



Global Terrestrial Observing System

Annual Report 1997

GTOS-14

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Background

The Global Terrestrial Observing System was established in 1996 in response to a growing need for understanding the effects of global change in terrestrial ecosystems on sustainable development. The five sponsors - Food and Agriculture Organization of the United Nations (FAO), International Council of Scientific Unions (ICSU), United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Environment Programme (UNEP) and World Meteorological Organization (WMO) collaborate to promote stronger links between scientists and policy makers.

A GTOS Steering Committee (GTSC) assists in the implementation of GTOS and guides the scientific and technical content of the programme. At present, it consists of 18 members from 15 different countries and one representative for each co-sponsor (see annex 1). The GTSC establishes and updates requirements, reviews existing programmes to assess their ability to meet requirements, and recommends enhancements or new initiatives.

The first meeting of the GTSC (2-5 December 1996, Rome, Italy) defined a short-term implementation strategy and addressed a number of issues regarding the way in which GTOS will work with other global change groups, in particular the Global Climate Observing System (GCOS) and the Global Ocean Observing System (GOOS).

Working groups were established to define and further develop priority issues relating to biodiversity, coastal areas, earth sciences, site criteria, socio-economic issues, and the GTOS implementation plan. Among these, the latter group has been most active, working through the GTOS listserver to post information and exchange views.

A small Secretariat located at FAO in Rome supports the GTSC and is responsible for day-to-day programme implementation and for maintaining communication between members and liaison with outside organizations.

GTOS Plan

A GTOS Plan has been prepared and is now being reviewed by the members of the GTSC and the Co-sponsors. The Plan will be completed and distributed early in 1998.

The GTOS Coordination and Implementation meeting (12-15 May 1997, Rome, Italy) reviewed a preliminary draft plan and agreed that the implementation strategy would be divided into three main phases: a preparatory phase (short-term: 1997), an establishment phase (medium-term: 1998-99) and an operational phase (long-term: 2000 and beyond).

The main activities of the preparatory phase include the technical definition and the design framework for its operation. In this phase, the priorities are:

- establish a stronger foundation for the Secretariat by obtaining secure funding and additional scientific support;
- further definition of the plan and strategy;
- establish its boundaries in scope and operation; and
- prepare background documents about GTOS.

The establishment phase will aim to strengthen linkages between existing observing systems and GTOS by identifying a few existing international networks that share the GTOS objectives and which could form the core of a “network of networks”.

During the operational phase, action will be directed towards continued and expanded programme implementation, including the production of a range of outputs, continued evaluation and improvement of the programme, and establishing a GTOS identity among key groups of scientists and policy makers.

What is GTOS?

The central mission of GTOS is to provide policy makers, resource managers and researchers with access to the data needed to detect, quantify, locate, understand and warn of changes (especially reductions) in the capacity of terrestrial ecosystems to support sustainable development.

GTOS focuses on five issues of global concern: changes in land quality; availability of freshwater resources; loss of biodiversity; pollution and toxicity; climate change.

This programme aims to provide guidance in data analysis and to promote (a) integration of bio-physical and socio-economic geo-referenced data; (b) interaction between monitoring networks, research programmes and policy makers; (c) data exchange and application; and (d) quality assurance and harmonization of measurements methods.

During 1997 work has concentrated on the following main areas:

1. Preparation of a GTOS Plan
2. Initiation of a global terrestrial observing network (GT-Net)
3. Support for GTOS initiatives
4. Collaborative activities
5. Information and communication

GT-Net

During the GTOS Coordination and Implementation meeting in May, it was agreed that a priority activity should be to examine ways of linking existing terrestrial monitoring networks. This was followed by a meeting of Experts on Ecological Networks (17-20 June 1997, Guernica, Spain) jointly sponsored by GCOS, GTOS and IGBP, which brought together for the first time the major terrestrial monitoring networks to present their programmes, discuss future plans and ways to collaborate (see annex 2).

This meeting confirmed the common ground shared by the networks and the need for a forum and mechanisms to work together. The participants decided to establish a Global Terrestrial Observing Network (GT-Net) and to work toward coordinating the activities of the terrestrial observation networks around a core set of issues, such as data access and availability, demonstration projects and harmonization of measurements methods.

A number of recommendations were made to the GTOS Steering Committee, including the establishment of a GTOS Network panel consisting of selected members of the GTSC and of participating networks.

GT-Net Structure

The GT-Net will be composed initially of the networks in attendance at the meeting in Guernica. This would be expanded as required after gaining experience in operating the network. A Network Panel, consisting of selected members of the GTSC and representatives of the participating networks, would guide the development and implementation of GT-Net. Initially the GTOS Secretariat will provide support to the GT-Net activities but efforts are underway to have one of the GT-Net members play a substantive role in programme coordination and monitoring.

Activities

The key activities of the GT-Net will be to:

- define a clear policy on data and information access;
- share and exchange environmental data;
- develop a set of standards for metadata as well as local/regional/global in situ data sets;
- and undertake demonstration projects, the initial one to estimate primary terrestrial productivity.

Demonstration Project

The GT-Net will undertake projects which demonstrate the effectiveness of linking existing networks by generating data sets which are useful in studying global change. This will serve as a test bed for collaboration among networks and sites, including data sharing and exchange, and obtaining the experience needed for a further development of the global terrestrial network.

The first project will concentrate on improving current estimates of global terrestrial primary productivity. It will adopt a hierarchical approach and use models which combine both satellite data and in situ observations. A set of output products, which have Net Primary Production (NPP) as their common foundation, would serve this purpose.

Scope of GT-Net

The overall objective of GT-Net is to better understand global and regional change by linking existing terrestrial observation networks. Initially, it will be limited to those networks that attended the meeting in Guernica and that are regularly making in situ terrestrial and freshwater measurements. Over the longer term, the GT-Net will strive to meet the needs of the other Global Observing Systems on issues relating to climate and oceans.

Programme Support

A number of project proposals were prepared during the first half of 1997 to be used in making contacts with potential donors.

Scientific and Technical Support to the GTOS Programme	<p>The value of having top quality scientific expertise in the Secretariat cannot be over-emphasized. The GTOS programme benefited greatly in many areas of work through the presence of Dr. Hal Kibby who was seconded for two years by USEPA to work with GCOS and during 1997 worked half-time, supported by FAO, on the GTOS programme. His experience and dedication will be missed in 1998. Terms of Reference have been prepared to recruit senior scientists to work on GTOS activities in Rome for 1-2 years under the FAO Academic Exchange Programme.</p> <p>This project would provide scientific and technical support within the GTOS Secretariat in areas relating to data management and information exchange, data and information exchange, data and information support to the international conventions and capacity building in countries. It will allow the Secretariat, under the guidance of the Steering Committee, to implement the GTOS programme on an accelerated basis.</p>
Support for the Assessment and Development of User Requirements	<p>This project would consult with policy makers, planners and scientists to develop a priority list of long-term terrestrial observation requirements based on the five GTOS priority issues: changes in land quality, availability of freshwater resources; loss of biodiversity; climate change; and effects of pollution and toxicity.</p>

Support to the TEMS Meta-database	This project would improve the Terrestrial Ecosystem Monitoring Sites (TEMS) meta-database by expanding the number of registered terrestrial monitoring sites, updating the content and quality of existing data, introducing and distributing a pc-based version of the meta-database, incorporating new user features and make the Internet access more robust. It would also promote wider use of TEMS among scientists and policy analysts.
Application of GCOS/GTOS in Developing Countries	This project would organize a workshop in Asia to bring together government policy makers and local scientists to formulate a project that will provide information to meet a regional and/or national environmental management needs. A similar proposal is under development for the Latin American region.
Definition and Demonstration of the Operational Aspects of the Global Observing Systems	The overall objective of the project is to define and demonstrate the operational aspects of GCOS, GOOS and GTOS in cooperation with the relevant institutions of six developing countries located in Africa, Asia and Latin America and two developed countries in Europe. This project was submitted to the government of Norway in 1996, which agreed to support a portion of it but requested the collaboration (cofinancing) of other donors. The proposal was therefore sent to other potential donors (Belgium, the Netherlands, Sweden). At present there have been expressions of interest but no firm agreement on support.

Endorsement of Proposals

During 1997 GTOS endorsed two project proposals that were consistent with the objectives of GTOS and which could contribute to better understanding of the changes taking place in terrestrial ecosystems.

Integrated Monitoring in EC/ENRICH Programme	A proposal on Networking of Long-term Integrated Monitoring in Terrestrial Systems (NoLIMITS) was developed in January 1997 and submitted to the European Union (EU). This proposal sets out a scheme for a preparatory action within ENRICH (European Network for Research in Global Change) which aims to provide a focus for the coordination of existing long-term integrated monitoring site schemes to ensure the maximum coherence of data and information products on a European scale. This includes the emerging opportunities for integrated monitoring schemes in Eastern Europe and the requirements of key users represented by the European Environment Agency (EEA), the Global Terrestrial Observing System (GTOS) and the Centre for Earth Observation (CEOS). It will strengthen the networking of existing long-term monitoring sites throughout Europe, and promote the transfer of information between existing sites, and between sites and the potential international users of data and information, through the use of the Internet. In July, the implementing organizations, among which is the Environment Change Network of the UK, were informed that their proposal had been accepted. They are now organizing a Steering Committee meeting in early 1998 to launch this project.
Quantitative Indicators	In September, GTOS supported a proposal prepared by the University of

and Indices of Environmental	Cantabria and submitted to the EU on quantitative indicators and indices of environmental quality which aims to build a Euro-Latin American Network for Environmental Assessment and Monitoring (ELANEM). This network, based on previous cooperation links among partners, will strengthen research and development capabilities of the different members and enhance their participation in specific international programmes. The immediate objective of the project is to design and test a procedure for measuring environmental quality and establishing relationships between the pressures and impacts arising from human actions and the level of societal response to environmental changes. Multidisciplinary and quantitative indicators and indices would be developed. A response from the EU is expected in early 1998.
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Other Sources of Financing

The annual core support from the co-sponsors to the GTOS trust fund has been instrumental in holding the initial meetings among the Steering Committee members and raising the awareness of the GTOS programme at key scientific meetings. However, additional resources are needed in order to demonstrate the benefits of GTOS.

Informal approaches for support to the programme were made to France, Germany, the Netherlands, Sweden, and the USA. It appears that resources may be forthcoming from the USA to develop a geospatial environmental information system for land, water and biodiversity - three of the five priority GTOS issues. Terms of reference for this work are being developed.

In addition to providing the staff and offices for the GTOS Secretariat, FAO has agreed to provide support in 1998 for GTOS to develop a framework and indicators on the socio-economic aspects of "managed" biodiversity of which the major part is in the areas of agriculture, forestry, and fisheries. This agrobiodiversity initiative, aimed directly at the countries that are party to the Convention on Biological Diversity (CBD), would involve a number of other organizations in producing a technical paper for consideration by CBD's Subsidiary Body for Scientific, Technical and Technological Advice. The Secretariat will seek to test the work, initially in a few countries in Central America, where complementary initiatives are underway.

Although 1997 has not resulted in significant additional financing for GTOS, a number of important elements have been put into place. Not the least of these are: formulation of project ideas and proposals that reflect GTOS priorities; establishing contact with appropriate persons in financing organizations who understand and appreciate the importance of global change issues; and, identification of sources for possible future funding. Hopefully these efforts will pay off in 1998.

Three sources of financing relevant to GTOS will need to be followed up in 1998:

- The Fund for Methodological Support to Ecoregional Programmes, which is managed by the International Service for National Agricultural Research (ISNAR). The

objectives and operations of this fund are guided by an international Steering Committee (ISC). The Fund supports research to develop methodology that (a) enhances implementation activities in ecoregions and (b) supports processes of change in ecoregions to improve management of natural resources and rural development.

- ICSU's Grants Programme: for 1999, all of ICSU's Joint Initiatives will be eligible for a grant in Category I, i.e. for new innovative projects involving one – or preferably more – ICSU bodies, with high profile (potentially) and international nature, and consistent with ICSU's objective to promote basic sciences or their application to development and human welfare. The grants are for amounts ranging between US\$ 50,000 – 100,000.
- The U.S. National Science Foundation which through a process of competitive grants has supported the development of long-term ecological research programmes and is also initiating a programme called “Knowledge and Distributed Intelligence” (KDI) that fits well with the GT-Net objectives of information and data sharing. By teaming up with appropriate U.S. institutions, support for initiatives that reflect the NSF criteria and the objectives of GTOS could be realized.

Collaborative Activities

Collaboration with GCOS and GOOS

GTOS complements the two other global observing systems, GCOS (climate) and GOOS (oceans), by using common procedures in data management and space observations, and through joint panels or activities for land-climate and land-coastal issues. Some of the more recent developments include the Global Observing Systems Space Panel and the Joint Data and Information Management Panel.

Global Observing Systems Space Panel (GOSSP)

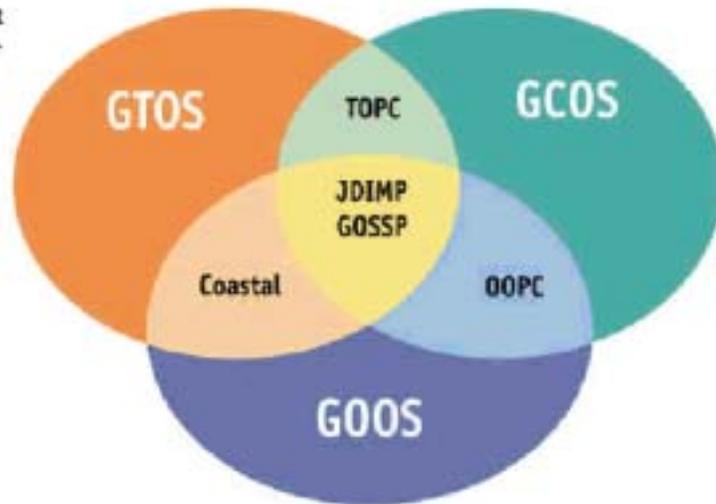
This panel provides a mechanism for coordinating technical inputs to the Committee for Earth Observation Satellites (CEOS) which represents most of the space agencies and aims to facilitate the contacts between the space agencies, their sponsors and other parts of the user community. In March 1997 GTOS accepted the invitation of CEOS to become an affiliate member and played a role in developing one of the CEOS prototype projects which deals with forest cover.

André Bassolé, GTSC member, represented GTOS at the first GOSSP session (May 1997, Paris, France), which reviewed the methodology for assessing how well existing space instruments meet the requirements of the observing systems. It was decided that CEOS should provide an annual report informing the Panel about progress in planned activities for every operational and planned satellite. The performance of each system will be checked against the user requirements and a set of assessment scores given for each application area. Particular attention was given to the initiative for developing an Integrated Global Observing Strategy (IGOS) and to the requirements needed for the "prototype projects" developed in this regard at the CEOS Strategic Implementation Team (SIT) meeting.

Fig.1: Common areas of interest between the Global Observing Systems.

Legend:

- GTOS: Global Terrestrial Observing System
- GCOS: Global Climate Observing System
- GOOS: Global Ocean Observing System
- TOPC: Terrestrial Observation Panel for Climate
- OOPC: Ocean Observation Panel for Climate
- JDIMP: Joint Data and Information Management Panel
- GOSSP: Global Observing Systems Space Panel
- Coastal: informal collaboration on coastal zones between GOOS and GTOS.



<p>Joint Data and Information Management Panel (JDIMP)</p>	<p>Originally formed as a GCOS panel, the Data and Information Management Panel completed work on the GCOS Data and Information Management Plan, which outlines the steps necessary to develop an Initial Operational System (IOS) for observations and data. It now serves as a joint panel for all three observing systems (G3OS). Gwynneth Martin, GTSC member, represented GTOS at the first session of the JDIMP (July 1997, Tokyo, Japan), where it was agreed that a prototype data and information management system for the G3OS will be developed to accommodate data and products from the various components of the global observing systems. In concert with the G3OS science requirements and associated user communities, JDIMP will formulate and develop the G3OS Data and Information Management Plan(s).</p> <p>The panel also recommended that GTOS develops a Data and Information Management Plan focusing on terrestrial data management.</p>
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During the JDIMP meeting in Tokyo (July 1997), GCOS proposed to develop an Information Center (IC) that would use Internet technology to allow users to locate and access data and information holdings at participating centres. The IC would provide search capabilities and access to a world-wide set of observations and information, but would not hold data itself. The panel suggested to undertake a pilot activity to evaluate the feasibility and usefulness of a G3OS Information Center, and – if the evaluation is positive – to transfer the activity to an associate institution. GTOS needs to consider the proposal, its relevance to the 5 priority issues of the programme and evaluate what the costs and benefits would be.

Participation in Meetings

In addition to GTOS Representatives at the GOSSP and JDIMP meetings, efforts were made to link up with initiatives that share common ground and to participate in the development of the coordination between the three global observing systems.

<p>GOOS Joint Scientific and Technical Committee</p>	<p>Michael Glantz, chairman of the GTSC, attended the fourth session of the Joint Scientific and Technical Committee for the Global Ocean Observing System (J-GOOS), held in Miami, USA, 23-25 April 1997. With regards to the coastal zones issues, which is an area of interest for both GOOS and GTOS, the participants were briefed on the results of the Coastal Workshop held in February 1997 in Miami, which made a number of recommendations to J-GOOS for the way ahead to develop the Coastal Module. It was agreed to establish a GOOS Coastal Panel to oversee and review coastal activities. Re-formulated Terms of Reference were prepared and accepted.</p>
<p>ILTER Workshop</p>	<p>Michael Glantz attended the Latin American Program on Long Term Ecological Research (ILTER), held in Foz do Iguacu, Brazil, 9-13 June 1997. This workshop was based on decisions reached both in the Latin American Workshop on Long Term Ecological Research (San Juan, Puerto Rico) and in the ILTER Panama & Costa Rica meetings. Among the issues addressed were: criteria used to select national sites; general description of the proposed sites; indication of which sites have sufficient capacity to take part in the ILTER Programme; evaluation of the priorities and basic needs of the selected "sites"; and definition of basic research topics to be included in the ILTER Programme.</p> <p>The formation of an International Long Term Ecological Research (ILTER) network has important implications for the GT-Net initiative. Continued contact with ILTER will be needed.</p>
<p>Second meeting of the Sponsors Group for the G3OS</p>	<p>In addition to the sponsors representatives, the directors of the GCOS, GOOS and GTOS Secretariats also attended the second meeting of the Sponsors Group for the Global Observing Systems (Geneva, Switzerland, 15-16 November 1997). As regard matters relating to GTOS, the sponsors endorsed the establishment of the Global Terrestrial Observing Network (GT-Net), encouraged GTOS to identify and develop a core list of terrestrial variables that would be of use for CEOS as well as to GT-Net, and discussed funding issues and coordination among the three observing systems.</p> <p>The sponsors also examined the financial impact of GTSC meetings vis a vis implementation of programme objectives. They suggested to form a core GTOS Executive Group to guide the programme and to organize meetings of the working groups when circumstances merited this. Should sufficient additional resources come available, meetings of the full GTSC would be highly desirable.</p>

<p>GCOS Joint Scientific and Technical Committee</p>	<p>Michael Gwynne, GTSC member, and Jeff Tschirley, Programme Director a.i. of the GTOS Secretariat, attended the seventh session of GCOS Joint scientific and Technical Committee (JSTC), held in Eindhoven, The Netherlands, 22-25 September 1997.</p> <p>Among the issues related to GTOS were the following: (1) the JSTC endorsed the JDIMP recommendation to develop a G3OS Information Centre and encouraged GTOS to review the proposal and its relevance to GTOS priorities, (2) GTOS was proposed as a co-sponsor of networks on glaciers and hydrology; (3) the chairman of the Terrestrial Observation Panel for Climate (TOPC) expressed interest to establish stronger links with GTOS and to assist in identifying a core set of terrestrial measurements for land, water and biodiversity</p>
<p>LUCC Data Requirements Workshop</p>	<p>Antonio Cendrero, member of the GTSC, attended the LUCC Data Requirements Workshop, organized by IGBP/IHDP LUCC and IGBP-DIS (Barcelona, Spain, 11-14 November 1997). This was the first of a series of four meetings planned to establish data priorities and define procedures and methods for the production of specific datasets for Land Use and Land Cover Change Research. The main objectives of this Workshop were to allow scientists to articulate their specific data needs for research, to identify major common data and monitoring needs, and to determine data priorities.</p> <p>One outcome of this workshop is a report including an initial LUCC list of variables for systematic observations. This list will be sent to GTOS in order to develop a core set of terrestrial observations which would be of interest for both programmes. After the workshop, GTOS contacted LUCC proposing a joint meeting to discuss further collaboration.</p>

Integrated Strategic Plan for the Global Observing Systems

At the Sponsors Group meeting, UNEP presented to the group a draft paper for the development of an Integrated Global Observing Strategy (IGOS) for the G3OS, intended to be a framework encompassing integrated planning, linking research and operational activities, and linking space and in situ observations. CEOS/IGFA (the Committee on Earth Observation Satellites and the International Group of Funding Agencies for global change research) have also seen the need for a such a strategy and they have established a Strategic Implementation Team (SIT) which prepared in July 1997 a scoping paper "Towards an Integrated Global Observing Strategy" that was distributed at the meeting.

The G3OS document was revised after the meeting, incorporating a number of additions and modifications, including some elements of the CEOS/IGFA scoping paper. Its title was changed to "Integrated Strategic Plan for the Global Observing Systems". It addresses specific issues of the G3OS and broader questions that should contribute to the evolution of an Integrated Global Observing Strategy among all of the nations, agencies and organizations involved in the collection and analysis of data on the global environment. It also defines elements of the necessary ongoing strategic planning process. It is intended to be an evolving working document to be considered and updated at each Sponsors Group meeting to reflect the present state of collaboration between the global observing systems and within larger partnerships, and to identify the contributions of the G3OS to an integrated global observing strategy. The sponsors will draw on it as appropriate and necessary to prepare documents for approval within their organizations and by their governing bodies.

Information and Communication

A number of GTOS publications were produced during 1997 and are available from the GTOS Secretariat. See annex 3 for the complete list. During the Conference of the Parties (COP) of the Convention to Combat Desertification (Rome, October 1997), the Secretariat distributed 400 copies of a document: "GTOS and the Convention on Desertification" – composed of selected parts of the document "GTOS and the Conventions".

A GTOS brochure has been produced in English and in French. In addition, ICSU is developing a G3OS brochure for the global observing systems, which should be ready early in 1998.

A set of colour overheads which describe the GTOS mission, activities and structure has been prepared by the Secretariat and can be customized according to the audience. It is available to GTOS members by "ftp" or on request in Power Point or Adobe Acrobat format; printed overheads can be made available as needed.

A GTOS list server was established in January 1997 to facilitate the communication and exchange of information between the Secretariat, the Sponsors and the Steering Committee. Approximately 150 messages were posted during the year in the following categories:

- Working Groups
- Implementation Plan
- Development of Networks
- Documents for Information and/or for Comments (including meetings reports)
- Various GTOS Activities

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For a Global Vision of the Earth We Share**

Annex 1 - GTOS Steering Committee Members

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Dr. Robert Landis
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Annex 2- GT-Net: Participating Networks

- Arab Centre for the Studies of Arid Zones and Dry Lands (ACSAD)
- Actic Monitoring and Assessment Programme (AMAP)
- Chinese Ecosystem Research Network (CERN)
- Consultative Group on International Agricultural Research (CGIAR)
- Fluxnet
- International Cooperative Programme on Integrated Monitoring of Air Pollution Effects on Ecosystem (ICP IM)
- Organismo Autonomo Parques Nacionales
- Réseau d'Observatoires de Surveillance Ecologique à Long Terme (ROSELT)
- UK Environmental Change Network (ECN)
- US Long-term Ecological Research Networks (LTER)
- Worldwide Network of Biosphere Reserves (MAB-BR)

Annex 3 - GTOS Publications

Report of the GCOS/GTOS Terrestrial Observation Panel For Climate

Third session (Cape Town, South Africa, 19-21 March 1996). GTOS-1

Report of the Expert Meeting on Hydrological Data for Global Observing Systems

(29 April-1 May 1996, Geneva, Switzerland). GTOS-2

Planning Group Report - "GTOS: Turning a Sound Concept into a Practical Reality"

June 1996. GTOS-3

In Situ Observations for the Global Observing Systems

(Geneva, Switzerland, September 10-13, 1996). GTOS-4

Report of the Global Observing Systems Space Panel

Second session (Geneva, Switzerland, October 16-18, 1996). GTOS-5

Report of the First Meeting of the GTOS Steering Committee

(2-5 December 1996, Rome, Italy). GTOS-6

GTOS and the Conventions

Michael D. Gwynne, December 1996. GTOS-7

Report of the GTOS Coordination and Implementation Meeting

(12-15 May 1997, Rome, Italy). GTOS-8

Report of the Global Observing Systems Space Panel (GOSSP)

First session (Paris, France, May 27-30, 1997). GTOS-9

Report of the Meeting of Experts on Ecological Networks

(17-20 June 1997, Guernica, Spain). GTOS-10

GCOS/GTOS Plan for Terrestrial Climate-Related Observations

Version 2.0, June 1997. GTOS-11

GCOS/GOOS/GTOS Joint Data and Information Management Panel (JDIMP)

Third session (Tokyo, Japan, 15-18 July 1997). GTOS-12

GHOST - Global Hierarchical Observing Strategy

June 1997. GTOS-13