REPORT

UNITED NATIONS/SWEDEN ANNUAL COURSE SERIES ON REMOTE SENSING EDUCATION FOR EDUCATORS

Impact of 1990, 1992 and 1993 Courses

UNITED NATIONS

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Office for Outer Space Affairs
United Nations Office at Vienna

REPORT

RESULTS OF THE QUESTIONNAIRE ON THE IMPACT OF THE UNITED NATIONS/SWEDEN ANNUAL COURSE SERIES ON REMOTE SENSING EDUCATION FOR EDUCATORS

Classes of 1990, 1992 and 1993

UNITED NATIONS
1995

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Introduction

1. The United Nations Programme on Space Applications of the Office for Outer Space Affairs was established in 1971 in order to promote the practical applications of space technologies, including satellite communications, remote sensing and satellite meteorology, especially for the benefit of developing countries. The General Assembly, in its resolution 37/90 of 10 December 1982, took into account the recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82), held in Vienna in 1982, and expanded the mandate of the Programme to include, in particular, the following elements: (a) provisional assistance in the development of indigenous capability at the local level; (b) provision of long-range fellowships for in-depth training; (c) provision of technical advisory services to Member States and regional institutions upon request; (d) organization of regional and international training courses, seminars, workshops, conferences and technical expert meetings for the benefit of specialist educators, managers and decision makers in order to enhance their technical capabilities as well as keep them abreast of ongoing developments in the discipline; (e) acquisition and dissemination of space-related information; and (f) promotion of greater cooperation between developed and developing countries, as well as among developing countries.

2. Following the conclusion of UNISPACE 82, the Office for Outer Space Affairs focused its attention on how to translate the elements of the expanded mandate of the Programme into operational programmes. A number of initiatives were developed under the auspices of the Programme, in response to the UNISPACE 82 recommendations, including the following:

(a) The establishment of regional centres for space science and technology education in the developing countries;

(b) Development of a satellite-based information network, called COPINE;

(c) The organization of a course series, each session lasting six weeks, on remote sensing education for university educators.

3. The centres will be education and research institutions that are capable of high attainments in the development and transmission of knowledge in the fields of science and technology. Thus, the principal goal of these centres is the development of the skills and knowledge of university educators and of research and application scientists, by rigorous theory, research, applications, field exercises and pilot projects in those aspects of space science and technology that can enhance social and economic development in each country.

4. The COPINE project would address the collection, transmission, distribution and exchange of information within each country and among African universities in such areas as science and technology, agriculture, and the management of natural resources and the environment. Africa is the target region for the first phase of COPINE. Subsequent phases will lead to the expansion of the project to Asia, Latin America and the Caribbean, and Western Asia. The remaining part of this report will address the initiative referred to in paragraph 2 (c) above and its impact on the beneficiaries, i.e. the participants and their countries.

5. In response to the recommendations of UNISPACE 82 and those of the United Nations International Meeting of Experts on the Development of Remote Sensing Skills and Knowledge, held at Dundee, Scotland, in 1989, the Government of Sweden in 1990, through the Swedish Board for Investment and Technical Support (BITS), now called the Swedish International Development Cooperation Agency (SIDA), initiated jointly with the Office for Outer Space Affairs the annual course series on Remote Sensing Education for Educators. The annual course is hosted by the Department of Physical Geography, Stockholm University, the Swedish Space Corporation (SSC Satellitbild) at Kiruna and the Office for Outer Space Affairs, through the United Nations Programme on Space Applications.

6. The course is directed at educators from African, Asian and Latin American universities. The participants in the first course in 1990 were from Africa; in the second, third, fourth and fifth courses, held in 1992, 1993, 1994 and 1995 respectively, the participants were from Africa, Asia, and Latin America and the Caribbean.

7. The main objective of the course is to develop the practical knowledge and skills of educators from developing countries in remote sensing technology and to equip them with the skills needed to introduce the discipline, as appropriate, into the educational curricula of universities and institutes in their home countries. The participants are taught project planning and management and are exposed to the various aspects of the application of satellite data, including data and materials from their own countries,with particular emphasis on: (a) remote sensing and global change; (b) remote sensing applications: limitations and potential in developing countries; (c) remote sensing training strategy in developing countries; (d) remote sensing satellite systems; (e) visual interpretation of satellite images; and (f) land-use planning and environmental monitoring, including land use and vegetation mapping, monitoring of change, water resource development and environmental monitoring.

8. In order to provide the participants with the opportunity for practical training in the visual interpretation of remote sensing data, numerous practical exercises and field trips to the Abisco Scientific Research Station (100 km north of Kiruna) are organized. The course is supplemented with visits to SSC Satellitbild facilities and laboratories at Kiruna and the European Space Agency (ESA) Salmijarvi Ground Station and to the Esrange satellite station of ESA.

Questionnaire on the impact of the course

9. It is the hope of the co-sponsors, the United Nations and the Government of Sweden, that the course, which has benefited from input from both industrialized and developing countries, will result in a multiplying effect and will contribute significantly to the development of indigenous capability in remote sensing, including environment-related disciplines in developing countries.

10. In order to assist in adjusting the scope of activity organized by the United Nations Programme on Space Applications and to ascertain that the contribution of a particular activity is geared towards the development of the remote sensing capacity of the participating countries, it is the standard practice of the Office for Outer Space Affairs to seek the views of those who have participated in the activities of the Programme.

11. In order for the co-sponsors of the United Nations/Sweden annual course series to respond effectively to the needs of the international community, the Office decided to seek the views of those who have participated in this course series on the impact that this training has had on their performance and productivity in their own countries. A questionnaire was sent to the participants of the course held in 1990, 1992 and 1993, as it was felt that sufficient time had passed for them to judge the impact of the course. The observations contained in their replies were collated and summarized.

Methodology

12. The questionnaire (see annex I) was prepared by the Space Applications Section, the Office for Outer Space Affairs, in consultation with the Department of Physical Geography, Stockholm University.

13. The questionnaire was sent to the participants on 5 July 1994 through the respective Permanent Missions to the United Nations (Vienna) of the countries concerned and the resident representatives of the United Nations Development Programme in the same countries. A response was requested by 15 August 1994. As few replies were received by that deadline, the questionnaire was sent a second time, on 14 November 1994.

14. The questionnaire was sent to 78 participants, of which 11 were female. A total of 53 replied, of which 7 were female. Detailed statistics of countries responding to the questionnaire are given in annex II.

15. A list of participants and their educational institutions or similar entities, with addresses, compiled by region, is given in annex III. This list will be updated in the near future to include participants who attended the course in 1994, 1995 and 1996.

16. The objective of the questionnaire is to assess how valuable the training has been for the participants, especially in applying their newly acquired knowledge and experience in their own countries.

Observations

17. All the replies stressed that the knowledge gained through the course had met their professional needs. The majority of the participants had the opportunity, within a year, to apply the information obtained and the techniques learned in the course. The vast majority of the participants have organized a course in remote sensing and its applications, including the use of Geographic Information Systems (GIS), in their countries while others are planning to include such a course in the curriculum of their institution. Others have helped to revise the design of the remote sensing curriculum for postgraduate programmes and have taught a course in remote sensing and its applications.

18. Most activities of the participants have concentrated, in order of priority, on the following: education, research and development, planning, operational activities and consultation. Their activities in remote sensing have focused on mapping, agriculture, forestry, hydrology and GIS. A few of the activities concentrated on geology, mineralogy and fishery.

19. In the areas of environmental sciences and applications, a majority of the participants concentrated on the following: climate and hydrological systems, biochemistry and geophysics, radiation, dynamics and hydrology, and solid earth science. A limited number addressed oceanography.

20. Conscious of the increasing awareness in their countries of the important role that remote sensing techniques can play, and noting that with the effective and efficient use of satellite-remote sensing technology the quality of life could improve, most of the participants are now encouraging the extensive use of the technology at the national and regional levels.

21. In most of the replies, the participants stressed the importance of the transfer of knowledge and cooperation between their institution and their Government, especially with such ministries as agriculture and hydrology that are able to use remote sensing techniques, a major aspect emphasized by the course.

22. Depending on their region, several participants, apart from teaching: (a) participated actively in governmental institutions with a view to setting up the necessary facilities for a remote sensing and GIS centre; (b) contributed to the national environmental action plan of their country, providing ideas on environmental monitoring; (c) and collaborated with other establishments such as remote sensing institutes for forestry and departments of land management, including application of GIS in hydrology and water resource management.

23. The vast majority of the participants stressed the importance of and have contributed to the strengthening of the mechanism of information exchange by organizing conferences and publishing articles, textbooks and regional newsletters in order to establish a communications network. Among the contributions to the development of activities related to remote sensing education, including the publication of articles, are the following:

(a) Publication of textbooks in the area of photogrammetry;

(b) Research reports in the updating of topographic maps;

(c) Organization of training courses;

(d) Coordination of national and regional activities in order to develop infrastructure facilities and human resources in each institution;

(e) Exchange of information on education and training capabilities and expertise through these activities.

24. In order to gain more exposure to the technology, some participants pursued their postgraduate education for a second master's degree or for a doctorate abroad. Most participants stressed that they were hoping to establish, *inter alia*, a land resource management centre at their university that would be responsible for coordinating research in resource management and organizing seminars. A few participants had also attended other activities of the United Nations Programme on Space Applications.

25. In virtually all of the replies, the participants emphasized that participation in the course was a stepping-stone to contributing, in their own country, to the development of remote sensing education and its practical applications, including the use of GIS. The course taught them a systematic approach in teaching methods and better planning for the courses they were to prepare and teach.

26. The vast majority of the participants indicated that they wished to continue developing their scientific capacity and capability through specific projects, *inter alia*:

(a) Preparing a historical and geographical atlas;

(b) Introducing the use of GIS into the curriculum of the university;

(c) Developing a remote sensing laboratory;

(d) Strengthening remote sensing at the undergraduate level;

(e) Preparing a regional conference and inviting participants to present their research;

(f) Collaborating with other academic and government institutions on the exchange of information;

(g) Strengthening space science applications in their region.

27. A majority of the participants still use the materials provided by the Department of Physical Geography, Stockholm University and by SSC Satellitbild for teaching the basic principles of remote sensing and image interpretation. The practical classes they are teaching are along the lines of what they were exposed to in Sweden. The material provided by Sweden is also very useful to the participants in their research work.

28. Lack of funding at the national, regional and global levels remains a major obstacle in the development of the participants' capability to assist in the strengthening of the technological capacity of their own countries. As a result, a limited number of participants have not yet had the opportunity of contributing to the development of remote sensing education and its applications in their own countries due to lack of facilities in their institutions.

Conclusions

29. An appropriate educational programme is a precondition for preparing a society to participate in the utilization and growth of any technology and the annual course has continually directed attention to the provision of relevant education for educators from the developing countries in their own environment. A major priority has been to reorient education towards sustainable development by improving every country's capacity to address environmental and development issues in its educational programmes. Consequently, one of the increasingly important tasks for education has been to prepare developing countries for the transfer, adaptation and development of technology.

30. The overwhelmingly positive response to the course indicates that the requirements for the sustainable development of a country are in the process of being provided. This achievement is due to the scientific expertise and experience from which the participants benefited at the course, which enabled them to do, *inter alia,* the following: (a) address environmental and development issues of their country; (b) increase public knowledge and awareness; and (c) understand how to use space technology for environmental purposes by integrating remote sensing and related technologies into existing educational curricula in their own countries.

31. The experience gained by the participants has had multiplying effects that have contributed significantly to the development of indigenous capabilities in research and applications in remote sensing and in GIS and data management. These accomplishments are essential tools for environmental assessment and efficient natural resource management in the participants' own countries.

32. The ongoing efforts of the co-sponsors of this course, the United Nations and the Government of Sweden, have enhanced the quantity and quality of the scientific and technical education of national specialists. Subsequently, these individuals are able to contribute to the overall development of their countries. It is the hope of the co-sponsors that the scientific isolation that educators and researchers have experienced in the past, which has been an obstacle to successful research, will end through the local, regional and global exposure given to participants in this course series.

33. The participants are in a position to create an international core of educators who will pursue the objectives of the course and identify areas that will facilitate and increase cooperation and, consequently, create a forum for discussing problems and formulating policies and recommendations.

34. The successful undertaking of the annual course has helped developing countries to develop, through in-depth education, indigenous capabilities for research and applications in space science and technology, specifically in remote sensing, GIS and data management, as a part of the essential tools for environmental assessment and efficient natural resource management.

35. In the light of the above, and in order to continue these encouraging efforts, it is essential to strengthen international cooperation between developed and developing countries, as well as international agencies, by integrating the participants of the course into that cooperation. Such cooperation could be in the form of joint projects and field applications of common interest, which would promote appropriate interdisciplinary studies on a regional basis among the participants and organizers of the course.

36. On the whole, the above approach will lessen the existing communication gap between the participants and educators, scientists and policy makers whose interests might be articulated by governmental and non-governmental organizations. Science and technology need to be rooted in the participants' own countries and regions. Development that benefits only a few is not sustainable. The co-sponsors of the course series are playing and will continue to play an instrumental role in this endeavour.

*Annex I**

QUESTIONNAIRE

UNITED NATIONS/SWEDEN COURSE ON REMOTE SENSING EDUCATION FOR EDUCATORS

(Please print or type)

1. Family name | First name | Other names

2. Nationality | Sex | Year of Participation

Mailing address | Home address

Telephone: _____
Telefax: _____
Telex: _____
Cable: _____
E-mail: _____

3. Institution Type:

College or University	[ ]
Research Institute	[ ]
Non-profit Corporation	[ ]
Government Agency	[ ]
Others (Specify)	[ ]

4. (a) Position and responsibilities at the time of the course:

(b) Position and responsibilities since your participation in the above course:

*Not formally edited.

5. Specify the nature of your subsequent professional activities:

Research and development	[ ]
Planning	[ ]
Operational activities	[ ]
Education	[ ]
Other (Please specify)	[ ]

Further explanation, if necessary:

6. Specify the area(s) of your professional activities in (a) Remote Sensing, (b) Environment Science & Applications:

[a] Remote sensing

Mapping	[ ]
Agriculture	[ ]
Forestry	[ ]
Hydrology	[ ]
Geology	[ ]
Mineralogy	[ ]
Fisheries	[ ]
GIS	[ ]

[b] Environment science and applications

Climate and hydrological system	[ ]
Biogeochemistry and geophysics	[ ]
Radiation, dynamics & hydrology	[ ]
Ecosystem dynamics & bio-chemistry cycles	[ ]
Atmospheric chemistry	[ ]
Solid earth science	[ ]

7. To what extent did your participation in this course help your teaching and research activities?

8. State briefly in what way you have contributed to the development of remote sensing education and its practical applications in your own country.

9. Within which of the following periods were you able to make use of the knowledge acquired at the course upon returning to your home country?

Within one year	[ ]
Within two years	[ ]
Have not made use of it	[ ]

10. Did your participation in the course help you initiate, institute or organize in your home country any of the following?

	Initiate	Institute	Organize	Number of people in each group
a) Teach remote sensing and its applications as a part of your Institution's curricula	[ ]	[ ]	[ ]	[ ]
Organize seminars/ Workshops	[ ]	[ ]	[ ]	[ ]
Study group	[ ]	[ ]	[ ]	[ ]
Coordinate user group	[ ]	[ ]	[ ]	[ ]
National committee	[ ]	[ ]	[ ]	[ ]
National programme	[ ]	[ ]	[ ]	[ ]
Regional/international cooperation	[ ]	[ ]	[ ]	[ ]
Data receiving station	[ ]	[ ]	[ ]	[ ]
Data analysis centre	[ ]	[ ]	[ ]	[ ]
Training facility	[ ]	[ ]	[ ]	[ ]
Other (Please specify)	[ ]	[ ]	[ ]	[ ]

b) Please give a brief description of your accomplishments:

11. Provide details of the facilities (space, equipment etc.), at your disposal for carrying out the above tasks:

12. List selected publications you have written since your attendance at the course:

13. How many public lectures dealing with any part of space science or any part of space science and technology have you organized since your participation in this course?

14. Describe precisely, the material and financial support you have received from your institution and government in furtherance of your professional efforts following this course.

15. Indicate any additional remote sensing educational programme you have participated in since the UN Sweden course.

16. Summarize your professional objectives in the next five years.

17. Do you communicate with other participants of this training course?

*Annex II**

STATISTICS ON COUNTRIES RESPONDING TO THE QUESTIONNAIRE

Questionnaire: United Nations/Sweden Course on Remote Sensing Education for Educators

1990

Questionnaire sent to 25 participants, of which 1 was female

Region: Africa

Country	**Sex**
Algeria	M
Cameroon	M
Egypt	M M
Ethiopia	M
Guinea	M
Malawi	M
Nigeria	M
Senegal	M
Sierra Leone	M
Somalia	M
Swaziland	M
United Republic of Tanzania	M

$\Sigma = 13$
$\Sigma M = 13$
$\Sigma F = --$

*Not formally edited.

1992

Questionnaire sent to 27 participants, of which 6 were female

Region: Africa

Country	**Sex**
Uganda	M
Zambia	M
Zimbabwe	M

$\Sigma = 3$
$\Sigma M = 3$
$\Sigma F = --$

Region: Asia

Bangladesh	M
Lao People's Democratic Republic	M
Pakistan	M
Sri Lanka	M
Thailand	M M
Viet Nam	M

$\Sigma = 7$
$\Sigma M = 1$
$\Sigma F = --$

Region: Latin America

Colombia	M
Ecuador	M
El Salvador	M
Mexico	F
Venezuela	F
Uruguay	F

$\Sigma = 6$
$\Sigma M = 3$
$\Sigma F = 3$

1993

Questionnaire sent to 26 participants, of which 5 were female

Region: Africa

Country	**Sex**
Ghana	M
Jordan	F
Kenya	M
Madagascar	F
Mauritius	M
Nigeria	M
Uganda	F M
Zimbabwe	M

$\Sigma = 9$
$\Sigma M = 6$
$\Sigma F = 3$

Region: Asia

Bangladesh	M
Malaysia	M
Micronesia (Federated States of)	M
Nepal	M
Sri Lanka	M
Thailand	M
Viet Nam	M M

$\Sigma = 8$
$\Sigma M = 8$
$\Sigma F = --$

Region: Latin America

Country	**Sex**
Chile	M
Costa Rica	M M
Ecuador	M F
Uruguay	M
Venezuela	M

$\Sigma = 7$
$\Sigma M = 6$
$\Sigma F = 1$

Σ = Total replies 53
ΣM = Total replies 46
ΣF = Total replies 7

*Annex III**

LIST OF EDUCATIONAL INSTITUTIONS AND PARTICIPANTS THAT REPLIED TO THE QUESTIONNAIRE

AFRICA

Institution	*Participants***
Algeria	
Image Processing Laboratory U.S.T.H.B./Electronic Institute BP 32 El-Alia Bab-Ezzouar 16111 Alger Fax: (+213) 2764311	Youcef Smara (1990)
Cameroon	
Geography Department University of Yaounde I P.O. Box 12551 Yaounde Fax: --	Emmanuel Ngwa (1990)
Egypt	
Department of Civil Engineering Cairo University Cairo Fax: --	Mohamed Shakwi Elghazali (1990)
Soil and Water Department Faculty of Agriculture University of Alexandria Aflaton Street El-Shatby Alexandria Fax: (+20) 03 5965427	Ahmed Suliman (1990)
Ethiopia	
Department of Geology Faculty of Science Addis Ababa University P.O. Box 1176 Addis Ababa Fax: (+251) 550655	Tiyustu Haile (1990)

*Not formally edited.
**The year of participation is given in parentheses.

AFRICA (cont.)

Institution	*Participants**
Ghana	
Department of Geography University of Cape Coast Cape Coast Fax: (+233) 0422449	Peter Acheampong (1993)
Guinea	
Faculty of Letters and Human Sciences Conakry University BP 1147 Conakry Fax: --	Abdoul Diallo (1990)
Kenya	
Agricultural Engineering Department Jomo Kenyatta University of Agriculture and Technology P.O. Box 62000 Nairobi Fax: (+254) 15121764	David Mburu (1993)
Madagascar	
UNESCO Environment Programme c/o PNUD BP 1348 101 Tananarive Fax: (+261) 235370	Noeline Raondry (1993)
Malawi	
Department of Geography and Earth Sciences Chancellor College P.O. Box 280 Zomba Fax: (+265) 522046	Micheal Dolozi (1990)

*The year of participation is given in parentheses.

AFRICA (cont.)

Institution	*Participants**
Mauritius	
Faculty of Engineering University of Mauritius Reduit Fax: (+230) 4549642	Umessah Armoogum (1993)
Nigeria	
Department of Civil Engineering Obafemi Awolowo University Ile Ife Fax: (+234) 36232401	Martins Ogedengbe (1990)
Geology Department Obafemi Awolowo University Ile Ife Fax: (+234) 36232401	Victor Olarewaju (1993)
Senegal	
Institute of Earth Sciences BP 5396 Dakar-Fann Fax: (+221) 247113	Souleye Wade (1990)
Sierra Leone	
Department of Geography Fourah Bay College Mount Aureol University of Sierra Leone Freetown Fax: (+232) 2222 4439	Reynold Johnson (1990)
Somalia	
Cartography and Remote Sensing Unit UNECA P.O. Box 3005 Addis Ababa Fax: (+251) 1514416	Abdishakour Gulaid (1990)

*The year of participation is given in parentheses.

AFRICA (cont.)

Institution	*Participants**
Swaziland	
Department of Land and Water Management University of Swaziland P.O. Luyengo Fax: --	Absalom Manyatsi (1990)
Uganda	
Makerere University P.O. Box 16215 Kampala Fax: (+256) 41531288	Nasani Batungi (1992)
Faculty of Agriculture and Forestry Makerere University P.O. Box 7062 Kampala Fax: --	Joseph Obau (1993)
Makerere University Institute of Environment and Natural Resources P.O. Box 7062 Kampala Fax: (+256) 41241720	Rose Ssebatindira (1993)
United Republic of Tanzania	
Sokine University of Agriculture Department of Forest, Mines and Management P.O. Box 3010 Chuo Kikuu Morogoro Fax: (+256) 4153288	Yusufu Malende (1990)
Sokine University of Agriculture Department of Forest, Mines and Management P.O. Box 3010 Chuo Kikuu Morogoro Fax: (+256) 4153288	Nasani Batungi (1992)
Zambia	
Geography Department UNZA P.O. Box 32379 Lusaka Fax: --	Mufal Mbinji (1992)

*The year of participation is given in parentheses.

AFRICA (cont.)

Institution	*Participants**
Zimbabwe	
Department of Geography University of Zimbabwe Box MP 167 Mt. Pleasant Fax: (+263) 4333407	Daniel Tevera (1992)
Department of Science and Maths Education University of Zimbabwe Box MP 167 Mt. Pleasant Fax: (+263) 4333407	Peter Ngwazikazana (1993)
ASIA	
Bangladesh	
Institute of Flood Control and Drainage Research Bangladesh University of Engineering and Technology Dhaka-1000 Fax: (+880) 2863026	Mohammed Rahman (1992)
Institute of Flood Control and Drainage Research Bangladesh University of Engineering and Technology Dhaka-1000 Fax: (+880) 2863026	Muhammad Khan (1993)
Jordan	
Royal Jordan Geographic Centre P.O. Box 214 Amman Fax: (+962) 6847694	Jakleen Al-Halasah (1993)
Lao People's Democratic Republic	
Hydropower Engineering Consultants Fangum Road P.O. Box 2352 Vientiane Fax: (+856) 217203	Samsavanh Phanmath (1992)

*The year of participation is given in parentheses.

ASIA (cont.)

Institution	*Participants**
Malaysia	
Department of Geography University of Malaya 59100 Kuala Lumpur Fax: (+603) 7563454	Khairulmaini Osman-Salleh (1993)
Micronesia (Federated States of)	
P.O. Box 159 Kolonia Pohnpei FSM 96941 Fax: (+691) 3202479	Ahser Edward (1993)
Nepal	
Central Department of Meteorology District Post Office P.O. Box 127 Lalitpur Patan Dhoka Fax: (+977) 1228914	Khadga Thapa (1993)
Pakistan	
Department of Earth Sciences Quaid-I-Azam University Islamabad Fax: --	Azam Khwaja (1992)
Sri Lanka	
Department of Civil Engineering University of Moratuwa Moratuwa Fax: (+94) 1647622	Sunil Wickramasuriya (1992)
Department of Agricultural Engineering Faculty of Engineering University of Peradeniya Peradeniya Fax: (+94) 888041	Ranjith Wachchi-Patabendege (1993)

*The year of participation is given in parentheses.

ASIA (cont.)

Institution	*Participants**
Thailand	
Asian Institute of Technology G.P.O. Box 2754 Bangkok 10501 Fax: (+66) 25245597	Kaew Nualchawee (1992)
Department of Geography Faculty of Social Sciences Chiang Mai University Chiang Mai Fax: (+66) 53 222763	Chira Prangkio (1992)
Geography Department Faculty of Arts Silpakorn University Nakhon Pathom 73000 Fax: (+66) 34 255794	Suttinee Tongsard (1993)
Viet Nam	
Vietnam Centre for Science and Technology Viet Nam Fax: (+84) 4352483	Thinh Nguyen (1992)
Hanoi College of Mining and Geology Daihoc Mo-Dia Chat Tu Liem Hanoi Fax: (+84) 4343633	Hoang van Hung (1993)
28 Nguyen Huy Tu Hanoi Fax: --	Quynh Phan (1993)

LATIN AMERICA

Chile	
Universidad de Santiago de Chile Departmento Ingeniería Geografica Ad. Bernardo O'Higgins #3363 Estación Central Santiago Fax: (+56) 681 1213	Roberto Richardson (1993)

*The year of participation is given in parentheses.

LATIN AMERICA (cont.)

Institution	*Participants**
Colombia	
Departamento de Biologia Universidad del Valle Apartado Aéreo 25360 Cali Fax: (+923) 3392440	Fernando Zapata (1992)
Costa Rica	
School of Geology University of Costa Rica Aptdo. 35-2060 San José Fax: (+506) 2342347	Percy Denyer (1993)
Faculty of Engineering University of Costa Rica Aptdo. 4219 San José Fax: (+506) 253 3415	Rafael Oremuno (1993)
Ecuador	
Cotopaxi Ground Station, CLIRSEN C.P. 18-08-8216 Quito Fax: (+593) 2 581 066	Cesar Guevara (1992)
Cotopaxi Ground Station, CLIRSEN C.P. 18-08-8216 Quito Fax: (+593) 2 581 066	Wilma Armas de Robles (1993)
INCEL Lasso, Cotopaxi Fax: (+593) 3719068	José Echeveria-Ramirez (1993)
El Salvador	
Centre for Geophysical Research Universidad de Costa Rica San Pedro de Montes de Oca San Jose Fax: --	Sergio Burgos (1992)

*The year of participation is given in parentheses.

LATIN AMERICA (cont.)

Institution	*Participants**
Mexico	
Instituto de Geofísica Ciudad Universitaria c.p. 04510 México, D.F Fax: (+525) 550-2486	Rosa Maria Prol-Ledesma (1992)
Uruguay	
Universidad de la Republica Avda, Del Libertador Montevideo 11800 Fax: --	Ana Martinez (1992)
Faculty of Sciences/Dept. of Geography Tristán Narvaja 1674 11200 Montevideo Fax: (+598) 2409973	Alvaro Gonzales (1993)
Venezuela	
Instituto de Ingeniera Poba International Apartado Postal 10200 Caracas 1040-A Fax: (+58) 962 10251942	Carmen Goitia-Blanco (1992)
Universidad de Los Andes Escuela de Ingenieria Forestal Merida 5101 Fax: (+74) 401503/19	Jose Pernia (1993)

*The year of participation is given in parentheses.

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