

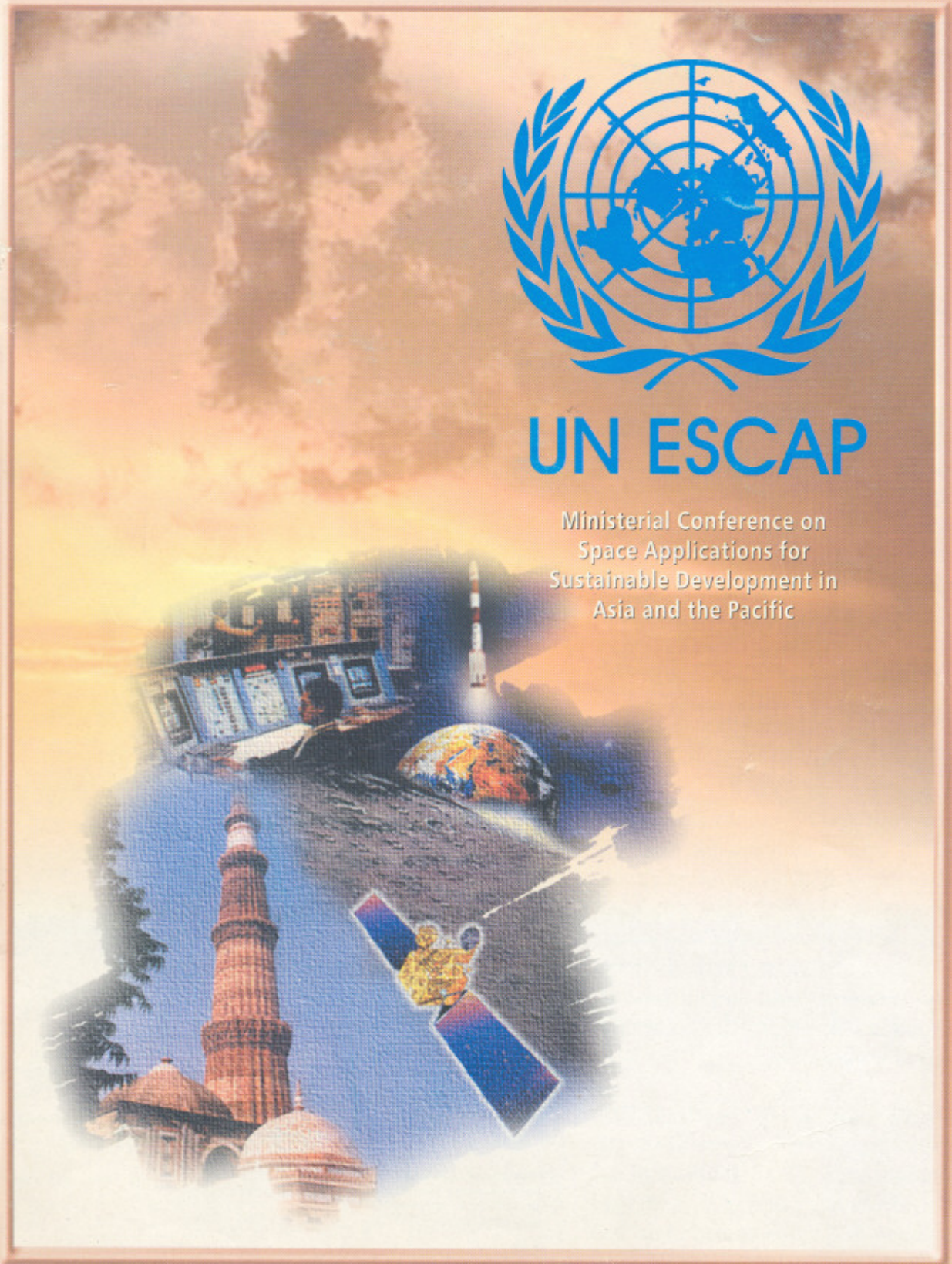
July-December 1999

SPACE india



UN ESCAP

Ministerial Conference on
Space Applications for
Sustainable Development in
Asia and the Pacific



INDIAN SPACE RESEARCH ORGANISATION

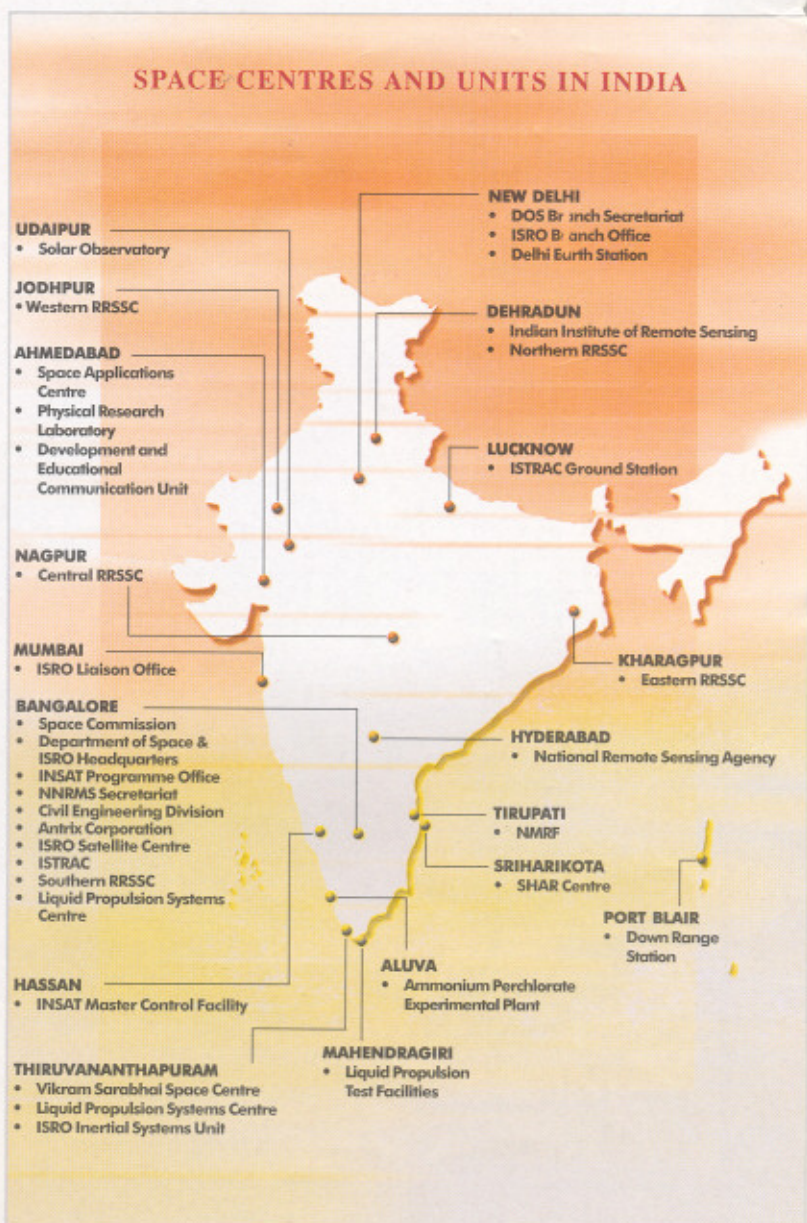
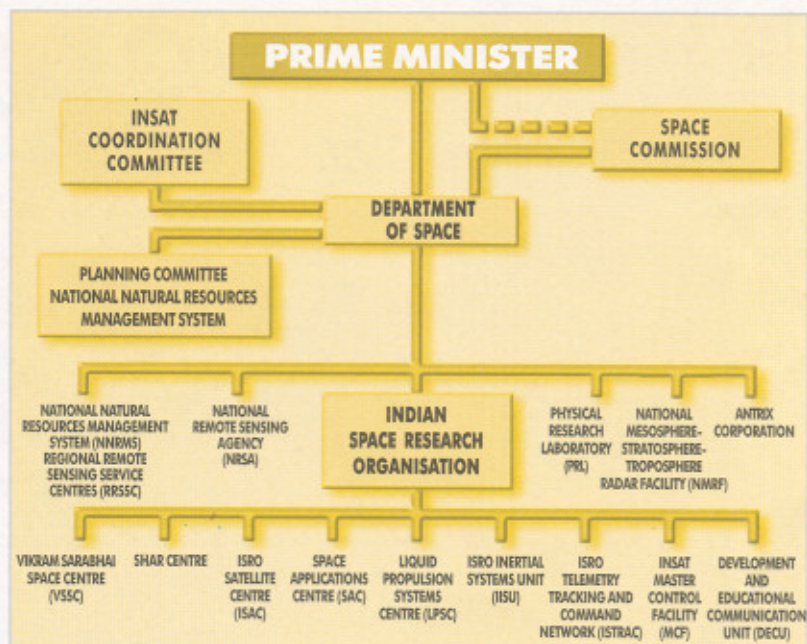
The Indian Space Programme

The setting up of the Thumba Equatorial Rocket Launching Station (TERLS) in 1963 marked the beginning of the Indian Space Programme. The Space Commission and the Department of Space (DOS) were established by the Government of India in 1972 to promote unified development and application of space science and technology for identified national objectives.

The Indian Space Programme is directed towards the goal of self-reliant use of space technology for national development, its main thrusts being (a) satellite communications for various applications, (b) satellite remote sensing for resources survey and management, environmental monitoring and meteorological services and (c) development and operationalisation of indigenous satellite and launch vehicles for providing these space services.

The Indian Space Research Organisation (ISRO) is the research and development wing of DOS and is responsible for the execution of the national space programme. ISRO also provides support to universities and other academic institutions in the country for research and development projects relevant to the country's space programme.

Both the DOS and ISRO Headquarters are located at Bangalore. The development activities are carried out at the Centres and Units spread over the country.





SPACE india

July - December 1999

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'SPACE india' is published by the Indian Space Research Organisation for limited circulation. Articles appearing in SPACE india may be reproduced accompanied by the credit line "Reprinted from SPACE india" along with the date of issue.

Editorial / Circulation Office

Publications & Public Relations Unit,
ISRO Headquarters, Antariksh
Bhavan, New BEL Road,
Bangalore - 560 094, India.

Printed at Carto Prints Pvt. Ltd., Bangalore.

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India Hosts **UN-ESCAP Second Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific**

India hosted the Second Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific at Vigyan Bhavan, New Delhi, during November 15-20, 1999. Organised by the United Nations Economic and Social Commission for Asia and the Pacific (UN-ESCAP), the conference had two main components - the Senior Officials Meeting during November 15-17, 1999 and the Meeting of Ministers during November 18-20, 1999. A technical exhibition Space '99 and a science symposium entitled "Space Technology of Improving the Quality of Life in Developing Countries - A Perspective for the New

Millennium" were also organised coinciding with the Ministerial conference.

ESCAP had organised the first Ministerial Conference on Space Applications for Development in Asia and the Pacific in September 1994 at Beijing, China. That conference adopted the Beijing Declaration on Space Technology Applications for Environmentally Sound and Sustainable Development in Asia and the Pacific and endorsed the Strategy for Regional Cooperation in Space Applications for Sustainable Development and the Action Plan on Space Applications for Sustainable Development in Asia



Prime Minister Shri Atal Bihari Vajpayee Inaugrating the meet.

and the Pacific. In Beijing conference also launched the Regional Space Applications Programme for Sustainable Development (RESAP) for realising the goals set forth in the strategy and action plan. The main objective of the Second Ministerial Conference at Delhi was to provide a forum for policy planners and decision makers to exchange perspectives and information, develop new policy scenarios, prepare a blueprint for regional space development, and to decide upon an action-driven and result-oriented programme towards implementation of the Regional Space Applications Programme for Sustainable Development.

Mr Atal Bihari Vajpayee, Prime Minister of India, opened the Ministerial Conference on November 18, 1999. In his inaugural address, the Prime Minister observed that as the human race stood at the threshold of a new millennium, it had fulfilled what had been a dream of the past: to

extend its reach to space. He noted that this endeavour was a collective journey and not of any single country or group of countries. He stressed the regional cooperation, as part of the wider context of global cooperation, lay at the heart of the exploration and application of space. He noted that the countries of Asia and the Pacific shared many challenges to sustainable development, especially in the areas of food security, water conservation, environment protection, disaster management, education and healthcare. He felt that there was an urgent need to re-focus the collective attention of the countries in the region, as well as that of the world, to achieve improved quality of life for the popularisation of the region, which represented about sixty percent of the global population. He highlighted the achievements of India in space research and its applications and India's significant contribution to the Regional Space Application Programme for Sustainable Development in Asia and the Pacific.

Participants to second ministerial conference

The Second Ministerial Conference was attended by representatives of the following members and associate members of the Economic and Social Commission for Asia and the Pacific (ESCAP): Austria, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Democratic People's Republic of Korea, France, India, Indonesia, Islamic Republic of Iran, Japan, Kazakhstan, Lao People's Democratic Republic, Macau, Malaysia, Mongolia, Myanmar, Nepal, Netherlands, Pakistan, Philippines, Republic of Korea, Sri Lanka, Thailand, United States of America, and Viet Nam.

Representatives of the following United Nations bodies and specialized agencies attended: United Nations Office for Outer Space Affairs (OOSA), United Nations Population Fund (UNFPA), Food and Agriculture Organization of the United Nations (FAO), United Nations Educational, Scientific and Cultural Organization (UNESCO), and World Meteorological Organization (WMO).

Representatives of the following intergovernmental organisation also attended: Asia-Pacific Telecommunity (APT), Committee on Earth Observation Satellite (CEOS) European Space Agency (ESA), Intersputnik International Organization of Communications (INTERSPUTNIK).

Representatives of the following non-governmental organizations and other entities also attended: the International Astronautical Federation (IAF) and the International Council of Scientific Union/Committee on Space Research (ICSU/COSPAR).

A number of space planners, scientists, academicians and entrepreneurs participating in the Science Symposium and the Technical Exhibition (both held in conjunction with the Ministerial Conference and the Senior Officials Meeting) also attended as observers.

He expressed India's willingness to share her experience and expertise with the countries in the region and to work jointly towards achieving a sustainable living for all peoples in the region. Mr Atal Bihari Vajpayee stressed the need for developing space applications for global peace and

security and noted that space must become the newest frontier not for arms race, but for humankind's collaborative and common race for development.

Welcoming the delegates, Dr Murli Manohar Joshi, India's Minister of Human Resources

Space'99 Exhibition

Department of Space organised the Space '99 Exhibition at the Vigyan Bhavan as a side event of the Second Ministerial Conference. The exhibition was inaugurated by the Deputy Executive Secretary of ESCAP on November 15, 1999. 21 Agencies from the Private and Government sectors from 9 countries exhibited their products and services at the exhibition. The theme of the exhibition was on the achievements and products of direct relevance to Asia Pacific Region in this innovative space technologies, launch vehicle technologies, professional societies and bodies, mobile satellite communication, earth observation imaging services, space flight market products, reliability and testing equipment, ground systems and technologies, earth observation and GIS value added services, direct-to-home technologies and many other equipment and services. Participants of the Ministerial Conference and many other experts availed the opportunity to interact with the exhibiting agencies and obtained detailed information of the products and services. India highlighted its achievements in the development and application of space technology and opportunities available for the ESCAP countries for cooperation with India.



A section of Space '99 Exhibition at UN-ESCAP second ministerial conference at New Delhi.

Development and Science and Technology, who was elected as the Chairperson of the Ministerial Conference, highlighted the discussions on the practical applications of space science and technology that took place during the science symposium held preceding the conference. He said that India intends to conduct major studies to create a long term vision for space exploration and application over the next few decades and invited other countries particularly ESCAP members, to participate in these studies.

The Secretary General of United Nations in his message stated that space technology and its applications were providing new tools for addressing problems of society and the environment, and were likely to have many more exciting new uses which were still to be discovered. He noted that in the Asia and Pacific region, the use of satellites had reduced the isolation of distant islands and villages and made remote areas more accessible. He noted that the conference provided an opportunity for the countries of the region to unite behind a common cause: developing new ways to use space to improve conditions on Earth. He expressed confidence that the participants of the conference would move towards ever greater

collaboration in space activities and the deliberations would provide a framework for concrete strategies and a plan of action for continuing the cooperation achieved through RESAP thus far. The Executive Secretary of ESCAP highlighted the outcome of the first Ministerial Conference held in Beijing and inspiring developments since the launching of RESAP.

The two day Ministerial conference discussed the various policies and perspectives on space technology development and applications and status of preparedness of the region to meet challenges and opportunities in the twenty-first century. Heads of the delegations briefed on the various activities taking place under their respective national space programmes, current problems and constraints they were facing and their priorities for the future. Smt. Vasundhara Raje, India's Minister of State for Small Scale Industries and Space participated in the discussion as part of the Indian delegation. The conference noted with satisfaction that, since the launch of RESAP, very significant achievements had been attained at both regional and national level. The conference also noted that regional cooperation contributed significantly towards nurturing the



Mr. Mursoli Maran, Minister for Commerce and Industries inaugurating senior officials meeting.

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Symposium on

Space Technology for improving Quality of Life in Developing Countries: — A Perspective for the next Millennium

The symposium on 'Space Technology for Improving Quality of Life in Developing Countries: A Perspective for the next Millennium' was organised during November 15-17, 1999 as a parallel event to the Second Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific at New Delhi.

The objective of the symposium was to provide a forum for interaction between scientists, academicians, development planners and specialists involved in the space industry, technology development and applications and policy making. The presentations were organised to provide status of the technology and applications globally and to work out an action plan for the region. The discussions helped in developing cooperative projects in space technology applications for sustainable development to be taken up among the member countries. A summary of the report and a set of recommendations adopted by the symposium participants was presented on 17 November 1999 at the Senior Officials Meeting preparatory to the ministerial conference.

The symposium, inaugurated by Dr Murli Manohar Joshi, Minister for Human Resources Development and Science and Technology, Government of India, was organised to cover various aspects of space technology and

applications in improving the quality of life in developing countries. Five technical sessions, namely, Food Security, Environment Integrity, Disaster Management, Education, Rural Development and Health Care and Infrastructure for Space Applications, were held during which 29 technical papers were presented.

A panel discussion was held at the end of the symposium in which the issues and thrust required for 'Space Technology and Applications for the New Millennium' were discussed by international experts and the participants. The panelists were unanimous that the emerging trends of earth observation, geographic information system, geographic position system and satellite communications coupled with information technology should be oriented towards maximising benefits to the society. The discussion also focussed on sustainable development strategies, furthering integrated global observing strategy, disaster management support programmes, environmental monitoring and global change, space services for education and health, education and training and the future national/international space programmes.

The following recommendations towards developing strategies and programmes for further promotion of space technology application for sustainable development and improving quality of

general development of the region and reiterated its conviction that such cooperation should be further strengthened in the coming years. Recognising that the Ministerial Conference was the first regional meeting held after UNISPACE III, the importance of this Conference was underscored in being able to consolidate, coordinate and synergise its recommendations with those of the conclusions and

recommendations of that global event. In particular, it noted the importance of the "Space Millennium: Vienna Declaration on Space and Human Development" and its annexed action plans as a framework for cooperation.

The Ministerial Conference was preceded by three-days senior officials meeting which was inaugurated by minister Murasoli Maran, Minister



Dr. Murli Manohar Joshi, Minister for Science and Technology and Human Resource Development inaugurating the science symposium.

life in developing countries were arrived at during the Science Symposium which were placed before ESCAP for consideration.

- Encourage members of Asia Pacific region to use space technology for sustainable agricultural management to ensure food security.
- Develop environmental management strategies and facilitate programmes and research in the operational use of remote sensing data and ensure easy access and affordability of imagery to the countries of the Asia Pacific region.
- Promote the establishment of an integrated global system for managing natural disasters through appropriate monitoring/warning, mitigation, relief and prevention efforts.
- Promote distance education and tele-health programmes within and amongst various members states of the region through appropriate space and ground infrastructure.

for commerce and industries on November 15, 1999, held under the chairmanship of Dr K Kasturirangan, Secretary, Department of Space of India, and reviewed the draft strategy and action plan on space applications for sustainable development in Asia and the Pacific for the new millennium. The report of the Senior Officials Meeting contained the conclusions and recommendations arising from the review of the

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- Promote use of space technology and applications for human welfare as relevant inputs to programmes on rural development and social welfare.
- Strengthen further the programmes on education and training in space technology and application that will go a long way in enhancing capacities and building capability in Asia-Pacific region to benefit from the use of space technology.
- Encourage member states of Asia and the Pacific region to develop national programmes towards supporting the regional programmes under Integrated Global Observing Strategy (IGOS) with a view to benefit from this global endeavour.
- Initiate a concerted programme to establish appropriate information infrastructure and address related issues of technology, standards, formats and protocols and its wide spread use in society.
- Encourage nations to develop space policies and institutional mechanisms to effectively utilise space capabilities for national development.
- Encourage member states to enhance the academic and technical exchange of information through bilateral and multi-lateral co-operation.

About 200 scientists, academicians, specialists, planners, policy makers and entrepreneurs from 24 countries and five inter-governmental organisations in the field of space technology and applications attended the symposium.

ESCAP Secretariat documents on

- Status of implementation of the Regional Space Applications Programme for Sustainable Development
- Space technology applications for sustainable development in Asia and the Pacific
- Space Vision 21: The future of space technology development and applications in Asia and the Pacific and

Delhi Declaration on Space Technology for Improved Quality of Life

We, the members and associate members of the Economic and Social Commission for Asia and the Pacific, convening at the Second Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific, held in New Delhi from 15 to 20 November 1999.

Recalling that the first Ministerial Conference on Space Applications for Development in Asia and the Pacific, held in Beijing in 1994, was an important milestone in the promotion of space science and technology development and applications in the Asian and Pacific region.

Acknowledging that the launching of the Regional Space Applications Programme for Sustainable Development at the first Ministerial Conference and its implementation have had a significant impact on national capacity-building, enhancing regional capabilities and raising the status of the Asian and Pacific region to be one of the fast growing areas for space technology development and applications.

Guided by the decisions, recommendations and resolutions adopted by various United Nations and other forums on the applications and use of space technology for the benefit of humanity, and in particular:

- (a) Resolution 51/11 of 1 May 1995 of the Economic and Social Commission for Asia and the Pacific on regional cooperation on space applications for environment and sustainable development in Asia and the Pacific, which endorsed the Beijing Declaration on Space Technology Applications for Environmentally Sound and Sustainable Development in Asia and the Pacific and the recommendations of the first Ministerial Conference.
- (b) General Assembly resolution 51/123 of 13 December 1996 on international cooperation in the peaceful uses of outer space, which emphasised the need to increase the benefits of space technology and its applications and to contribute to an orderly growth of space activities favourable to sustained economic growth and sustainable development.
- (c) The recommendation of the Committee on Environment and Natural Resources Development at its first session,

held in Bangkok in October 1998, to continue efforts in, inter alia, the promotion of the development of remote sensing, spatial information systems and other space technology applications for environmental monitoring, natural resources development and natural disaster reduction,

- (d) The recommendations of the Economic and Social Commission for Asia and the Pacific at its fifty-fifth session, held in Bangkok in April 1999, to continue with the activities being implemented under the Regional Space Applications Programme for Sustainable Development with a view to making its implementation more effective in order to assist developing countries in gaining full benefits from space applications through national capacity-building, technical assistance, information exchange and promotional activities under technical cooperation among developing countries arrangements,
- (e) The recommendation of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNCESPACE III), held at Vienna in July 1999, bringing the impact of this important global event into the regional context and helping the region to benefit from space technology applications in the new millennium,

Noting that rapid technological developments are leading to the integrated use of space and information technologies to form Earth observation, spatial information and decision support systems that will become indispensable tools for practical applications in high priority areas,

Noting also that satellite communications and broadcasting systems, together with fibre optics provide multimedia technologies and other services, and are contributing to improve human connectivity, human resource development and poverty alleviation through applications such as distance education, rural health care and emergency relief,

Recognising that space science research and technologies for satellite Earth observation, satellite-based positioning and navigation, and satellite communications are advancing rapidly and that new areas of technology applications keep emerging,

Applications in Asia and the Pacific in the New Millennium

Taking cognizance of the fusion of space technologies and the ever-growing role of information technology and others, not only in the development of space technologies but also in the extension of their applications,

Realizing that the growing interest in regionalization and the tremendous opportunities for economies of scale in space activities generate a greater need for a genuine regional partnership arrangement among interested entities in space technology development mission and integrated operational space applications services,

Hereby affirm that we:

- 1. Stress the essential role of space technology and applications to environmental and natural resource management; food security; capacity-building; human resource development and education; poverty alleviation; weather forecasting; natural disaster reduction; health care and hygiene; and sustainable development planning;*
- 2. Agree that it is essential to use practical and feasible means for the effective implementation of technology research and development programmes, including the mechanism for enhancing academic exchange and human resource development;*
- 3. Agree that there is an urgent need to examine and institutionalize regional cooperative mechanisms appropriate for accelerating collaboration in the field of space technology to achieve a more equitable benefit for the countries of the region;*
- 4. Share the vision for the twenty-first century aimed at regional cooperation as envisaged in "Space vision 21: the future of space technology development and applications in Asia and the Pacific", which addresses the potential for space technology applications in dealing with many of the problems facing the Asian and Pacific region, in order to improve the quality of life;*
- 5. Adopt the overall strategy and endorse the action plan of the Strategy and Action Plan on Space Technology*

Applications for Sustainable Development in Asia and the Pacific for the New Millennium for extending regional cooperation in space applications for sustainable development designed to enhance further the accomplishments achieved through the first phase of the Regional Space Applications Programme for Sustainable Development;

- 6. Declare the launching of the second phase of the Regional Space Applications Programme for Sustainable Development, which focuses on an action-oriented, result-driven programme for optimizing human and financial resources in the region through vigorous cooperation in the areas of environmental and natural resource management; food security; weather forecasting; natural disaster reduction; health care and hygiene; and sustainable development planning towards improving the quality of life;*
- 7. Urge bilateral and multilateral donors and international organizations to support the implementation of the second phase of the Regional Space Applications Programme for Sustainable Development;*
- 8. Commit ourselves to participate actively in the second phase of the Regional Space Applications Programme for Sustainable Development;*
- 9. Request the Executive Secretary of the Economic and Social Commission for Asia and the Pacific to convene a third Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific to review the progress on the second phase of the Regional Space Applications Programme for Sustainable Development and the development efforts under the Strategy and Action Plan endorsed by the present Conference, at an appropriate time in the future to be determined by emerging conditions in the region.*

About ESCAP

The Economic and Social Commission for Asia and the Pacific (ESCAP), is an international body under the aegis of the United Nations. It has its Headquarters at Bangkok, Thailand. ESCAP has the major objective of bringing together the member countries and provide a forum for discussions and develop mutually beneficial collaborative programmes. The thrust areas of ESCAP activities cover establishing network of countries through regional mechanisms like inter-governmental commissions, regional working groups, task forces etc, human resource development and collaborative projects for sustainable development. A key theme being actively pursued by ESCAP is space applications for development.

ESCAP members include Japan and Australia, the dynamic "tiger" economies, such as the Republic of Korea, Singapore, Thailand, Indonesia, India, Malaysia and Hong Kong, and seven new Republics of Central Asia, which are undergoing rapid economic transition. Thirteen of the world's least developed countries make up one quarter of ESCAP's full members. And 19 small Pacific island developing countries account for over one third of ESCAP's total membership. The smallest country is Niue with a population of 2,000. The largest is China with a population of 1.2 billion people.

The 51 Member States of ESCAP are:

Afghanistan, Armenia, Australia, Azerbaijan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Democratic Peoples Rep of Korea, Fiji, France, India, Indonesia, Iran, Japan, Kazakhstan, Kiribati, Kyrgyzstan, Lao PDR, Malaysia, Maldives, Marshall Islands, Micronesia, Mongolia, Myanmar, Nauru, Nepal, Netherlands, New Zealand, Pakistan, Palau, Papua New Guinea, Philippines, Republic of Korea, Russian Federation, Samoa, Singapore, Solomon Islands, Sri Lanka, Tajkistan, Thailand, Tonga, Turkey, Turkmenistan, Tuvalu, United Kingdom, United States of America, Uzbekistan, Vanuatu, Viet Nam.

The 9 Associate Members are:

American Samoa, Cook Islands, French Polynesia, Guam, Hong Kong, Macau, New Caledonia, Niue, Northern Marianas

- Strategy and Action Plan on space technology applications for sustainable development in Asia and the Pacific for the new millennium

The Ministerial Conference adopted the Report of the Senior Officials Meeting with acclamation.

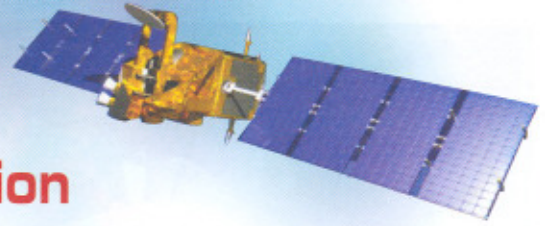
The Ministerial Conference adopted the draft declaration on Space technology applications for improved quality of life in the new millennium which had been earlier reviewed and endorsed by the Senior Officials meeting after deciding to name it Delhi Declaration on Space Technology Applications in Asia and the Pacific for Improved Quality of Life in the New Millennium.

The Delhi conference was well attended with

about 160 delegates including 20 ministers representing 27 countries and 11 UN, Inter-governmental and non-governmental organizations participating in the deliberations.

The Second Ministerial Conference made a significant impact on the countries in the region in terms of showcasing the success stories of space technology applications and the potential for future space applications development. The conference provided a great opportunity for India to expose its own technological capabilities as well as the extensive application of space technology in the country that are playing a crucial role in various developmental tasks.

Megha Tropiques



ISRO and CNES, Undertake Atmospheric Research Mission

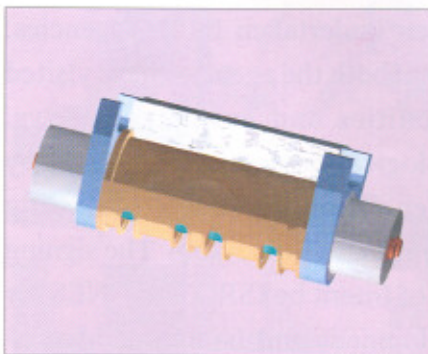
ISRO and the French Space Agency, CNES, signed a Statement of Intent on November 21, 1999 at Bangalore for the design, development and launch of an atmospheric research satellite, Megha-Tropiques. The Statement of Intent was signed by Dr K Kasturirangan, Chairman, ISRO, and Alain Bensoussan, President, CNES. Indian Minister of State for Space Ms Vasundhara Raje and French Minister for Education and Research Mr Claude Allegre graced the signing ceremony. Megha Tropiques (Megha meaning cloud in Sanskrit and Tropiques in French meaning Tropics) is primarily a scientific mission to study the atmospheric activity in the tropical region.

Speaking on the occasion, Ms Vasundhara Raje said that the signing of the statement of intent for the Megha Tropiques was yet another milestone in the long standing relationship between India and France and hopefully will set the trend and pace of activities for the coming years. She said that India and France have been collaborating in various areas of economic and technological fields including space. She recalled the cooperative activities with France for the sounding rockets at the initial stages of ISRO which has, over the time, strengthened the bond between French and Indian space activities. She said that India considered Megha Tropiques an important mission to fulfil

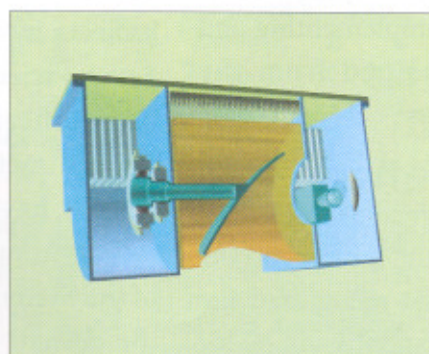
not only the national requirements of the two countries but also enhance considerably the global capability for climate and weather applications especially in the tropical regions.

It is well known that the tropical region is the domain of squall lines and cyclones and is characterised by large intra-seasonal, inter-seasonal and inter-annual variations that have led to several catastrophic events such as droughts and floods. Changes in energy and water budget of the land-ocean-atmosphere systems in the tropics influences the global climate to a great extent. The exchange of energy in the inter-tropical zone influences the climate of the rest of the planet. These systems interact with the general circulation of the atmosphere in ways that are yet to be fully understood and hence reducing the reliability in the prediction of the weather and climate events.

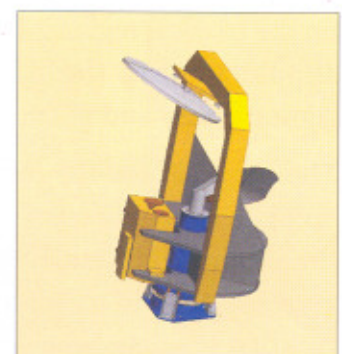
For quite sometime, Indian scientists involved in atmospheric research, were considering the development of a scientific satellite for better understanding of the climate, studying the atmosphere and oceanic activities with emphasis on the regions around the Indian subcontinent. Such studies could greatly help in medium range and long range weather forecasting techniques and more accurate climate modeling. It was also felt



ScaRaB instrument view.



Cutaway drawing of SAPHIR instrument.



MADRAS instrument view.



Mr. Claude Allegre, Minister for Education and Research, France and Dr. K. Kasturirangan, Chairman, ISRO (right) exchange greetings. Ms Vasundhara Raje, India's Minister of State for Space, India looks on.

by the scientists that the data obtained from such a satellite should complement and supplement the data from other existing and planned future satellites. Several scientific teams in France were also working on a possible satellite mission, Tropiques, aimed at measuring parameters related to climate, with emphasis on high temporal sampling of tropical regions of the globe.

Geostationary satellites like INSAT provide a good space time sampling of the cloud cover while polar orbiting satellites with microwave instrument could retrieve information on water vapour profiles, deep cloud cover and precipitation. But their visible and infrared instrument give only limited information on cloud surface properties or horizontal distribution of water vapour. Polar satellites that orbit the earth in north-south direction can provide data samples of the tropical region but not continuously. A satellite placed in an orbit inclined at 22 degree with respect to the equatorial plane can provide optimally the data on the tropical regions, thus, complementing and supplementing the data obtained from the geostationary and polar satellites.

The proposal for the joint Indo-French Megha-Tropiques satellite mission emerged as a result of the exchange of views between the Indian and the French scientific community that recognised the fact that the data from such a satellite will be for mutual benefit. The mission is configured around the French satellite bus Proteus and will be

launched using ISRO's Polar Satellite Launch Vehicle (PSLV) sometime during 2005. Megha Tropiques will weigh about 500 kg and will orbit the earth at an altitude of 817 km. The orbit will be inclined at 22 degree with respect to the equator. Megha-Tropiques will carry three payloads.

- Microwave Analysis and Detection of Rain and Atmospheric Systems (MADRAS) which is a microwave imaging radiometer,
- a Scanner for Radiation Budget (ScaRaB)
- an atmospheric humidity profiler (SAPHIR).

The data from the satellite is expected to help in understanding the convective system that influences the tropical weather and climate. It is important to note that all these three payloads do not depend on the availability of sunlight on the earth for their operations unlike the sensors operating in the visible spectral bands. Hence the data from these instruments could be collected for longer time and hence with a much better repetitivity.

The data from the Megha-Tropiques will be received by ground stations both in India and France. A recorder on board the satellite will allow collection of data around the globe. The data will be shared by the scientists in India and France for scientific studies. Thus it is conceived to optimally use scientific and technical capabilities of both India and France.

It is to be noted that ISRO and CNES have a long standing collaboration and several joint research projects have been undertaken by the agencies. Several scientists of both the agencies have visited each others' facilities and exchanged views. Several meteorological payloads, developed by CNES, have been flown by Indian sounding rockets from Thumba and Sriharikota. The signing of the Statement of Intent by ISRO and CNES for the design, development and launch of Megha-Tropiques is another important milestone in the Indo-French cooperation in the scientific field.

UNISPACE-III Held in Vienna

The Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE-III), with the theme "Space Benefits for Humanity in the 21st Century", was held at Vienna during July 19-30, 1999. In all, 101 States and 30 International Organisations, UN specialist agencies and professional associations participated in the Conference. Mr Kofi Annan, Secretary General of UN, declaring the conference open on July 19, 1999, noted the progress in science and technology over the last century especially the birth of space technology and emphasised the globalising effect of satellite communications, space-based observation of earth's environment and use of space technology in monitoring natural disasters. He cautioned that space should not become yet another battle field for earthly conflict; instead the international community should ensure that the fruits of the technical progress were made available to all people in all nations.



Welcoming the participants, Mr Thomas Klestil, President of Austria noted that though space technology had become a significant part of modern life, much more could be done to promote sustainable development and to monitor events that threatened the well-being and livelihood of many people throughout the world. He expressed the view that, unless developed countries were prepared to share their technological know-how with developing countries, the benefits of space technology would remain limited, to the detriment of all.

Prof U R Rao of India who is the Chairman of the UN Committee on Peaceful Uses of Outer Space (UN-COPUOS) was elected unanimously to preside over UNISPACE-III Conference.

The Indian delegation was led by Dr K Kasturirangan, Secretary, Department of Space and Chairman, ISRO. During the Plenary, India emphasised the need to integrate advances in space technology and its applications to the



entire structure of the society in order to improve the quality of life of the people. Emphasising international cooperation, India articulated the expectations from this conference. India proposed a UN special fund to implement the recommendations of the conference, specially, for enhancing the human resources on a sustainable basis through the activities of Regional Centres for Space and Technology Education. The achievements of India under its space programme and the Regional Centre for Asia Pacific Region (located in India) were also highlighted.

The Ambassador of India to Austria/Permanent Representative of India to UN, Vienna in his capacity as the Chairman of the G-77 (and China) Group addressed the Plenary emphasising the necessity of special fund mechanism for the implementation of UNISPACE-III recommendations.

Since the space age began following the launching of Sputnik of erstwhile USSR in 1957, the world has gained many practical benefits by adapting space technology - which previously had been mostly the domain of the military - to civilian uses. The United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) of which Prof U R Rao is the current chairman, has helped shape the world's policies regarding the development and uses of space technology. The first UNISPACE Conference held in Vienna in 1968, succeeded in bringing an awareness of the vast potential of space benefits to all the Member States. Significant successes achieved in the seventies in the application of space technology, particularly, in communication, weather monitoring and management of natural resources, clearly established the urgent need to promote greater use of space technology in all Member States through international cooperation. Following the recommendations of UNISPACE-II held in Vienna in 1982, the United Nations programme on space applications was considerably strengthened and expanded, resulting in increased opportunities for developing countries

for participating in educational and training activities in space science and technology and to develop their indigenous capabilities in the use of space technology. Large increase in the number of developing countries involved in space activities since 1982, combined with the far reaching changes in the political climate of the world due to the end of the cold war, have created a conducive atmosphere for increased international cooperation. Rapid growth in commercialisation of space activities, which were earlier essentially the domain of Governments, has made a qualitative change in the spread of space benefits across the world. New scientific discoveries have helped in sharply focussing attention on the environmental problems facing the world community. Sustainable development has rightly become the watch word for the survival of humanity in the next millennium. It was against the background of these developments that a decision was taken to hold UNISPACE-III Conference, with a view to take stock of the recent advances in space science and technology and develop a comprehensive road map for promoting its wide spread application.

The world community gathered in Vienna for UNISPACE-III had the opportunity to determine how best to promote the use of space technology to help solve regional and global problem and consequently plan for the most effective means to engage the entire international community on the benefits of using space technology applications for economic, social, and cultural development.

As the only major intergovernmental gathering on outer space affairs held in the last 17 years, UNISPACE-III was a unique event in that, for the first time during a UN global conference, the private sector and civil society participated as partners of the United Nations. The conference attracted the participation of high-level government officials and policy makers from UN Member States, including Heads of space agencies, as well as representatives of inter-governmental



ISRO pavilion at UNISPACE-III Exhibition.

executives from space related industry. All participants from industrialised and developing countries found UNISPACE-III to be an excellent opportunity for exchanging ideas on the direction of space activities, establishing professional networks for future cooperation and exploring commercial opportunities.

One of the key objectives of UNISPACE-III was to identify specific areas and actions through which space science and technology could help solve common problems of regional or global significance. The conference was also to promote the use of space technology and help strengthen the capabilities of UN Member States, particularly in developing countries, in using space applications for telecommunications, broadcasting and navigation; agriculture and vegetation monitoring; protecting the environment; disaster warning; and space research for human development. UNISPACE-III considered ways of using space technology by UN Member States to

promote sustainable development, particularly, in implementing the recommendations contained in Agenda 21, adopted by the United Nations Conference on Environment and Development, through the involvement of a larger number of developing countries in international research programmes such as the International Geosphere-Biosphere (Global Change) Programme. UNISPACE-III addressed issues related to education, training and technical assistance in space science and technology and their applications aimed at the development of indigenous capabilities in all States. It provided a valuable forum for a critical evaluation of space activities and increase awareness among the general public about the benefits of space technology with a view towards strengthening international cooperation in space technology applications.

The conference featured a technical forum, in cooperation with a number of space agencies and

and non-governmental organisations and top international organisations, including around 40 workshops, seminars, forums and panels on various issues related to the agenda and objectives of the UNISPACE-III in which governments, R&D institutions and space industry worldwide participated. An international public exhibition showcased global achievements in space technology, highlighted current and future development tools and helped champion the spirit of international cooperation and globalisation besides presenting emerging technologies and providing a forum for business opportunities and establish partnerships among developed and developing nations. ISRO participated in the exhibition projecting its programme and achievements.

Another unique feature of the conference was the Space Generation Forum, organised in cooperation with the alumni association of the International Space University (ISU), France. Delegates to the forum spoke for the world's youth at UNISPACE-III. The Forum gave young professionals an unprecedented chance to shape humankind's future by airing their views about crucial space activities for the next century. In addition to the Space Generation Forum, a Space Festival was organised to provide young people from 8 to 18 years of age opportunities to learn about practical benefits of space technology and to motivate them to join space endeavours in the future. The Festival, organised by four non-profit organisations and a private firm, featured an international essay writing contest. Other special events included the commemoration of the 30th anniversary of the Moon Landing with the participation of astronauts and cosmonauts.

UNISPACE-III concluded with the recommendation of the following action strategies on Space and Human Development:

- Protecting the earth's environment and managing its resources
- Using space applications for human security,

development and welfare

- Advancing scientific knowledge of space and protecting the space environment
- Enhancing education and training opportunities and ensuring public awareness of the importance of space activities
- Strengthening and repositioning of space activities in the United Nations system
- Promoting international cooperation.

UNISPACE-III also recommended to the UN General Assembly to declare the week between October 4th and October 10th as the "World Space Week" for yearly celebration at the international level. The week is chosen to commemorate important events in the space field - i.e., October 4, 1957 which was the date of the launch of first man-made satellite Sputnik-I, and October 10, which was the date of entry into force of the UN Outer Space Treaty.

It is to be noted that India is an active member of UN Committee on Peaceful Uses of Outer Space (UN-COPUOS) since its inception. As one of the outcome of UNISPACE-II held in 1982, India took the initiative to share its experience in space with other developing countries by training their personnel under a programme called SHARES (Sharing of Experience in Space). India has set up the UN sponsored Centre for Space Science and Technology Education for Asia and the Pacific which started functioning in 1995. India got due recognition through the conference with Prof U R Rao being elected to preside over UNISPACE III. It is important to recall that late Dr Vikram Sarabhai, the first Chairman of ISRO was the Vice-President and Scientific Chairman of the first UN conference on space held in 1968 and Prof Yash Pal former Director of ISRO's Space Application Centre was the Secretary General of second UN conference held in 1982.

Rocket Pioneer Dr Srinivasan Passes Away

Dr S Srinivasan, Director of Vikram Sarabhai Space Centre, ISRO, Thiruvananthapuram, and a pioneer in rocket technology, passed away on September 1, 1999 at Chennai, following a heart ailment. Dr Srinivasan played a lead role in all the launch vehicle projects of ISRO — SLV-3, ASLV, PSLV and GSLV.

Born on April 14, 1941 in the erstwhile Thanjavur District of Tamil Nadu, Dr S Srinivasan took his Bachelors Degree in Electrical Engineering with Honors from Annamalai University and Masters degree in Aeronautical Engineering from the Indian Institute of Science, Bangalore. He received his doctorate degree in Engineering Mechanics from the Ohio State University, USA.

Joining Space Science and Technology Centre of ISRO in Thiruvananthapuram in October 1970, Dr Srinivasan was one of the first to be involved in the development of sounding rockets in ISRO. He later worked for the first satellite launch vehicle of India, SLV-3, of which he was Deputy Project Director. He led PSLV as Project Director in its formative stages and set up various facilities for the project like aerospace mechanisms, integration and check out at Valiamala, Thiruvananthapuram. He was also responsible for initial conception and plans for the facilities for liquid propulsion test facilities at LPSC, Mahendragiri and vehicle integration and launch facilities at SHAR Centre, Sriharikota

Taking over as Programme Director of the Integrated Launch Vehicle Programme (ILVP) in 1988, Dr Srinivasan contributed to the planning of the future launch vehicle programmes of ISRO including GSLV. He was Director of ISRO's SHAR Centre for a brief period before taking over as Director, VSSC in October, 1994. He led VSSC in new R&D tasks.

Dr Srinivasan was one among the pioneers in launch vehicles systems technology in India. He chaired many technical committees in ISRO for planning of programmes and reviewing the design. Dr Srinivasan was a Fellow of Aeronautical Society of India and Indian National Academy of Engineering. He was also a Member of Astronautical Society and Society for R&D Managers of India.

A very amiable person, Dr Srinivasan combined humane qualities with his technical abilities and management acumen. His colleagues considered him as a workoholic. He attracted everyone with his vision, will, tenacity, mastery in rocket technology and above all for his human concern.

