
**- A Strategy for PacificGOOS -
Pacific Islands Regional Alliance for Global Ocean Observing System**

**SOPAC Miscellaneous Report 446
August 2001**



PacificGOOS Secretariat
SOPAC
Private Mail Bag
Suva FIJI
Telephone 679 381 377
Facsimile 679 370 040
Email Cristelle@sopac.org



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1 Introduction

Our biosphere, is that thin layer of water, air and soil that covers the surface of the Earth, where life exists and the sustainability of the Earth's life support systems are determined. These systems encompass our "natural environmental systems as well as the ancillary social system required to foster social harmony, safety, nutrition, health care, economic standards, and the development of new technology"¹.

Recent achievements in science and technology raise the possibility of deciphering the complex processes that determine the characteristics of our biosphere, as well as building simulation models to predict their seasonal fluctuations and their decadal trends. Scientists aspire to developing the capability to extrapolate to the Global Environment on a decadal time scale, a system similar to that already developed for short-term weather forecasting. This view of an Integrated Global Observing System Strategy (IGOS) is a long-term and ambitious vision.

The Global Ocean Observing System (GOOS) is part of IGOS. With oceans being the heat engine of the Earth's climate system, they play an important and critical role in climate change. Therefore GOOS is the ocean component of the Global Climate Observing System (GCOS) and the marine coastal component of the Global Terrestrial Observing System (GTOS). A Joint Commission on Oceanography and Marine Meteorology [J-COMM] has been established to, amongst other things, coordinate and manage the observing system elements common to both GOOS and GCOS.

The establishment and strengthening of GOOS is being championed by the United Nations Educational, Scientific and Cultural Organisation and its Intergovernmental Oceanographic Commission (UNESCO-IOC), in close collaboration with other United Nations Agencies such as, the United Nations Environment Programme (UNEP), World Meteorological Organisation (WMO), and Food and Agricultural Organisation (FAO); the International Council of Scientific Unions (ICSU) and, various Space Agencies. These organisations are working toward developing the four key areas of ocean prediction tools, being: remote sensing, in-situ observation, computational resources and modelling. The complexity and the costs to build GOOS mean that co-operation needs to be encouraged at the global, regional and national levels.

Key stakeholder countries for GOOS in the first phase of implementation of its key components were the developed countries of the "Pacific Rim" and Europe. However, early in the 1990's the question of participation of the developing countries such as the Island Countries of the Pacific was raised. Further, as the Pacific Ocean covers more than a third of the earth's surface, it is key to GOOS and key to improving our understanding of the ocean, as well as the interactions between the ocean and atmosphere.

This document seeks to:

- Analyse the primary reasons for Pacific Island countries and Territories (PICTs) involvement and contribution to GOOS
- Address related issues
- Propose relevant, appropriate strategic action.

¹ See the definition of the *Life Support System* in *Encyclopedia of Life Systems*, EOLSS-UNESCO Project, 1998. [<http://www.eolss.co.uk>]

The Pacific Island countries, which have been identified as needing to co-operate toward establishing a regional alliance to promote and implement GOOS components in the Pacific, form part of the very diverse Pacific region in which exist some of the world's smallest and lesser developed countries (LDC), when measured in terms of their human resource development or per capita income². Despite their great diversity, most of them have very small land territories and populations, with sovereign rights over huge marine Exclusive Economic Zones (EEZ's), with economies largely or wholly dependent upon ocean resources.

Although these islands countries considered for PacificGOOS may be very diverse in terms of their political and economic status, they share a common interest in the sustainable development of their ocean and islands resources. Access to the natural resources within their EEZs is one, if not the single most important element for PiCTs in their negotiations with the main GOOS stakeholder countries, for involvement and contribution to GOOS. The benefits for PiCTs will be the GOOS data and tools and, most importantly, the products most appropriate to meeting specific local and regional needs.

Most PiCTs have political, economic and cultural connections and co-operation links with key GOOS stakeholder countries who also belong to the Organisation for Economic Cooperation and Development (OECD), both through bi-lateral relationships and through the various regional organisations of the Pacific Island region³.

These existing regional institutional alliances demonstrate that Pacific Island countries can and do work together. Further, that there is potential for them to successfully co-operate toward defining and adopting a common strategy, to build and implement the GOOS components appropriate for their specific needs.

An approach to developing such a strategy is proposed in this report. It assumes regional peace, security and political stability within the context of diminishing external development assistance. It is based on concrete, simple and short-term actions with the ultimate objective of establishing partnerships between Pacific Island countries and Territories, between their regional organisations and with the international community. It has a long-term vision for establishing strong partnerships, with in-kind and financial contributions, rather than the status quo of being heavily dependent upon development assistance.

Section 1 - Provides an outline of the general principles and objectives of GOOS, which have been retained as the guiding principles and objectives within the PacificGOOS Strategy.

Section 2 - Describes the specific features of Pacific island countries and territories in PacificGOOS, addresses the rationale for them to work together and reviews their efforts to set-up a regional alliance.

Section 3 - Proposes a strategy to establish the PacificGOOS. It includes setting up an Interim PacificGOOS with an enabling framework and calendar, to define, prioritise, prepare and promote components of PacificGOOS.

Section 4 - Provides strategic actions for implementation by Interim PacificGOOS.

² See Pacific Human Development report 1999. [<http://www.undp.org.fj/phdr/>]

³ Pacific Island regional organisations include the Pacific island Forum [PIF], South Pacific Applied Geoscience Commission [SOPAC], University of the South Pacific [USP], Secretariat of the Pacific Community [SPC], South Pacific Regional Environment Programme [SPREP], Forum Fisheries Agency [FFA], South Pacific Tourism Organisation [SPTO] and the Pacific Island Development Programme [PIDP]

1.1 GOOS Overview

1.1.1 Historical Background, Present Status and Main Objectives.

Over the past decades the development of new technology, particularly for observations and measurements from space, have provided scientists with enabling tools, to describe and better understand interactions between physical, chemical and biological processes that regulate the total Earth system, and to assess how it is influenced by human activities. New technology has also provided powerful tools for data transmission and processing, and for operating numerical models to simulate these complex interactive processes.

Recent, significant progress made in oceanography is a result of using these tools in implementing a number of complex international research programmes such as the World Climate Programme (WCP) and associated experiments such as World Ocean Climate Experiment (WOCE), Tropical Ocean and Global Atmosphere (TOGA) and the International Geosphere-Biosphere Programme – Study of Global Change (IGBP).

Such research initiatives have enabled scientists to anticipate ENSO phenomena and its related effects. It has also improved our capacity to forecast climate variations and predict associated impacts at global and regional levels.

GOOS, was founded in 1991 by a number of States who wanted to: improve forecasts of climate change and variability; enhance the management of their ocean resources; mitigate natural hazards; and, improve utilization and environmental protection of their coastal zones.

It is co-sponsored by the United Nations bodies UNESCO-IOC, WMO and UNEP, and the non-governmental organisation ICSU. GOOS works in close partnership with the Global Climate Observing System [GCOS] and the Global Terrestrial Observing System [GTOS], with the climate component of GOOS being the ocean component of GCOS.

A Joint Commission on Oceanography and Marine Meteorology [J-COMM] has been established to, amongst other things, coordinate and manage the observing system elements common to both GOOS and GCOS.

The main objectives of GOOS are to:

- Specify the ocean observation data needed on a continuous basis to meet the requirement of global users of ocean resources and the ocean environment
- Develop and implement an internationally co-ordinated strategy for the gathering, acquisition and exchange of these data
- Facilitate, encourage and widen data usage to develop enabling tools and services for better and sustainable use of ocean resources and the ocean environment
- Facilitate the means by which lesser-developed and developing countries can contribute to the objectives of GOOS [2].

1.2 GOOS Design Principles.

To ensure endorsement under the GOOS label, there is a requirement for system components of initiatives by global regional alliances (GRA) of GOOS to respect the following key principles:

- Meet the needs of identified users

- Assume long-term routine operations, which meet agreed quality standards
- Cover the range of activities from data capture to the provision of end products and services
- Follow GOOS data policy for data management, processing and distribution
- Rely, wherever possible, upon existing components, systems of observation and data management [2].

The beneficiaries and users of the services produced by GOOS are numerous. They include, among others, the managers of coastal defences, port and harbour authorities, marine culture and farming, shipping and ship routing, oceanic and coastal marine fishing, and other marine resources industries such as tourism and recreation. Other less obvious beneficiaries include agriculture and land-based food producers, energy and fresh water service providers, and public health authorities as a result of improved forecasting of seasonal and multi-year climate variations.

1.3 GOOS Modular Structure

To respond to particular end-users needs, the original project for GOOS was developed into the following five modules by panels of experts:

- Climate monitoring, assessment and prediction
- Health of the Ocean, Assessment and Prediction
- Monitoring and Assessment of Marine Living Resources
- Coastal Seas Management and Development
- Marine Meteorological and Oceanographic Services.

These have since been amalgamated into two Panels, being the:

Ocean Observing Panel for Climate (OOPC) – a consolidation of Marine Meteorological and Oceanographic Services and Climate monitoring, assessment and prediction due to the intimate linkages between the data and models required for climate monitoring, assessment and prediction, and the readily available outcomes and products from established marine meteorological and oceanographic services.

Coastal Ocean Observing Panel (COOP) – a result of the modules for Health of the Ocean, Assessment and Prediction; Monitoring and Assessment of Marine Living Resources; and, Coastal Seas Management and Development being combined, on the basis that their processes are interdependent and reliant upon an intricate mixing of physical, chemical and biological parameters.

1.3.1 The Ocean Observing Panel for Climate – (OOPC).

The current priority research activity of the OOPC is the Global Ocean Data Assimilation Experiment (GODAE). GODAE aims to demonstrate the feasibility of operational real-time integration of global ocean data (obtained from space and in-situ) and their assimilation in prediction models. This experiment is considered to be a key requirement for establishing and entrenching GOOS.

It is important to highlight that GODAE requires in-situ measurements, which will involve the deployment of at least 3000 autonomous profiler floats as part of the international Argo Project. The Argo Project is co-financed by various countries⁴ and is a key priority of the GOOS Steering Committee (GSC). It is generally accepted that such global models are necessary to enable effective nesting of national [local] and regional models.

1.3.2 The Coastal Ocean Observing Panel - (COOP).

COOP activities have reached various stages of development and are largely dependent on the countries or the regions concerned. In some regions, observing systems advocated by COOP already exist, such as in the activities of the GRA - BalticGOOS.

At the GOOS level the priority tasks for COOP are to develop:

- Plans to ensure that local /regional observing systems are consistent with the GOOS design principles and technical requirements
- Ensure easy exchange and integration of relevant data between local, regional and global levels
- Mechanisms for more effective and sustained involvement of all users
- Developing and building capacity in those developing countries most vulnerable to environmental changes
- Procedures for continuous exchange of information and ongoing evaluation of equipment, operating systems, pilot projects and research activities relevant to coastal ocean observing
- COOP in order to prevent useless duplication and to offer opportunities for co-operation.

1.4 GOOS Implementation through a GOOS Regional Strategy.

Five overlapping phases are proposed for implementing GOOS [2]. They include:

1. Planning, including design and technical definitions of GOOS;
2. Operational demonstrations and pilot experiments;
3. Incorporation of suitable already-existing systems, and relevant activities;
4. Gradual implementation towards fully operational criteria;
5. Continued assessment and improvement of parts or of the entire system.

It is widely proffered that GOOS' implementation can be accomplished through establishing GRAs. GRA implementation involves activities related to both OOPC and COOP. Regional projects offer an attractive option to recruiting and engaging small, developing countries into GOOS, as regionalism allows them to achieve "critical mass".

Further, GRAS are able to consider, include and reflect local and regional needs and improve the effectiveness for implementation of capacity building, human resource development and, infrastructure development and strengthening [2].

⁴ Pacific Rim countries Australia, Canada, Japan, New Zealand and the USA intend to fund 1976 profiling floats, with Asian countries India and Korea intending to fund 260 and Europe 720.

At the 4th GOOS Steering Committee Meeting in May 2001, the status and progress of established⁵ [and proposed] GRAs were reported on, and their activities described [12]. Refer to Annex B for the current list of GRAs.

Although regional development is both natural and desirable, it is recognised that a GOOS regional policy is necessary to acknowledge and respect the mandates of existing regional organizations and avoid duplication of efforts, inefficient use of resources and conflicts of interests. Consequently, proposals for the design of considered regional GOOS strategic initiatives should be encouraged. This will provide the opportunity to secure funds for discrete strategic initiatives and their component activities in the event that insufficient finances prevent implementation.

The draft PacificGOOS Strategy will need to be reviewed at a later date, to ensure that it is consistent with final I-GOOS conditions and requirements for building GOOS on a regional basis [15].

2. GOOS in the Pacific Region

2.1 The Pacific Ocean & Pacific Island communities.

The Pacific Ocean comprises 180 million km² and covers half of the world's ocean area and close to one third of that of the Earth. By contrast, the land areas of the Pacific islands, which are scattered across 38.5 million km² of this vast ocean space, are with the exception of a few islands in Melanesia, generally small (that is, less than 5000 km²) and in many cases very small (that is, less than 100km²) [1; 11]. However, most of these islands have national and resource jurisdiction over very large tracts of ocean space, and are thus, the custodians and stewards of significant and important global ocean spaces and resources.

2.1.1 Geography

The Pacific islands countries and territories [PiCTs] in South & Central Pacific range in size from very small islands such as Tokelau, Niue and Nauru, to larger islands such as Papua New Guinea [PNG], Solomon Islands and New Caledonia, and widely scattered groups of coral atolls such as Kiribati. National populations range from less than 2,000 inhabitants in Niue, to approaching 4 million in PNG. The majority of these populations still live in rural areas. However, as elsewhere in the world there is a trend toward urbanisation. The seafloor of the Pacific Ocean comprises two large similar features, the Pacific and the Australian/Indian Plates. The large [up to 100 Km wide in some portions], extremely long, geologically complex boundary zone between these plates, has been active for at least the past 100 million years and is the focus of major threats to the region as it is the locus of present-day volcanic and earthquake activity and associated hazards such as tsunamis, and landslides.

It has been extremely valuable to the region in generating mineral resource deposits for countries such as Papua New Guinea, Vanuatu, Solomon Islands, Fiji Island and New Caledonia. These island States and Territories are dominated by high, large volcanic islands with fertile soils and reliable rainfall resulting in rich biodiversity and, agriculture, forestry, mining and tourism industries.

⁵ It is important to highlight that some GRAs are well established, such as EuroGOOS and NEARGOOS, and some like PacificGOOS, are in a gestation phase such as GOOS Africa and Indian Ocean GOOS.

Atoll States of the region, such as the Marshall Islands, Kiribati, Tokelau or Tuvalu, on the other hand are generally much more low-lying, resource-limited, and almost entirely dependent on potential ocean resources for economic development.

2.1.2 Economic Context

The economies of PiCTs cover a wide range of situations, with variation in Gross National Product [GNP] per capita from USD 470.00 [for the Solomon Islands] to USD 15,000.00 [for Hawaii]. However, economic growth is generally low, for most PiCTs. For the poorest of these States, despite investing nearly one third of Gross Domestic Product [GDP] into their economies over the past decade, the high population growth, which is upwards of four percent, has generated exceedingly low economic growth per capita and ever-declining living conditions⁶.

Economies of PiCTs are largely based on agriculture, fisheries and tourism, all of which depend upon a healthy environment, bio-diversity conservation and sustainable development. For most PiCTs, agriculture remains the dominant economic sector and major employer, producing mainly subsistence food crops. The ocean sector is of major economic importance primarily through fisheries. Due to the large EEZ's of PiCTs, the ocean sector offers one of the few opportunities for their economic growth, with mariculture, coastal and oceanic fisheries and, tourism contributing or potentially contributing to significant foreign exchange earnings.

Whilst existing, established GRAs bring together parties from countries located around semi-closed seas or oceanic basins of limited size, such as BalticGOOS, NEARGOOS or MedGOOS, the situation is quite different with PacificGOOS in the Central and South Pacific region. They are a grouping of small island countries and territories dispersed in the vast Pacific Ocean.

The capacity to protect the environment and explore, develop and exploit fully the ocean resources of the region does not currently exist within this grouping of small islands. They need global assistance and support from countries, special involvement and contribution from countries of the Pacific Rim and, co-operation and collaboration with other small islands in other regions such as the Indian Ocean and Caribbean, who share the same sorts of challenges and issues.

With respect to development assistance through foreign aid, OECD countries agreed, in 1960, to set a target of 1% of their GDP as their contribution to foreign aid. However, reporting at the Rio and Copenhagen Conferences, convened in 1992 and 1995, respectively, suggest estimates of foreign aid contributions to be in the vicinity of 0.7%. In 2000, estimates of foreign aid contributions were reported to be as low as 0.25 %⁷. Foreign aid to the developing PiCTs has followed this global trend, with the decreasing contributions being further exacerbated by the ever-diminishing strategic importance of the region, due to the emergence of the USA as the World Superpower.

⁶ Refer [http://www.undp.org/fj/phdr/contents_of_the_report.htm]

⁷ Le Monde Diplomatique, May 2001

2.1.3 Political Context

Historically, PiCTs have served as ports of call to supply food and fresh water to Western navigators and as human labour reservoirs to press-gang natives. More recently the islands have been of interest as components of various political zones of influence or as strategic military focal points for camps of belligerents in worldwide conflicts .

Today, despite the potential risks of severe future conflicts in other Regions in the World, it will be assumed that the Pacific Region for the PacificGOOS GRA, which will be defined in more detail in Section 3, will be established during a period of peaceful adaptation to the rising pressure of the globalisation of the World economy.

2.2 Rationale for Establishing a Regional PacificGOOS.

As previously articulated, GOOS resulted from the opportunity borne of recent scientific achievements being taken up by a strong lobby of the oceanography community, with a key objective being the long-term prediction of climate change. Such an enabling system had never seriously been addressed either as a priority need for mankind or as a true social demand, until the 1990's. This bottom-up approach, which resulted in the creation of GOOS and praised as such, in GOOS principle, may not be immediately obviously to PiCTs Leaders.

This is further supported by the current list of GOOS global players in the climate panel, which is limited to a few big countries with capacity to design, build and operate the required equipment necessary to acquire and process the massive flows of data for sophisticated predictive models, from which useful predictions are ultimately extracted.

Within the overall GOOS framework, it appears that the only role of the small island States are to assist toward facilitating and concurring to access of their EEZ, for long-term, in-situ ocean measurements and observations. However, Pacific islands leaders acknowledge that whatever their contribution to the predictions for the climate changes and variability, the resulting data and information will in all cases be made available to them.

The over simplified presentation of GOOS mechanics is probably unlikely to inspire the Leaders of PiCTs to invest even a small share of their meagre resources to OOPC. However, the COOP should be of greater interest to PiCTs as it deals with shorter term, more localised and tangible issues.

A possible response to this dichotomy in GOOS is that running predictive models of ecological events relevant to COOP activities needs to be "nested" within the larger geographical models, which require inputs from the results of OOPC activities. It is on this basis that PiCTs need to have specific interests to co-operate and contribute to both the OOPC [Climate] and COOP [Coastal] GOOS modules.

The establishment of a PacificGOOS GRA will place an obligation on the participants, to review their ongoing ocean research and monitoring activities, as well as to assess their priority demands and needs of GOOS. It will permit to integrate present ongoing ocean research and monitoring activities into the Pacific Island Regional Ocean Policy [Quote PIROP Reference], as well as to broaden the scope of activities for marine environment protection and marine resources management. The setting up of an active PacificGOOS GRA could possibly trigger opportunities for new activities and new partnerships both within and outside the region.

2.3 Past Initiatives Toward a PacificGOOS GRA.

To date, the following two regional GOOS initiatives have been undertaken in the PiCTs Region, to promote the idea and philosophy of GOOS:

- Pacific Regional GOOS Capacity Building Workshop convened in Suva Fiji in 1998, which considered organisational arrangements, as well as the development issues for a PacificGOOS GRA and the possible capacity-building implications for establishing a GRA [4].
- Pacific Regional Coastal-GOOS Workshop held in Apia, Samoa in 2000, which convened to develop concept papers for COOP [Coastal-GOOS] pilot projects in the Pacific Region.

2.3.1 Pacific Regional GOOS Capacity Building Workshop, Fiji - 1998.

The Pacific Regional GOOS workshop identified fisheries, climate change, sea-level rise, El Nino phenomenon, coastal management and conflicts for sharing the marine spaces in the coastal zone, marine pollution and water quality, coral reef and mangrove health, and the availability and use of science data, as the primary issues of importance to local users in the Pacific. The workshop concluded that, a regional PacificGOOS would be relevant and positively beneficial, in both a regional and global context.

It also agreed that the regional organizations FFA, SPC, SOPAC, SPREP and USP, which are already established with specific mandates to serve an essentially consistent client base of Pacific islands countries governments, would guide the PacificGOOS GRA and ensure the political support required to sustain the success of the program. External organizations, with an active interest in the region were also identified and included JAMSTEC, University of Hawaii, IRD, British Geological Survey [BGS], CSIRO and NOAA.

This regional forum acknowledged that significant volumes of natural resources observational data for the region already exist in regional databases, and that - “given the development of an appropriate data management system” - these data could form the basis of the PacificGOOS program. The Workshop recommended the immediate formation of an “ad hoc Steering Committee” [4].

2.3.2 Pacific Regional CoastalGOOS Workshop, Samoa - 2000.

Fourteen of the potential twenty-three PacificGOOS Members attended this important meeting. The workshop devoted time to both the OOPC and COOP components of GOOS.

OOPC - The International Argo Project (refer §1.3.1) was presented, with participants noting the potential of the Project to advance our understanding of the ocean in climate. General consensus prevailed that the Argo Project would be both important for and beneficial to PiCTs. It also noted that the successful implementation of the Argo Project would be dependent upon the active contribution of PiCTs through their concurrence for access to their EEZ’s. The proposed “Rights and Duties between Pacific Island Countries and the Argo Float Providing Countries” is outlined in Annex F.

It should be noted that the Workshop report [8] highlighted only the in-situ data to be collected for the Argo Project. As Argo is a component of GODAE, which includes data both from satellites and in-situ, the availability of satellite data and communications nets to the future PacificGOOS members needs to be explored and clarified. This is important since the

access to and the capacity for processing remote sensing data will be key factors for determining and ensuring the success of PacificGOOS pilot projects, and particularly pilot projects in coastal marine areas. It is suggested that the future contribution of PacificGOOS countries to the Argo Project needs to be re-assessed and defined more precisely, with specific contributions agreed between the parties involved.

COOP - This part of the workshop involved participants working toward the identification and development of concepts for three potential CoastalGOOS pilot projects in the areas of:

- Coastal water quality;
- Pearl and seaweed mariculture development;
- Coral reef health.

For each of these projects "champions" from various Pacific regional organisations and national governments were identified, with each of the pilot projects addressing the needs of different end-users.

Although the monitoring and predictive components of the 3 pilot projects identified will essentially be different, it is highly probable that they will each have a common set of core specifications comprising the basic parameters for water quality data. It is suggested that through defining a common set of parameters for monitoring, co-operation for at least the first phase of these projects could be achieved.

Aside from government users, other "users" concerned with Water Quality issues, such as on-land and coastal marine mining companies and, tourism operators and should be invited and encouraged to participate.

The data and results of coastal pilot projects should be made readily accessible both within and outside the region in order to attract the interest of end-users with similar needs. In some cases, such as the proposed pilot project for mariculture development, the end-users may be competitors and co-operation might be difficult to establish. For example, black pearl producers from French Polynesia may not be willing to co-operate with those from Cook Islands. On the other hand co-operation on the pilot project for coastal water quality should be easier to promote and develop.

However, such perceived difficulties should not deter promotion of initiatives such as the mariculture development concept, where long-term monitoring and observation is necessary for sound management and should be encouraged to promote best practice. It is envisaged that publicity and promotion of pilot projects dealing with water quality and environmental protection issues will undoubtedly attract the interest of the suppliers of measuring and monitoring equipment.

2.4 Existing observing, data holdings and communication

A current inventory of global ocean observing systems, acknowledged as expressly contributing to GOOS and recognised as "Level 1" contributions, are included in Annex E. Of these, the list of GOOS elements that exist in the Pacific Islands include:

- Vessel of Opportunity, of World Meteorological Organisation (VOS of WMO)
- Ship of Opportunity of Tropical Ocean and Global Atmosphere (TOGA)
- Data Buoy Co-Operation Panel (DBCP)

- Tropical Atmosphere Ocean array in the equatorial Pacific Ocean) (TAO)
- Global Sea-Level Observing System (GLOSS)
- Global Temperature-Salinity Pilot Project (GTSP)
- Global Coral Reef Monitoring Network (GCRMN)
- Global Telecommunication System (GTS) of WWW for data transmission and communication.

A comparison of the list provided above, with the responses to a questionnaire distributed in 1998 by SOPAC to determine the status of existing marine observing systems in the Pacific Region [4] demonstrated that “there are fundamental gaps” and a general lack of appreciation by PiCTs of GOOS technologies, GOOS Principles (refer § 1.3) and applications in the Pacific region.

This gap in GOOS knowledge has probably narrowed since the 1998 - Regional GOOS Capacity Building Workshop held in Fiji. However, there is a need to update information on existing components, which potentially could be adapted to meet GOOS requirements and principles. This remains a crucial “first” step toward institutionalising GOOS in the region. Such an inventory would need to include contributions from the meteorological offices in the region [2].

3. PacificGOOS Strategy – Proposed Approach.

GOOS is an ambitious project because its implementation still requires better understanding of complicated natural processes. The modelling of complete ecosystems is an example of the scientific challenge for GOOS. It will necessitate expensive, long-term operations for collecting data and producing useful products through the use of complex simulation tools, both from space and in-situ.

GOOS development will necessitate the involvement and co-operation of the whole international community but only a few countries will have the capacity to aggregate data and exploit the system optimally. The ultimate result aiming to relate predictions of ecosystems changes to their economic impacts and social consequences.

In the longer term this predictive capacity obviously represents a further means for the main GOOS stakeholders to continue to dominate over smaller, lesser developed countries, which may not have access to GOOS products of strategic importance.

3.1 Setting the PacificGOOS Regional Limits.

The mode of living and the very existence of the few millions inhabitants of a majority of the small islands scattered across the Pacific Ocean essentially depend upon the ocean environment and resources. There is a lot at stake for them with GOOS but most have little means besides scarce international aid-as-usual to participate in the project as active stakeholders. With their collective sovereign rights covering approximately 38.5 million Km² of the Pacific Ocean, access to PiCTs EEZ's and their ocean resources is one of their major assets. This aspect provides a strong platform, which they can use when negotiating their participation to GOOS and, ensure easy access to GOOS data, tools and products most adapted to their needs.

The geographical coverage proposed for consideration for the PacificGOOS regional alliance is the overall area of the combined land and marine exclusive economic zones (EEZ's) of the islands located within the limits shown on the map in Annexe C. The proposed grouping includes the countries which belong to the Alliance of Small Island States [AOSIS]⁸, American Samoa and Guam, who both hold observer status at AOSIS, and others like Hawaii, Okinawa, Mariana, French Polynesia, New Caledonia, Pitcairn, Norfolk, Wallis & Futuna and Tokelau. Refer to Annex D for a list of potential candidates for membership to the PacificGOOS GRA.

Irrespective of their development and political status these PiCTs represent a community that share common interests in establishing a GRA, with related issues and benefits. The listing in Annex D, represents a true community of interest for similar GOOS data and products and also delineate reasonable limits and overlaps with other GOOS GRAs such as Southern Pacific Ocean GOOS, South East American GOOS and NEARGOOS, that are favourable to inter-regional co-operation.

3.2 Pacific Regional Needs for GOOS Data and Products.

From the outset a distinction needs to be made between GOOS data, tools and products resulting from the two main GOOS components, OOPC and COOP. For OOPC meteorological and oceanographic services and ultimately long term events prediction such as ENSO and climate change such as sea level rise will most likely, in all cases, be made available to PiCTs. For COOP data, tools and products that will respond to local demands for resource management and environmental protection, and that will not be developed without tenacious determination and significant contributions by PiCTs.

The obvious and most apparent conclusion is that PiCTs should have different attitudes and adopt a different approach and strategy to addressing and dealing with the COOP and OOPC components of GOOS. To participate in the Climate Panel of GOOS, PiCTs will have to respond to the external demands of the main stakeholder countries in GOOS. However, participation in the Coastal Panel of GOOS will require PiCTs to take the initiative to define their own needs and priorities, design and develop demonstration and pilot projects, promote any necessary research actions and ultimately build and run operational observing systems that meet their needs and fulfil GOOS criteria and requirements.

This is already in process and reports from past activities and the 1998 Regional GOOS Capacity Building Workshop in Fiji suggest broad interest within PiCTs in specific components of CoastalGOOS, in order to effectively manage and protect their environment and economic resources, and improve their quality of life. The drafts of three pilot project proposals exist with identified project "champions" [8].

3.3 Participants to PacificGOOS.

Previous consultations suggest that many different parties are potential participants to the PacificGOOS GRA, with contributions both in kind and in cash. Some have already agreed to contribute to setting up the current "ad hoc Steering Committee" [4] and to be "champions" for developing the proposed CoastalGOOS Pilot Projects [8].

The parties, which are already more or less engaged in this still informal "thinking and building process" are listed below.

⁸ For more information refer AOSIS [<http://sidnet.org/aosis/members.html>]

Other potential participants found in the literature include: UNEP, GEF, World Bank, FFA, SPACHEE, UPNG, UNC, Universities in Australia and New Zealand, CSIRO, AIMS, Great Barrier Marine Park, NIWA, National Governments, JAMSTEC, NOAA, KORDI and IFREMER. The common denominator between all of the above-mentioned organisations and agencies is their interest in and their ability to contribute to monitoring and modelling and, product development and use, of the Pacific Ocean.

Organisations International and Regional	National Governments and Agencies
<p>Regional SOPAC SPREP SPC IOI-PI SPTO USP GCRMN-Pacific Nodes</p>	<p>Governments Kiribati Marshall Islands Vanuatu Fiji PNG Tonga Samoa Solomon Islands Cook Island Nauru</p>
<p>International UNESCO-IOC GOOS sponsors WMO</p>	<p>Agencies IRD ex-ORSTOM [New Caledonia] WERI [Guam] IFREMER</p>

Obviously this list of parties is not exhaustive and part of the process toward promoting the goals and projects of PacificGOOS will be to enlarge the number of contributors. Other parties from countries such as Taiwan⁹, for example, are already active in marine related international initiatives such as JGOFS, LOICZ and GLOBEC may be willing to contribute .

It is suggested that the list of declared and potential participants to PacificGOOS should be regularly maintained, with clearly identified focal points.

3.4 PacificGOOS - Organisation and Working Rules.

The establishment of PacificGOOS as a GRA aims to bring together and organise parties with an interest in GOOS objectives in general and with the ability to contribute to the establishment, design and implementation of GOOS subsystems and components in the Pacific region.

Proposed Parties include government representatives, national and international or intergovernmental agencies, public or private organisations in research or commercial activities, groups and associations of users of marine spaces and resources. As has already been proposed only Parties from PiCTs [that is those located within the region] can apply for

⁹ Taiwan is active within the IGBP, a co-sponsor of several important GOOS initiatives

Membership, with other parties accorded the right to apply for Associate Membership or Observer status.

Further, it is suggested that in order to avoid confusion between the contributors from countries whose EEZ fall within the region and contributors external to the region any contributing Organisation, Government, University or Agency located within the PacificGOOS geographical region [such as those listed as part of the proposed PiCTs membership - see Annex D] can apply for **Membership**. Other contributors would apply for status as an **Associate Member**. Non or yet-to-be contributors would be welcome to apply for **Observer** status. Such a classification makes explicit the basic common interests and responsibilities of different parties. Such clear demarcation between those with sovereignty rights in the region and those without such rights will be fundamental to the future organisation and operation of PacificGOOS. As a matter of principle the choice of pilot projects to be proposed for implementation under the PacificGOOS label shall be the exclusive right of Members, in consultation with the balance of their Associate members and advice from Observers.

It should be noted that the terms Member, Associate Member and Observer, as proposed in this draft Strategy paper for PacificGOOS, differ from those used or proposed in other GOOS regional components. For instance in the Indian Ocean Strategy it is proposed to refer only to Members with sub-categories for regional and global members, government and non-governmental members. Some consistency in terminology will need to be discussed with UNESCO-IOC, however, it is believed that the PacificGOOS GRA must be founded on strong solidarity links fostered by the PiCTs located in the Central and South Pacific.

The roles and responsibilities of the various participants and contributors to PacificGOOS projects need to be clearly defined, with care taken to identify and designate the Contracting Authority, the Project Manager (or Principal Contractor) and eventually the subcontractors and consultants. The Contracting Authority is responsible for defining the overall objectives and general specifications and holds primary responsibility for raising funds to enable project implementation. The Principal Contractor (or Project Manager) is responsible for carrying out the project in compliance with the given specifications and within budget. The notion of Partnership is reserved to the possibilities offered to any individual or group of parties to agree formally on a sharing of responsibility to carry out any given task.

A Charter for PacificGOOS needs to be drafted and functioning by-laws are to be laid out in details. The basic rules will be:

- Any PacificGOOS party or group of parties (like projects "Partners" and "Champions" as outlined [8] can propose actions/projects with adapted partnerships and relevant conditions for implementation.
- For each project proposal, objective(s), technical specifications, costs, schedules and conditions of partnership will be set out in a memorandum of understanding [MoU].
- Only Member parties can decide to submit projects under the PacificGOOS label.

3.5 Interim PacificGOOS

The establishment of GOOS Regional Alliances supposes, for all members, long-term engagement and prior demonstration of their expertise and authority to develop GOOS components. Only a few PiCTs parties are currently in a position to comply with these requirements.

Therefore it is proposed that an Interim PacificGOOS (I-PGOOS) be established in the first instance, to enable and provide some legitimacy to the most advanced parties to submit GOOS-type actions/projects to contributors.

The most advanced parties to be solicited to forming I-PGOOS are among the Pacific islands Governmental Agencies and Regional Intergovernmental Organisations such as SOPAC, SPC, IRD, SPREP, IOI-PI and USP that already participate in the current “ad hoc Steering Committee”. In addition, agencies listed as “Champions” for proposed Coastal OOS pilot projects such as coral reef health [GCRMN-Pacific Node, IOI-PI, SPTO and the Diving Industry need to be encouraged to join. [8]. Any other relevant party located outside the PacificGOOS region would also be welcomed to joining I-PGOOS is associated or observers.

The I-PGOOS will meet the principles for organisation & working rules as proposed in Section 3. In a MoU, Parties [such as representatives of PiCTs Governments or Agencies] will agree to form I-PGOOS, with the following overall objectives:

- Promote GOOS, and facilitate installation & operation of GOOS components in the Pacific region; encourage formation of PiCTs national groups;
- Define/derive the GOOS data and products best adapted to and most appropriate for PiCTs needs,
- Define actions to promote regional OOS components, notably the design of pilot projects responding to identified user’s demand in the region;
- Demonstrate the PiCTs capacity to mobilize the necessary means for their implementation, and
- Make their best effort to establish a PacificGOOS with I-GOOS recognition.

They will agree to set up the Interim PacificGOOS as a temporary association, for a specific period of time to ensure that momentum is maintained towards the establishment of PacificGOOS and to optimise co-operative efforts toward achieving the overall objectives. In the Memorandum of Understanding the commitment of each of the Parties to fund the operating expenses of the I-PGOOS could be limited, at the very least, to a few person-days per month equivalent and to e-mail exchanges.

Additional specific support for meetings, travel and expertise costs is expected from the sources of funding previously solicited to run the “ad hoc Steering Committee”, as well as from other parties. The establishment of I-PGOOS is seen as an effort for GOOS capacity building. The establishment of I-PGOOS will also signal to the global GOOS community a considered step toward formal installation of a “recognised” PacificGOOS regional alliance.

4. Proposed Activities for the Interim PacificGOOS.

As a continuation of the initiatives undertaken by SOPAC and IOC, since 1998, the following actions and projects are proposed for I-PGOOS, to implement. The activities are not ranked in any order of priority. Rather they reflect a logical “incremental” approach toward establishment of PacificGOOS.

4.1 Component 1: Establish PacificGOOS Association.

The objective of this Component is to establish the mandate and procedures enabling a stable operating environment for the PacificGOOS GRA.

4.1.1 Outputs and Indicative Activities

- Draft a proposal for a PacificGOOS Charter (Objectives and Mandate)
- Draft PacificGOOS By-laws (Functioning rules of the PacificGOOS GRA)
- Submit outputs from indicative activities 1.1 and 1.2 to potential Members and Associate Members, for comment
- Establish and implement PacificGOOS GRA

The setting up of the PacificGOOS GRA assumes the minimum commitment by a sufficient number of parties. That is, prospective PacificGOOS Members and Associate Members commit to maintaining appropriate means both in terms of financial and in-kind through supporting PacificGOOS Secretariat-type activities over a period of time [for at least five to ten years].

It is acknowledged that the PacificGOOS GRA and all of its related activities will, at the global level, need to be aligned to IOC and WMO, who are global champions of GOOS.

Contracting Authority	Interim PacificGOOS [I-PGOOS]
Prime Contractor	IOC and SOPAC
Duration	Equivalent to the duration of I-PGOOS [the current proposed timeline being two years]
Cost	Expenses for this task are limited to the services of an experienced team providing the equivalent of six man-months and e-mail exchanges.

4.2 Component 2 - Define Specific Needs and Demands of PiCTs' from GODAE

The objective of this Component is to review of the contribution and participation of PiCTs in the Argo Project Component of GODAE , in order to define the specific demands and needs of PiCTs for remote sensing and in-situ data, and products derived from GODAE.

4.2.1 Outputs and Indicative Activities

- Describe GODAE – ascertain the Argo regional components in the Pacific region.
- Accurately define the contributions made by the PiCTs to the GODAE Program, given their involvement in the Argo Project [Refer Annex F for recommendations related to Argo Float deployments within the EEZs of SOPAC member PiCTs
- Define the specific demands and needs of the PiCTs from GODAE [In-situ Argo data & products]
- Draft a MoU to formally define reciprocal responsibilities of parties involved [PiCTs and active partners to GODAE], with indications of mutual needs and contribution.

Contracting Authority	Interim PacificGOOS [I-PGOOS]
Prime Contractor	IOC and SOPAC
Possible Partners	WMO, GODAE [Argo Project], GRA's such as such as IOGOOS and GOOS-Africa
Cost	To be determined

4.3 Component 3 – PacificGOOS Advocacy among Membership

The objective of the advocacy component is to build awareness of PiCTs needs for GOOS data and products amongst the wider global community, to engender interest and widen support and assistance to the PacificGOOS GRA.

4.3.1 Outputs and Indicative Activities

- Produce a brochure that gives an overview of PiCTs needs and GOOS offers is to publicise and raise worldwide interest for contributors to the PacificGOOS.
- Describe PiCTs similarities and differences in geography, economy and political status.
- Highlight difference between the “Haves” such as Hawaii and the “Have-nots” such as the Solomon Islands. Highlight issues they have in common.
- Evaluate the current economic value of the ocean sector for PiCTs and estimate their long-term economic potential.
- Assess the expected social, environmental and financial benefits to PiCTs from GOOS-type services and products.
- Highlight the need co-operation between PiCTs if they are to maximize the return from their participation in GOOS.

Contracting Authority	Interim PacificGOOS [I-PGOOS]
Prime Contractor	To be determined
Possible Partners	IOC, UNDP, SOPAC, SPC, New Caledonia [ZoNeCo], EuroGOOS
Cost	To be determined

4.4 Component 4 – Project Design Documents for CoastalGOOS Pilot Projects.

The objective of this Component is to develop project design documents for the three CoastalGOOS Pilot Project concepts identified by participants attending the Pacific Regional CoastalGOOS Workshop convened in Samoa in August 2000.

4.4.1 Outputs and Indicative Activities

- Encourage “Champions” for the following three CoastalGOOS Pilot Project concepts to design more detailed project design documents:
 - Coastal Water Quality
 - Mariculture development of Pearls and Seaweed
 - Coral Reef Health of Tourism Dive Sites
- Assist pilot project “Champions” to seek and secure the support and expertise necessary, to complete proposals that are consistent with GOOS principles.
- Encourage the use of the PacificGOOS label for Projects consistent with principles of GOOS
- Define common set of basic parameters to monitor coastal water quality [likely requirement for all three pilot projects identified]
- Enquire about existing technology and equipment availability and costs.

Contracting Authority	“Champions” for CoastalGOOS Pilot Projects Concepts
Prime Contractor	To be determined
Possible Partners	FerryBox – EuroGOOS, SeaKeepers Association [12]
Cost	To be determined

4.5 Component 5 - Identify GOOS Data and Products for Oceanic Fisheries

The objective for this Component being to identify all relevant GOOS data and products that will assist PiCTs to ensure sustainability and strengthening of the share of GNP from revenue generated by the oceanic Fishery.

4.5.1 Outputs and Indicative Activities

Demands for GOOS data and products for better understanding and management of the living resources in PiCTs coastal zones will most probably originate spontaneously from the PiCTs parties themselves. However, this may not be the case for the living resources of interest for the industrial High Sea’s fisheries since many PiCTs do not use the living resources of their EEZ directly but rather trade their fishing rights to foreign fishing companies.

Better knowledge of the present and future use of GOOS data and products relevant to this sector of activities is probably of importance to PiCTs as the ecology of the resource (fish behaviour) may influence their fishing strategy(ies). Improved cohesion between PiCTs is necessary for the long-term, sustainable economic development of fisheries and especially for the migratory species that occur within the region.

Contracting Authority	I-PGOOS
Prime Contractor	PIF, FFA, SPC
Possible Partners	USP, ICES, PICES, Fishing Fleets
Cost	To be determined

4.6 Component 6 - Filling “Knowledge Gaps” in Existing Regional “GOOS-type” Projects

The objective of this Component is to ensure that the knowledge gap on existing GOOS components in the Pacific Region is filled.

4.6.1 Outputs and Indicative Activities

- Activities, which need to be considered for filling the knowledge gap on existing GOOS components, in the Pacific Region, include Tools-type components and Programme-type components.
- “Tools-type” components
 - Data collection sub-systems
 - Data transmission and management sub-systems
 - General modelling and predictive tools
 - Specific system for dedicated products and services.
- “Programme” components
 - GLOSS
 - GTS-WMO
 - GCRMN

Annex E provides a list of existing sub-systems that expressly contribute to GOOS. The understanding of the organisation and procedures of all the components listed in this Annex is rather complicated and does not appear a general task to recommend as a priority for I-PGOOS.

Focus on strengthening knowledge of:

- Regional components and products using satellites remote sensing data [refer Annex G, which lists operational ocean satellites]
- Offices and activities of WMO in the PacificGOOS region. WMO is perceived to be of primary importance in so far as the provision of data and products, that could be made available to PacificGOOS for the implementation of its CoastalGOOS pilot projects, is concerned.

Contracting Authority	I-PGOOS
Prime Contractor	To be determined
Possible Partners	IRD
Cost	To be determined

A proposed schedule for I-PGOOS activities and related estimates of costs are included as Annex Ib.

5. Conclusion

Long-term ocean forecasts are essential for making informed, responsible decisions for sustainable management. As well they can provide timely “warnings” of potentially devastating hazards. There is a lot at stake with GOOS for the small islands located in the Central and South Pacific Ocean, due to their heavy dependence upon the ocean and its resources, and the fact that they are custodians of such large tracts of ocean space and the resources contained within it.

The PacificGOOS GRA aspires to bring Pacific islands Countries and Territories [PiCTs] together. This regional alliance will seek to engage the international community, in assisting them toward designing and implementing GOOS components that have been adapted to meet their specific problems and needs, and that will ultimately be translated into products that meet the specific needs of their leaders, decision makers and planners.

For decision makers the best forecasts or predictions are those that are timely, with a high degree of reliability. Their ultimate demand for such predictions would include indications of the preventative measures and contingency planning needed to mitigate harmful impacts.

Perhaps the best example of ideal long-term prediction is certainly the one God sent to Noah about the Flood. It described not only what would happen but also included precise instructions on the preventative measures to be taken and most importantly, for Noah, it was one hundred percent reliable. GOOS products should not be oversold, for such ideal long-term predictions are beyond the reach of scientists' knowledge.

Acknowledgements

I am grateful to the current PacificGOOS “ad hoc Steering Committee”, IOC and SOPAC for giving me the opportunity to express ideas for the establishment of a GOOS Regional Alliance in the Pacific Region. A special thank you to William Erb and Colin Summerhayes of UNESCO-IOC and, Alfred Simpson, Cristelle Pratt and Famiza Yunus of SOPAC for their help in providing documentation and useful comments for final drafting. I would also like to take this opportunity to thank all of my friends and colleagues from Asia, Europe, USA, and the South Pacific who I have contacted at very short notice and who gave, in confidence, useful information and relevant advice.

Annex A List of References

N°	Titles	Subtitle	Date	Reference	Authors
1	Le développement de l'exploitation des ressources marines et la protection de l'environnement marin dans la région du Pacifique Sud	Panorama (French/English versions)	1996 April	ICP , Nouméa N.C.	Institut Européen du Pacifique
2	The Global Ocean Observing System GOOS	Booklet	1998	GOOS publication N° 42	UNESCO
3	Strategic Plan and Principles for the Global Ocean Observing System (GOOS)	Version 1	1998 January	GOOS Report N° 41	IOC/INF 1091
4	IOC-SOPAC Workshop Report on Pacific Regional Global Ocean Observing System	SUVA, Fiji	1998 February	GOOS report N°53	SOPAC Joint contribution N°119 SOPAC/UNESCOWS N°144
5	South Pacific Organisations Coordinating Committee Meeting	SUVA, Fiji	1998 June	SPFS (97) SPOCR.5	
6	Draft summary of outcomes /progress record of the second marine sector working group meeting		1999 March	Circular N° 88/89	FORUM Secretariat General
7	IGOS Integrated Global Observing Strategy	Brochure	1999 July		http://www.igospartners.org
8	Report of the Regional Workshop Coastal Global Ocean Observing System for the Pacific Region	APIA, Samoa	2000 August		SOPAC Joint contribution 134 SOPPAC/IOC
9	Strategic design Plan for the coastal Components of the GOOS		2000 October	IOC/INF-1146 GOOS report N°90	UNESCO 2000
10	IGOS An Ocean Theme for the Partnership	Final report from the Ocean Theme Team	2001 January	IGOS	http://www.igospartners.org
11	Developing a Strategy for Ocean Observing in the Pacific	Discussion paper for Pacific GOOS Steering Committee	2001 February	Nouméa , NC	Prepared by SOPAC Secretariat (C.Pratt).
12	IOC-WMO-UNEP-ICSU Steering Committee of the GOOS	Fourth session Vina del Mar, Chile	2001 March		GOOS report N°102
13	Indian Ocean GOOS strategy		2001 April	IOC W.ERB	
14	POGO	Brochure	None		
15	The GOOS Regional Groups : A discussion Paper	GSC Prepared	2001 April	GOOS Report 101; IOC/INF 1159	UNESCO 2001

EuroGOOS.

Established in 1994, EuroGOOS is an association of 30 agencies with marine expertise, from 16 European countries. However there are some members such as Poland that are not members of the European Union]. The association is funded by members' subscriptions, which pay for the EuroGOOS Secretariat. Members of EuroGOOS fund projects. As some EuroGOOS members are meteorological agencies more collaboration with such agencies has been suggested so as to fully engage WMO Members in EuroGOOS activities.

NEAR-GOOS.

NEAR-GOOS is being implemented by China, Japan, Republic of Korea and the Russian Federation as a WestPac project. Several substantial GOOS-related research projects have been launched under the aegis of NEAR-GOOS, with most efforts, to date, being dedicated to data exchange.

NEAR-GOOS has achieved an operational data sharing system that permits contribution to and retrieval from the regional and national databases; databases are all currently accessible via Internet. The system should be developed as an open system for all who are interested in contributing to and accessing data from the system, with access to users free of charge. NEAR-GOOS organizes data and information annual training courses for regional and ex-regional people.

In future, NEAR-GOOS plans to broaden its remit and membership to incorporate issues related to living resources and environmental quality. In this context links are being developed with PICES and the UNEP Regional Sea Program - Northwest Pacific Action Plan [NOWPAC].

MedGOOS.

MedGOOS has a membership of 21 member countries from the Mediterranean Rim. Activities are focused on preparing pilot projects for submission to the European Union funding procedures. ***The IOC has provided support for a part-time assistant in the MedGOOS Secretariat in Malta.***

PacificGOOS.

IOCARIBE-GOOS.

The priority of the group is to develop inventories of existing operational systems and programs relevant to organizations with potential interest in existing and proposed scientific program of interest for and to commercial interests related to IOCARIBE.

These inventories are needed prior to finalizing a Strategic Plan and to defining selected pilot projects. ***The IOC has funded the appointment of a part-time assistant to function as the IOCARIBE GOOS Secretariat in Miami.***

GOOS-Africa.

GOOS-Africa priorities are to form a network of National Ocean Data Centers in the region and to facilitate Internet access and data exchanges on training, to upgrade the African GLOSS network and increase real-time access to satellite imagery with the ability to add value to this imagery in the form of planning products and forecasts.

Italy has offered to train African scientists at the CNR SeaWiFS station. GCOS is to work with GPO to get details from EUMETSAT of the PUMA proposal funded by the EC for a receiving station in Africa.

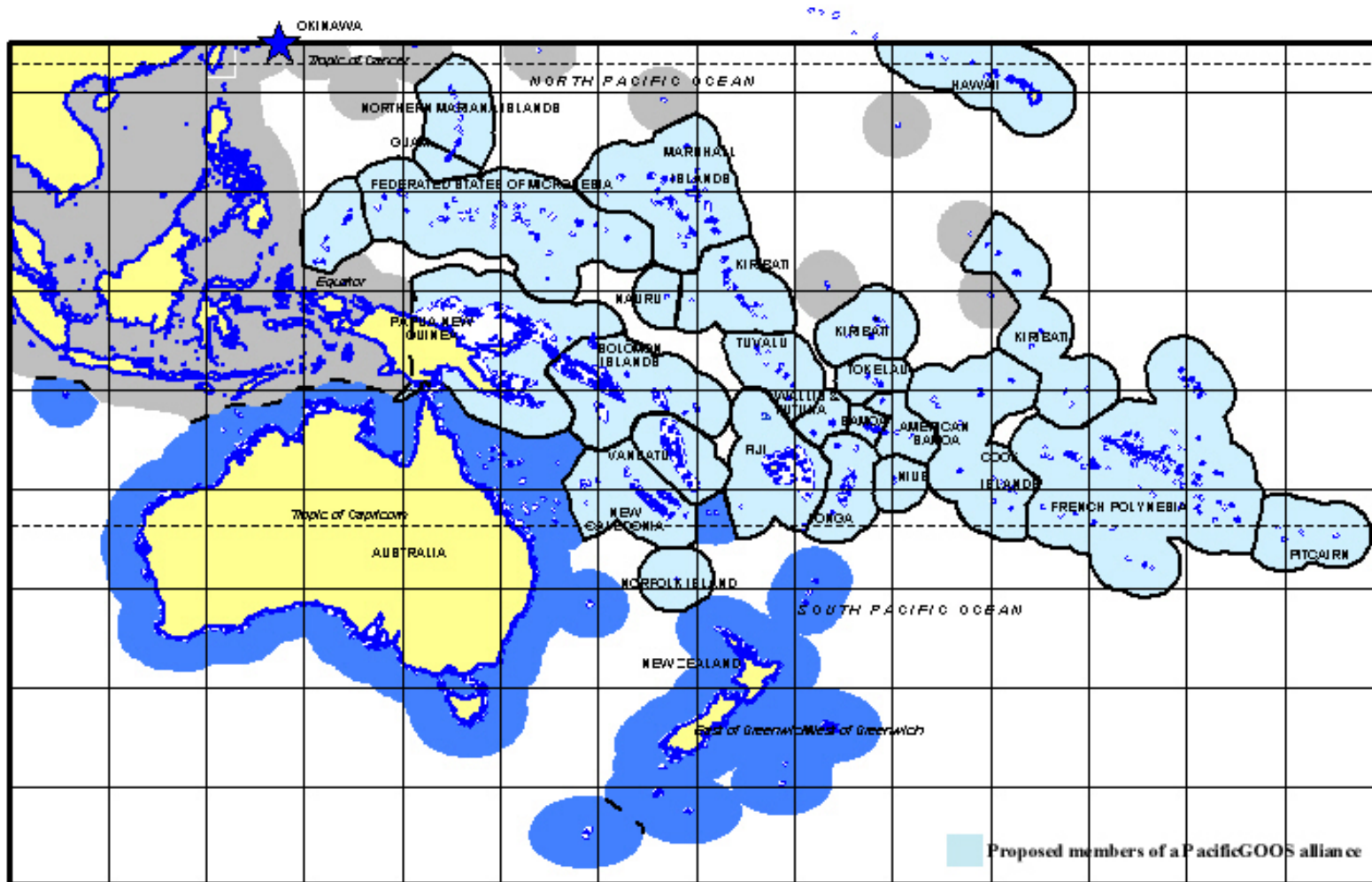
OTHERS.

Also worth mentioning is the effort to establish a South East Asia Center for Marine Prediction SeaCAMP, which, if funded, would make a major contribution to a South-East Asia GOOS [SEAGOOS].

Other GOOS Pilot Projects are in preparation for the Gulf of Thailand, the Western Indian Ocean [WIOMAP, a potential element for GOOS capacity building], for the Indian Ocean [a draft strategy to establish an Indian Ocean GOOS [IOGOOS]] [13].

Significant attention is also being given to a proposal for a possible role of the Western Australia Regional Remote Sensing & Applications & Technology Centre (WARRSAT) for providing GOOS products for the Indian Ocean and South Pacific.

Annex C Proposed Membership and Geographic Areas for the PacificGOOS Regional Alliance



Annex D Pacific island Countries and Territories as proposed for PacificGOOS

[Data to be reviewed and amended]

<i>Pacific Island Countries and Territories</i>	<i>POPULATION</i>	<i>LAND Area km²</i>	<i>EEZ Area km²</i>	<i>GNP USD/capita</i>	<i>Others to list HDI etc...</i>
Cook Islands	21000	240	360000	1720	
Fili Islands	722000	18000	1290000	1392	
<i>French Polynesia</i>	184000	4000	5000000	8860	
Guam	120000	550	218000	5150	
Hawaii	1100000	16600	2200000	15000	
Kiribati	67000	861	3550000	716	
Marianas	20000	475	1820000	1100	
Marshall Islands	37000	180	2112000	1500	
<i>Federated States of Micronesia</i>	97000	701	2970000	2000	
Nauru	7000	21	320000	10600	
New Caledonia	165000	19153	1740000	5958	
Papua New Guinea	3804000	475368	3120000	870	
Niue	3000	258	390000	1752	
Norfolk Island					
Okinawa					
Palau	16000	460	629000	1100	
Pitcairn	80	5	800000	0	
Solomon Islands	304000	28446	1340000	470	
American Samoa	33000	197	390000	5150	
Samoa	155000	2980	120000	630	
Tokelau	1000	10	290000	850	
Tonga	100000	799	700000	890	
Tuvalu	9000	26	900000	890	
Vanuatu	151000	14763	680000	870	
Wallis and Futuna	12000	124	300000	1400	
<i>Total PICs</i>	7128080	584217	31239000	3130,36 (av)	

Annex E Existing Observing Systems that Expressly Contribute to GOOS.

Level ONE Contribution [12]

- The operational ENSO Observing System in the tropical Pacific, including the Tropical Atmosphere Ocean (TAO) array of buoys
[<http://www.ogp.noaa.gov/enso/>] [<http://www.pmel.noaa.gov/toga-tao/>]
- Meteorological measurements from the Voluntary Observing Ship (VOS) network of the WMO.
- Upper ocean measurements of the Ship-of-Opportunity Programme (SOOP)
[<http://www.ifremer.fr/ird/soopip/>]
- Fixed and drifting buoys co-ordinated by the Data Buoy Co-operation Panel (DBCP)
[<http://dbcp.nos.noaa.gov/dbcp/>]
- The Global Sea Level Observing System (GLOSS) network of tide gauges
[<http://www.pol.ac.uk/psmsl/gloss.info.html>]
- The Global Temperature and Salinity Profile Programme (GTSP)
[<http://www.nodc.noaa.gov/GTSP/gtspp-home.html>]
- The Global Coral Reef Monitoring Network (GCRMN)
[<http://coral.aoml.noaa.gov/gcrmnindex.html>]
- The Global Telecommunications System (GTS) of the WMO
- The GOOS Data Centre of the Atlantic Oceanographic and Meteorological Laboratory (AOML) of National Oceanic and Atmospheric Administration (NOAA)
[<http://www.aoml.noaa.gov/>]
- Ocean observations from the operational satellites of NOAA and other entities
[<http://www.oso.noaa.gov/>]
- The Continuous Plankton Recorder (CPR) programme of the Sir Alister Hardy Foundation for Ocean Science (SAHLFOS) (added 1999)
[<http://www.npm.ac.uk/sahfos/introduction.html>]
- The ICES International Bottom Trawl Survey (IBTS) of the North Sea
- Time Series Station 'S' off Bermuda
- Time Series Station Bravo in the Labrador Sea
- The JCOMM Electronic Products Bulletin
[<http://iri.ldeo.columbia.edu/climate/monitoring/ipb/introduction.html>]
- The Global Observing Systems Information Centre (GOSIC) [<http://www.gos.udel.edu/>]
- California Cooperative Oceanic Fisheries Investigations (CalCOFI)
[<http://www.mlrg.ucsd.edu/calcofi.html>]

Annex G Operational Ocean Satellites [13]

Altimeter: Sea Surface Height-Ocean Circulation

US/French Topex Poseidon
ESA's ERS 2

Scatterometer: Global Near Surface Vector Winds/Air-Sea Interaction/Ice

ESA's ERS 2 (C-Band)
US QuikSCAT (~Ku-Band)

Synthetic Aperture Radar: Sea Ice, Wind/Wave/Current Interactions and Coastal Ecology

ESA's ERS 2 (C-Band)
Canadian/US Radarsat-1 (C-Band)

Ocean Color: Ocean Biology (Productivity) and Coastal Pollution

India's IRS-P3 (MOS)
US Seawifs
Taiwan's Rocsat-1
India's IRS P4 (OCM)
US Terra (MODIS)
Korea's KOMPSAT

Passive Microwave Spacecraft: Sea Ice/Scalar Surface Wind and Total Water Vapor

US DMSP 5D2 (SSM/I)
Japan/US TRMM (TMI)
India's IRS-P4 (MSRS)
US DMSP 5D-3 (SSMIS)
US Terra (MISR)

Visible/Infrared Low-Resolution: Sea Surface Temperature/Sea Ice

US NOAA TIROS/NEXT AVHRR and US DMSP 5D-1 (OLS)
Japan's MOS-1A (VTIR) and Japan's MOS-1B (VTIR)
ESA's ERS-1 (ATSR-1) and ESA'S ERS-2 (ATSR-2)
Japan/US TRMM (VIRS)
US TERRA (EOS-AM1) MODIS

Visible/Infrared Medium Resolution: Coastal Ecology and Monitoring/Coral Reef Research

US Landsat 5 and US Landsat 7
France Spot 1 and France Spot 2
India IRS-1B and India IRS-1C and India IRS-1D
China/Brazil CBERS1

Visible/Infrared High-Resolution: Mapping, Monitoring and Research

Space Imaging's IKONOS-2

Annex H

Acronyms

Meaning

(Argo)	(A global Array of Profiling Floats to Understand and Forecast Climate)
AIMS	Australian Institute for Marine Science
AOSIS	Alliance of Small Island States
BGS	British Geological Survey
COOP	Coastal Ocean Observing Panel
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
DBCP	Data Boy co-Operation Panel
EEZ	Exclusive Economic Zones
ENSO	El Nino Southern Oscillation
EuroGOOS.	European GOOS
FAO	Food and Agriculture Organisation (United Nations)
FFA	South Pacific Forum Fisheries Agencies
GCOS	Global Climate Observing System
GCRMN	Global Coral Reef Monitoring Network
GDP	Gross Domestic Product
GLOBEC	Global Ocean Ecosystem Dynamics
GLOSS	Global Sea-Level Observing System
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System
GTOS	Global Terrestrial Observing System
GTS	Global Telecommunication System
GTSP	Global Temperature-Salinity Pilot Project
HIG	Hawaiian Institute of Geophysics (USA)
ICES	International Council for the Exploration of the Sea
ICSU	International Council of Scientific Unions
IFREMER	Institut Français de Recherche pour l'Exploitation de la MER (France)
IGBP	International Geosphere-Biosphere Programme – (Study of Global Change)
I-GOOS	Intergovernmental Committee for GOOS
IGOS	Integrated Global Observing System Strategy
IOC	Intergovernmental Oceanographic Commission (UNESCO – UN body)
IOI-PI	International Ocean Institute- Pacific Islands
IPGOOS	Interim PacificGOOS
IRD	Institut de Recherche pour le Développement (ex ORSTOM)
JAMSTEC	Japanese Marine Science and Technology Centre
JGOFS	Joint Global Ocean Flux Study
KORDI	Korean Ocean Research and Development Institute
LOICZ	Land-Ocean Interaction in the Coastal Zone
MedGOOS.	Mediterranean GOOS
NEARGOOS	North East Asian Regional GOOS
NIWA	National Institute of Water and Atmospheric Research Ltd (NZ)
NOAA	National Oceanographic and Atmospheric Administration (USA)
OECD	Organisation for Economic Co-operation and Development
OOPC	Ocean Observing Panel for Climate
PIC	Pacific Island Countries & Territories
PICTs	North Pacific Marine Science Organisation
PIF	Pacific Island Forum
PNG	Papua New Guinea
SOOP	Ship of Opportunity
SOPAC	South Pacific Applied geoscience Commission
SPACHEE	South Pacific Action Committee for Human Ecology Environment
SPC	Secretariat of the Pacific Community
SPREP	South Pacific Regional Environmental Programme
SPREP	South Pacific Environment Programme
SPTO	South Pacific Tourism Organisation
ST	Steering Committee
TAO	Tropical Atmosphere Ocean array (in the equatorial Pacific ocean)
TOGA	Tropical Ocean and Global Atmosphere).
TOGA	Tropical Ocean and Global Atmosphere
UNC	University of New Caledonia
UNEP	United Nation Environmental Programme
UNESCO	
UPNG	University of Papua New Guinea
USP	University of the South Pacific
VOS	Vessel of Opportunity (of WMO World Meteorological Organisation)
WCP	World Climate Program
WERI	Water and Environmental Research Institute (Guam)
WMO	World Meteorological Organisation
WOCE	World Ocean Circulation Programme
WWW	World Weather Watch

June 2001

- ***Presentation of PacificGOOS Strategy Draft at I-GOOS***

July 2001 – March 2002

- Edit PacificGOOS Strategy paper
- Prepare Actions and Projects [research and demonstration]
- Write MoU [Charter and Bylaws] for an Interim regional alliance
- Establish the Interim PacificGOOS (I-PGOOS).

March 2002- December 2003

- Implement I-PGOOS research actions and projects.
- Define/Prepare proposals for PacificGOOS pilot projects
- Define/Prepare proposals for PacificGOOS operational components.
- Write Charter and Bylaws for future PacificGOOS regional alliance
- Prepare I-GOOS recognition of PacificGOOS
- Establish the PacificGOOS Regional Group.

January 2004

- Begin implementation of PacificGOOS
- Institute Pilot and Operational components.

June 2001

Presentation of PacificGOOS Strategy Draft at I-GOOS V

July 2001 – March 2002

TASK & OBJECTIVES	Contracting Authority	Cost and Human Resource Input
<ul style="list-style-type: none"> • Edit Draft PacificGOOS Strategy • Promote PacificGOOS • Search for Pioneer/Founding Parties 	Steering Committee ^a	➤ Steering Committee: 2 person-months equivalent
<ul style="list-style-type: none"> • Prepare I-PGOOS Actions and Projects • Review/Design Research and Demonstration Actions/Projects as proposed in §3.3 • Search for Partners/Contributors 	Steering Committee	<ul style="list-style-type: none"> ➤ Steering Committee: 2 person-months equivalent ➤ Resource commitment from “Project Champions” and contributors.
<ul style="list-style-type: none"> • Write Charter and Bylaws for I-PGOOS. 	Steering Committee	<ul style="list-style-type: none"> ➤ Steering Committee: 2 person-months equivalent ➤ Contribution/Labour from “Pioneers Parties”: not evaluated
<ul style="list-style-type: none"> • Establish I-PGOOS 	Steering Committee	<ul style="list-style-type: none"> ➤ Steering Committee: 1 person-month equivalent ➤ Assistance from IOC: 1 person-month ➤ Costs for one I-PGOOS founding meeting: <ul style="list-style-type: none"> - 6 participants = USD18000
TOTAL		<ul style="list-style-type: none"> ➤ 7 person-months equivalent [“ad hoc” Steering Committee] ➤ IOC 1 person-month assistance ➤ Person-month equivalents for Other Parties [eg Pioneer Parties] ➤ USD18000 for I-PGOOS founding meeting

^a Here the Steering Group [SG] is the current informal ‘ad hoc’ Steering Committee founded in 1998 [4]

March 2002- December 2003

TASK & OBJECTIVES	Contracting Authority	Cost and Human Resource Inputs
<ul style="list-style-type: none"> Implement I-PGOOS research actions and projects 	I-PGOOS ^b	<ul style="list-style-type: none"> ➤ Management and Follow up by I-PGOOS = 4 person-month equivalents [annual] ➤ I-PGOOS travel and meetings: USD 12,000 [annual]. ➤ Expenses and Resource inputs from Primary Contractors and Partners [to be determined]
<ul style="list-style-type: none"> Design/prepare/finalise proposals for PacificGOOS components [pilot or operational] 	“Projects Champions”	<ul style="list-style-type: none"> ➤ Follow up by I-PGOOS^a = 4 person-month equivalents [annual] ➤ Resource inputs from “Project champions”, Partners/Contributors [to be determined] ➤ Travel and meetings [to be determined]
<ul style="list-style-type: none"> Write Charter and By-laws for PacificGOOS 	I-PGOOS	<ul style="list-style-type: none"> ➤ I-PGOOS: 2 person-months equivalent [annual]. ➤ Resource inputs from interested Parties (Potential Members, Associate Members, Observers) [to be determined]
<ul style="list-style-type: none"> Achieve I-GOOS recognition of PacificGOOS GRA 	I-PGOOS	<ul style="list-style-type: none"> ➤ I-PGOOS: 2 person-month equivalents [annual] ➤ Assistance from IOC: 2 person-month [annual] ➤ Costs for the I-PGOOS Founding Meeting <ul style="list-style-type: none"> ○ 12 participants USD 36,000
TOTAL		<ul style="list-style-type: none"> ➤ I-PGOOS Functional: One person full time [annual] ➤ IOC assistance + Trip expenses: 2 person-month [annual] ➤ Partners/Contributors Expenses: to be determined

^b I-PGOOS Secretariat or other. Shall be determined in I-PGOOS Charter + By-laws

^a Here the Steering Group [SG] is the current informal ‘ad hoc’ Steering Committee founded in 1998 [4]

January 2004

TASK & OBJECTIVES	Contracting Authority	Cost and Human Resource Inputs
<ul style="list-style-type: none"> • Implement operational components of PacificGOOS 	PacificGOOS	<ul style="list-style-type: none"> ➤ PacificGOOS Secretariat <ul style="list-style-type: none"> ○ 3 x Full-time Equivalents ○ 1xDirector; 1xDeputy; 1Xta/pa] ○ Overhead costs ➤ Expenses and Resource Inputs from Members, Associates
TOTAL		➤ TO BE DETERMINED