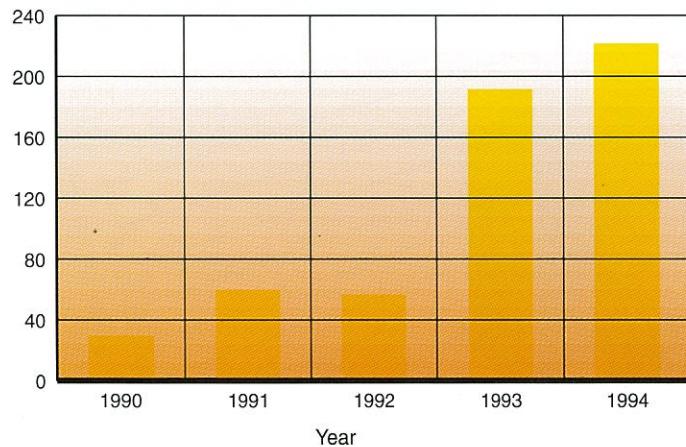
### PEMBANGUNAN SUMBER MANUSIA HUMAN RESOURCE DEVELOPMENT

\* Bilangan Kakitangan MACRES  
Number of Staff MACRES

Number of staff

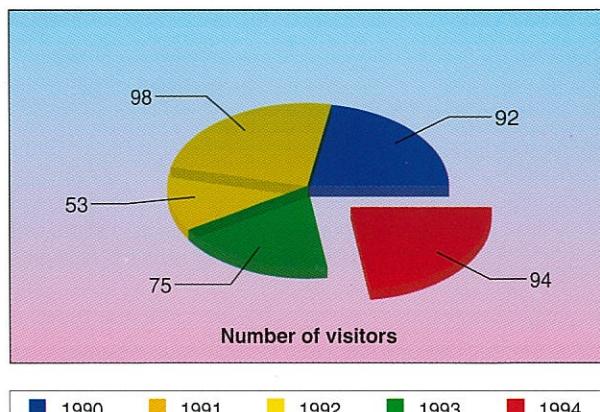


Number of participants



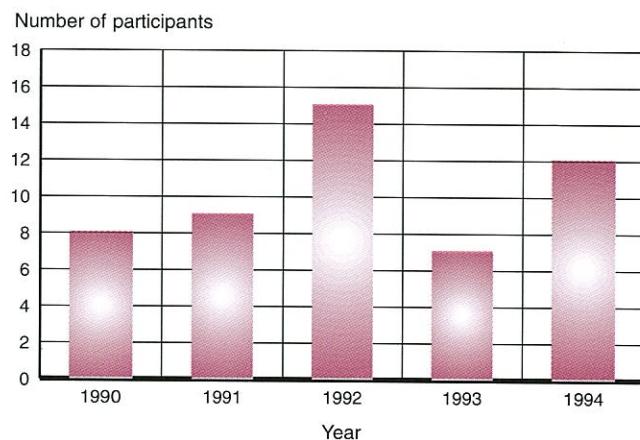
\* Peserta Seminar Anjuran MACRES  
Participants to Seminars Organised  
by MACRES

\* Jumlah Pelawat MACRES  
Total MACRES's Visitors

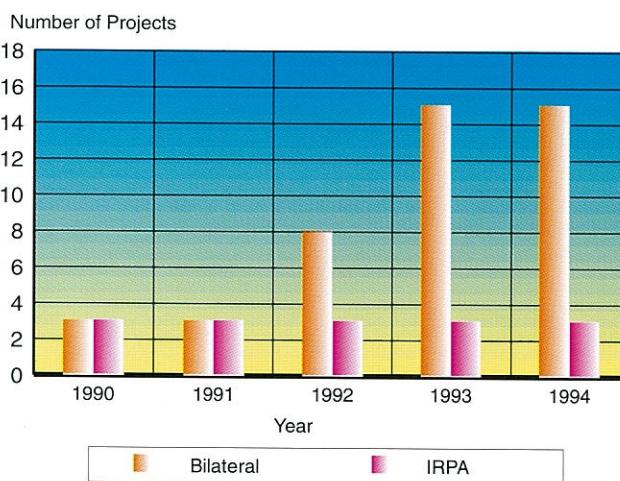


## **PERKEMBANGAN KEGIATAN INTERNASIONAL INTERNATIONAL ACTIVITIES DEVELOPMENT**

\* *Jumlah Peserta Forum di Peringkat Antarabangsa.*  
*Total Participants for International forum.*



## **PENYELIDIKAN DAN PEMBANGUNAN RESEARCH AND DEVELOPMENT**



\* *Jumlah Projek Penyelidikan MACRES bagi tempoh 5 tahun*  
*Research Project 5 Year Period.*

## **PERKHIDMATAN PENGGUNA USER SERVICES**

\* *Jumlah pengguna*  
*Total users*

