GLOBAL OCEAN OBSERVING SYSTEM FOR INDIAN OCEAN

Summary Proceedings of IOGOOS-VIII: The 8th Annual Meeting of the Indian Ocean Global Ocean Observing System

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The Global Ocean Observing System

United Nations Educational, Scientific and Cultural Organization

Organisation des Nations Unies pour l'éducation, la science et la culture

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Contents

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This report was written by Mr Nagaraja Kumar, Secretary, IOGOOS based on the meeting notes recorded during the sessions and inputs from Dr T Srinivasa Kumar, IOGOOS Officer and Dr Nick D'Adamo, Officer in Charge, UNESCO IOC Perth Regional Programme Office. The IOGOOS Secretariat can provide information on obtaining relevant talks and papers from the meeting. The authors of those materials are gratefully acknowledged for making their work available to IOGOOS stakeholders.

IOGOOS gratefully acknowledges the important hosting and generous co-sponsorship support of this meeting given by the Government of the Islamic Republic of Iran through the Iranian National Institute for Oceanography (INIO), Tehran, the underpinning Secretariat support (including meeting planning, coordination, facilitation and co-sponsorship) of the IOGOOS Secretariat through the Indian National Centre for Ocean Information Services (INCOIS), and the coordination and co-sponsorship of the UNESCO IOC Perth Regional Programme Office. IOGOOS also thanks delegates and their host institutions who gave of their valuable time and resources in attending the meeting to progress the vision and programs of IOGOOS.

IOGOOS wishes to particularly extend its acknowledgements and heartfelt gratitude to INIO colleagues for their warm welcome and hospitality and continuous and tireless efforts in the successful organisation of the IOGOOS-VIII meeting in Iran, represented through Dr Vahid Chegini, Dr Abbas Nobakhti, M. Nima Kiani, Mr Majid Naderi and Ms. Fahimeh Foroughi. The consolidation and enhancement of IOGOOS Member Iran in existing and emerging IOGOOS pilot projects was a notable outcome of the meeting. The introduction and insight provided to delegates on the scientific and cultural fabric of the I.R. of Iran was also warmly appreciated.

1 INTRODUCTION

The IOGOOS-VIII annual meeting sessions were held at the Ministry of Science, Research and Technology (MSRT) and Iranian Research Organisation for Science and Technology (IROST), Tehran, Iran during February 22 – 24, 2011. The meeting was generously hosted by the Iranian National Institute for Oceanography (INIO), Tehran, Iran. The IOGOOS Secretariat, based at INCOIS, India coordinated the meeting with assistance from UNESCO IOC Perth Regional Programme Office. The IOC Perth Office provided financial support for delegate participation and meeting logistics. IOGOOS Chair Dr Mitrasen Bhikajee was unable to attend. The role of Chair was performed during the meeting by IOGOOS Officer Dr. Somkiat Khokiattiwong, Thailand.

The opening ceremony and opening session of the meeting comprised the participation of delegates from IOGOOS, Iranian national research and development, academic and service oriented institutes. The session began with a moving rendition of national cultural music and song and the Iranian National anthem. Dr. Vahid Chegini, Director, INIO welcomed the gathering. The opening session included opening remarks from of Dr. Mahdi Nejaad Nouri, Honourable Deputy Minister for Research & Technology of the Ministry of Science, Research and Technology of the Islamic Republic of Iran. Distinguished guests also included Dr Moulanejad, Director, IOR-ARC Regional Center for Science and Technology Transfer and Dr. Mohamadreza Saeed-Abadi, General Director of I.R. Iran UNESCO National Commission. Dr Somkiat Khokiattiwong, IOGOOS Officer and Dr Nick D'Adamo, Officer in Charge, IOC Perth Regional Programme Office also gave opening remarks, emphasising their appreciation at the efforts of the INIO as the host institute and the IOGOOS Secretariat in the organisation of the meeting, being the first IOGOOS annual meeting held in the I.R. of Iran.

The detailed agenda and list of participants at the IOGOOS-VIII meeting are attached as **Annexures 1 & 2,** respectively**.**

This report provides a record of the salient elements, recommendations and action items resulting from the meeting.

Presentations delivered by the delegates at the meeting are available through the IOGOOS website (http://www.incois.gov.in/Incois/iogoos/home.jsp).

2 OPENING ADDRESS AND INAUGURAL CEREMONY

Dr Vahid Chegini, Director, Iranian National Institute for Oceanography (INIO) welcomed the delegates and the dignitaries to the IOGOOS 8th Annual meeting in Iran. He wishes all delegates a successful meeting and visit to the I.R. of Iran. Dr Vahid Chegini's address is enclosed at **Annexure 3.**

Dr Mahdi Nejaad Nouri, Honourable Deputy Minister for Research & Technology of the Ministry of Science, Research & Technology of the Islamic Republic of Iran addressed the session and emphasised that establishing diverse working groups and projects through IOGOOS will help the IOC and its Member States to foster protection of the ocean for future generations through international programs such as GOOS. He also underscored the importance of IOGOOS as a fruitful platform for improved learning and capacity building in respect to the implementation of important project results in policies that safeguard our oceans. He welcomed all the guests and wished the 8th IOGOOS Meeting a successful and enriching experience. The Deputy Minister's speech is enclosed at **Annexure 4.**

Dr. Somkiat Khokiattiwong, Officer, IOGOOS expressed his appreciation to the Iranian Government for hosting the IOGOOS VIII Annual meeting and workshop in Tehran, Iran. He also thanked the Iranian Colleagues for their support and warm welcome extended to the delegates. Dr. Somkiat Khokiattiwong speech is enclosed at **Annexure 5.**

Dr Nick D'Adamo, IOC Perth Office, extended his appreciation to INIO, related Iranian national agency colleagues, IOC UNESCO, IOGOOS Secretariat, IOGOOS Officers and Members, and INCOIS for the support provided in the organization of the IOGOOS 8th annual meeting and for IOGOOS members general support of the IOGOOS alliance. Dr. Nick D'Adamo speech is enclosed at **Annexure 6.**

Dr Moulanejad, Director, IOR_ARC Regional Center for Science and Technology Transfer and Dr Mohamadreza Saeed-Abadi, General Director of I.R. Iran UNESCO National Commission delivered opening remarks, expressing their warm welcome to delegates to their country and wished the meeting fruitful deliberations for the next three days.

3. IOGOOS Plenary Talks

Dr Nick D'Adamo delivered a plenary talk on the IOGOOS Pilot Project: Modelling for Ocean Forecasting and Process Studies. Dr D'Adamo overviewed the global GODAE programme in relation to the modelling aspects and indicated that since 1999, being the beginning of GODAE, we now have a number of global or ocean scale ocean forecasting systems either developed or close to being developed, as part of the GODAE OceanView initiative, which follows on from GODAE. He listed some of the ocean forecasting systems featured on the GODAE OceranView website and spoke about the downscaling of ocean forecasting models to finer scales models (in nesting schemes) where the large scale (ocean forecasting) system domains provide boundary (forcing) conditions for finer scale models in geographically more focussed areas of interest. He also briefed the gathering on the history of the present pilot project on modelling and process studies, its status and its forward aspirations and plans. He also presented the key elements of the ***Report on: Modelling for Ocean Forecasting and Process Studies. IOGOOS-7, 12-15 July 2010, Perth, Western Australia, Working Group Breakout Session*** which also included the outputs from the "Ocean Forecasting Demonstration Project for IOGOOS & SEAGOOS. Project Planning Meeting, held during July 9-10, 2010 at Perth, Western Australia. Dr D'Adamo confirmed his commitment to lead the project and for the IOC Perth Office to support its development as best it can. Dr D'Adamo also reported on some positive interactions that he had been having with potential supporters in the context of resources ad funds, including GEF. **He stressed that now we need to develop a solid plan of action to advance the project and sought comments from the members whilst also emphasising that this needed to be addressed later in the meeting during the relevant breakout session. One of the key aspects for consideration was the need to settle a group of committed participants in the project as well as progress the search for resources and funds for the project.**

Dr Yukio Masumoto (Co-Chair of the Indian Ocean Panel (IOP) with Dr Weidong Yu of China) presented a science-based talk on IOP's activities and science highlights. He briefed the gathering on the IOP and overviewed its terms of reference. He highlighted the role of the Indian Ocean science drivers, viz. seasonal monsoons, severe weather events & cyclones, intra-seasonal variations, Madden Julian Oscillations, inter-annual variations, the Indian Ocean Dipole (IOD), the influence of ENSO, decadal variability, warming trends and ocean circulation & biogeochemistry. He also highlighted and overviewed the Indian Ocean Observing System (IndOOS), along with the present deployment status of its various mooring arrays such as RAMA, ARGO and XBT/XCTD lines, and the data availability at the IndOOS

data portal site maintained by INCOIS. He advised that a new web page is being developed for RAMA. He also briefed delegates on the CINDY 2011 and DYNAMO programmes and their proposed observational networks and related scientific projects. CINDY 2011 is an international field program that will take place in the central equatorial Indian Ocean in late 2011 - early 2012 to collect in situ observations to advance our understanding of the Madden Julian Oscillation initiation processes and to improve MJO prediction. DYNAMO is the program that organizes the US interest of partaking in CINDY 2011. He also advised on some the key operational issues being faced in respect to the implementation of the RAMA / IndOOS Programme and in that context indicated that piracy is adversely affecting progress in the planned deployment of IndOOS observing infrastructure and is also limiting the securing of essential related resources such as ship time for deployments and maintenance.

Dr Masumoto provided notes on the proposed Indonesian Throughflow (ITF) Task Team. ITF Task Team has been proposed by individuals that have common objectives as an' ITF research community'. It is to be established under the auspices of CLIVAR (WCRP). Its overarching objective would be to identify the scientific gaps in our knowledge of the ITF and develop an integrated strategy towards an internationally sustained ITF observing system. The ToR for the proposed ITF Task Team would be:

- To provide a more complete description of the pathways, structure, and variability of the ITF (including related property transports).
- To better understand the mixing processes and their spatial and temporal patterns within the internal Indonesian seas and the role of mixing in transforming the Pacific stratification to the Indonesian profile
- To develop diagnostics and metrics for validation of ocean and climate models
- To enhance the understanding of the role of the ITF on interannual to decadal variations in the climate system, particularly in terms of their connections with Pacific and Indian Ocean variability.
- To improve data and product distribution from ITF programs
- To develop strategies for cost-effective, sustained monitoring of the ITF
- To promote and coordinate international collaborations between observational and modeling studies, and to build capacity for researchers from within the Indonesian archipelago.

Dr Masumoto will keep IOGOOS informed of the development of the CLIVAR *ITF Task Team.*

Dr Masumoto also overviewed the range of scientific research programmes that are using IndOOS data and how IndOOS is helping to improve the understanding of ocean phenomena of climate importance. Dr Masumoto noted that IndOOS is expanding at a commendable rate, and that exciting related scientific research is emerging from these programmes.

Dr D'Adamo presented on the submission of a 'new task' to the GEO (Group on Earth Observations) 2012-15 Work Plan, which has the aim of coordinating High Frequency Radar (HFR) activities around the globe, to promote synergy, capacity building and communications in what is a growing field of coastal observations. The initiative is currently being championed by the Integrated Ocean Observing System (IOOS) of USA and supported by the IOC Secretariat, GOOS, Spanish and Australian ocean observing representatives. Relevant documentation was forwarded by Dr D'Adamo to the IOGOOS Secretariat leading up to the IOGOOS-VIII meeting. He also gave a brief overview on the IMOS Australia coastal radar network in the context of highlighting the generic merits of HFR as elements of coastal observing systems. HFR has benefits such as: informing coastal and marine ecology studies, ecosystem based management, marine spatial planning; provision of real time currents for navigation, sea search and rescue; provision of data for pollutant spill tracking, harmful algal bloom monitoring, ecosystem based management and monitoring. It was described that this proposed 'new task' for the GEO Work Plan 2012-15 is aimed at accomplishing (i) a written assessment and inventory of world-wide HFR and its applications, (ii) a global portal for HFR data - for access to the HFR data and (iii) a process for international exchange of HFR expertise and thereby provide capacity building for HFR networks in developing countries. He mentioned that the programme is open to any interested parties to join. The GEP based proposal would bring expertise to developing countries. It was been presented at the IOGOOS-VIII meeting for information, reference and consideration in terms of whether IOGOOS wishes to form a solid connection with the proposal through becoming a focal point of contact. **Dr D'Adamo suggested "...that IOGOOS-VIII consider developing a pilot project for this process in order to create and maintain effective synergy and links with the GEO proposal and also include its collegial network to support and facilitate the project and to facilitate capacity development thereof amongst its members...". Dr D'Adamo indicated that IOC Perth would maintain links with the 'new task' proposal through liaison with the proposal's key stakeholders.**

Dr. Rudolf Hermes, Chief Technical Adviser of the Bay of Bengal Large Marine Ecosystem (BOBLME) program, gave an overview presentation on the BOBLME Program. He gave a brief history of the BOBLME program dating back to 2001, the LME concept and the five BOBLME modules of BOBLME (Pollution & Ecosystem Health, Productivity, Fish & Fisheries, Socio-economics and Governance), the five components of BOBLME (Development of an Action Plan, Resource Management, Understanding the Environment, Ecosystem Health, and Communications) and the details thereof. He also outlined the achievements so far, the project activities, project budget and the components of the programme, along with the expected project outputs and outcomes. He also emphasized that the one of the objectives of the SIBER science plan (relating to ecological comparisons

between the BOB and the Arabian Sea) closely overlaps with the objective of sub-component 3.1 of BOBLME Project Document and that in this context BOBLME would like to collaborate with SIBER in this objective. **It was suggested by Dr D'Adamo that a letter of agreement between SIBER and BOBLME might suffice for supporting each other's projects and pave the way for BOBLME to be included in SIBER's communication network and further be granted status to attend its meetings and engage in SIBER/BOBLME related project development.** In the lead-up to the IOGOOS-VIII meeting SIBER advised that it would welcome such as an association.

4. IOGOOS Annual Meeting

Dr. Mitrasen Bhikajee, Chair, IOGOOS was unable to participate in IOGOOS-VIII due to late and unavoidable circumstances preceding the meeting. In his absence, senior IOGOOS Officer Dr. Somkiat Khokiattiwong was requested to delegate for Dr Bhikajee as Chair. Members acknowledged with appreciation Dr Khokiattiwong's acceptance and he proceeded to Chair the meeting.

Mr. M. Nagaraja Kumar, Secretary, IOGOOS gave the IOGOOS Secretariat Report in which he has presented details of the actions taken against the items identified from the last annual meeting. The detailed Secretariat report is enclosed at **Annexure 7.**

During the meeting, Dr D'Adamo raised the issue of the status of IOGOOS membership and the level of participation from the member countries was been discussed and concern expressed on the low level of participation by some members. Keeping this in view, the annual meeting noted the need to re-energize membership and participation in this regard and identified the following actions for such.

1. **Chair, IOGOOS to write to appropriate high level stakeholders (eg institutional heads or political representatives) of countries linked to IOGOOS membership, with specific emphasis on those members that appear to have lost connection or active engagement with IOGOOS. The letter should provide background on IOGOOS, restate the case (ie mutual benefits for members) for participation through membership and active engagement and seek from the country the designation of and support for an appropriate representative to IOGOOS.**
2. **IOGOOS Secretariat will coordinate an opportunistic side meeting at the forthcoming 25th IOC Assembly meeting (IOC25) (21 June to 6 July 2011) in Paris if there is the possibility of making the same advocacy in person to appropriate national representatives who may be present at the IOC25 meeting**

Discussions on IOGOOS Pilot Projects

Dr D'Adamo raised the issue of reviewing IOGOOS pilot projects that appear to have become de-energised, inoperable or lacking in IOGOOS personnel to drive and run them. The salient points of this discussion were as follows.

- Since the inception of IOGOOS in 2002, IOGOOS pilot projects have been developed through the formative engagement and the active participation of the member countries' representatives, with the projects generally based on common interests of the member countries.
- The evolution of the full range of IOGOOS pilot projects has been a success in its own right and the intention since the beginning has been for good ideas to emerge and transform into pilot project ideas, with the ultimate aim of the concepts then transforming into active projects supported by champions (ie leaders from within the IOGOOS framework) and with resources (people, cash and in-kind) to derive the projects.
- Of course, not all concepts and ideas reach the stage of adequate resourcing, despite the admirable efforts of the conceivers of the projects. There inevitably comes a time when a review of the projects should be undertaken to examine whether projects should be continued with or not. The continual appearance of projects with less than critical mass of interest and resources poses a drain on IOGOOS's resources at annual meetings as they are repeatedly on the agenda and discussed for the purpose of passive inclusiveness rather than active progress.
- It was decided that since it is now 10 years since IOGOOS began and some pilot projects have almost the same age, a review of all projects should be undertaken with a view to continuance or cessation of projects.
- It was noted that this process should be a constructive one, whereby all possible effort will be made to continue and re-energise flailing projects, and that where it seems obvious that selected projects have reached their lifespan then the champions of those projects be sought to engage in other viable projects or suggest new projects.

In this regard the Secretariat was requested to coordinate a process for review of all IOGOOS projects through the formation of an IOGOOS Project Review Group. The group is to comprise five IOGOOS members. The group is to undertake its work in a systematic and timely manner ahead of the next IOGOOS meeting and report its recommendations at IOGOOS-IX in the form of a project assessment report. The report is to make clear recommendations as to which projects to continue with, which to cease and which require further information for possible continuance.

Mr. Majid Naderi, INIO enquired as to how IOGOOS related project data is managed within the IOGOOS framework, in the context of understanding how stakeholders are able to access data and related products. It was clarified that data obtained through IOGOOS programmes / pilot projects are arranged in a distributed format and not through a centralized data system. In general the sources of IOGOOS data can be identified via the IOGOS website, with data obtainable through direct query with respective project leaders. It was further noted that INCOIS has a Data Portal and the IOGOOS website has details on the projects including where contact details of the respective project leaders can be obtained. Dr Masumoto also queried whether IOGOOS has a formal data policy in place. The Secretariat clarified that there is no such policy.

Accounts and Financial Summary: Mr M. Nagaraja Kumar, Secretary, IOGOOS tabled the IOGOOS Statement of accounts for the period April 01, 2009 to March 31, 2010 and April 01, 2010 to February 10, 2011. The major sources of income and expenditures incurred in organizing IOGOOS workshops and meetings, including sponsorship of IOGOOS members for IOGOOS related events were conveyed. The accounts were verified and accepted by Dr Khokiattiwong as IOGOOS Officer.

Next Annual Meeting: Mr M Nagaraja Kumar, Secretary, IOGOOS advised that the Secretariat had yet to receive communications from potential hosts for the next meeting. **Accordingly, the Secretariat was tasked with securing of a host for the next IOGOOS Annual meeting in consultation with Chair of IOGOOS.**

February 23, 2011 (Day 2: Wednesday)

5. IOGOOS Projects and New Projects

Dr T Srinivasa Kumar, Project Leader, Indian Ocean Core Remote Sensing Project, India presented the progress and present status of its three sub projects viz. Keystone Ecosystems, Shoreline Changes Monitoring and Chlorophyll_a Mapping. He provided a summary of the discussions and recommendations of the related work from the IOGOOS-VII Annual meeting held in Perth, Australia during July 12 – 15, 2010.

Dr T S Kumar also provided a detailed update on the ChloroGIN - Chlorophyll-a Mapping project that he is leading. He outlined a number of advancements (since July 2010) which have contributed greatly to the objectives of the project, including: the processing chain for OCMM II data; launch of new MODIS products; and the newly launched Harmful Algal

Blooms (HABs) services by INCOIS. He also presented future work plans and forthcoming capacity building opportunities in ocean colour remote sensing applications. In response to a question seeking clarification of the 'third' parameter being used for the identification of HAB, Dr T S Kumar clarified that SST, Chl-a are two principle derived parameters but that the third , being 'bloom indices' was a derivative of Chl-a. DR T S Kumar again described how useful it is for Indian Ocean rim and island countries to engage in the project and contribute in-situ measurements to assist in calibrating broad-scale remotely sensed data. In this context, Dr D'Adamo queried whether INCOIS had considered developing a linkage with the Australian remote sensing component, as there would be sense in examining the geographical overlap of IMOS's and IOGOOS's respective geographical domains, and associated overlapping coastal/shelf SST and biological monitoring activities.

In this regard, it was recommended that IOGOOS project leader Mr T S Kumar correspond with IMOS to explore potential collaboration. Furthermore, it was suggested that IMOS (through its remote sensing component) be invited to attend and address the next IMOS meeting in this context.

Dr. Majid Noranian, INIO, Iran presented a talk titled "Water circulation modelling in Persian Gulf and Gulf of Oman", focusing on the numerical modelling of tidal and wind driven currents. Dr Noranian outlined the regional motivation for the study in respect to understanding the physical and associated ecological characteristics of the Persian Gulf and Sea of Oman. The talk covered the model setup, calibration, verification and modelling results. The main purpose of this program was to assist in studies on the sources of pollution and mechanisms responsible for the transport and mixing of pollutants in these waters. The study also contributes to the issue of characterising the ecological impacts of pollutants from these marginal seas on the NW Indian Ocean. The associated modelling team from Iran expressed strong interest in joining related IOGOOS pilot projects in this context. Dr D'Adamo responded that he believed it a progressive move for Iran to engage in the IOGOOS Pilot Project: Modelling for Ocean Forecasting and Process Studies. Dr Rudolf Hermes, BOBLME, added that the application of these types of hydrodynamic models in the general area of pollution monitoring is very aligned with the UN's National Plan of Action of Pollution Monitoring and encouraged a linkage. **Dr Noranian responded affirmatively that such a linkage had already been established.**

Dr. Hamid Rezae, INIO, Iran presented a talk titled "Distribution of Corals Around Some Remote Iranian Islands, Persian Gulf". He presented the methodology used for mapping of the corals and the results of the coral mapping. He also overviewed the threats to the corals, including: increased sedimentation and siltation as a result of construction, unplanned land

use practices, dredging and dumping near coral reef areas; trade in live and dead coral and aquarium fish; hand harvesting of corals and seashells; increasing tourism activities; anchor damage by boats; littering; unsustainable fishing; pollution due to oil & sewage; threats and impacts related to ship collisions; land reclamation; and dumping of solid wastes. He also covered the issue of bleaching and related impacts in the Persian Gulf, climate change effects, and red tides in terms of ecological impacts on corals. Dr Rezae outlined some of the national conservation efforts implemented in response to these threats and impacts. He also outlined future coral conservation projects such as coral transplantation, installation of underwater sculptures to encourage sustainable scuba diving practices, reef protection marker buoys, installation of environmentally sustainable moorings. Dr Rezae provided an overall summary of the coral reef management plans that have been implemented in Iran. Dr T S Kumar suggested a closer collaboration with the IOGOOS Keystone Ecosystems project of IOGOOS. He also queried as to whether the monitoring of water quality was part of Iran's programs in the region, with Dr Rezae confirming that it was. **Dr D'Adamo indicated that it would be worthwhile exploring stronger linkage with the Australian Institute of Marine Science (AIMS) for their significant expertise in the coral ecology. Dr. Rudolf Hermes added that AIMS was currently exploring potential funding from GEF in a proposal relating to coral transplantation and that there is also a useful range of tools being developed or applicable for coral monitoring through AIMS.**

Mr. M. Nagaraja Kumar, Secretary, IOGOOS presented a talk on behalf of Dr Boram Lee, IOC, titled "Enhancing Regional Capabilities for Coastal Hazards Forecasting" / Report of the JCOMM Storm Surge Modelling Workshop" and concerning the recently held 2nd Advisory Workshop on Enhancing Forecasting Capabilities for North Indian Ocean Storm Surges (11-15 February 2011, New Delhi) **http://www.jcomm.info/SSindia2**. This followed the 1st Advisory workshop on enhancing forecasting capabilities for North Indian Ocean Storm Surges (14-17 July 2009, New Delhi) **http://www.jcomm.info/SSindia**. Both advisory workshops were motivated by the formative 1st JCOMM Scientific and Technical Symposium on Storm Surges held in Seoul Korea, 2-6 October 2007. The goals of the 'advisory workshops' are: to support scientific/technical development for enhancing regional capabilities for coastal hazards forecasting, with primary target for improved storm surge predictability; to link regional community/activity with global framework; and to demonstrate regional application of improved Storm Surge forecasting: capacity building and technology transfer to developing countries in a high incidence of coastal disaster = 1st phase in North Indian Ocean region. The initial target/beneficiary countries of the Feb 2011 workshop in India were: Maldives, Myanmar, Oman, Pakistan, Sri Lanka, and Thailand. The key items addressed at the workshop were: review of the mid-term plan on the current operational storm surge forecasting model (IIT-D Model); review of the status in the region (observations,

model operation) against the identified requirements, and exchange of knowledge between countries on model operation and case studies; review and update of the technical work plan for the project on improving storm surge forecasting capabilities; and to deliberate on future direction of the regional activities. Details were also provided on the partners, sponsors and contributing expert trainers for the workshops. As a result of the presentation members expressed interest in maintaining a link with the initiative and future developments. A specific query related to whether different models were being examined in the workshop with a view to developing 'ensemble' results in respect to storm surge hazards predictions and that if not this notion should be conveyed as an interest of IOGOOS to the project focal point (ie Dr B Lee, IOC). **As a final note to the presentation, presented through Dr Kumar, Dr Lee asked that IOGOOS consider the creation of a formal link with the project, perhaps as an IOGOOS pilot project or through designating an IOGOOS focal point for the project, with the aim of ensuring that IOGOOS is appropriately represented in future related events and thereby maximizes the benefits of the initiative for its own members. This was agreed to, with in the first instance the IOGOOS Secretariat acting as the focal point for communications.**

Dr Said Mazaheri, INIO, Iran presented on Iranian national wave modelling and forecasting activities. He outlined the methodology used for the hind-casting exercises, examples of related results. He also outlined the overall modelling framework used in the Wave Watch III program for Iran, including comparisons undertaken between respective Wave Watch III and DHI MIKE Software models. He outlined plans for improving the forecasting accuracies and for the development of dissemination mechanisms of these forecast products. The discussion that ensued amongst participants focused on the capacity to develop nested systems whereby large scale model outputs can be used to drive finer scale 'nested' models. **In respect to validations, Dr T S Kumar undertook to engage with Dr Mazaheri to examine the availability of relevant wave buoy data from the study region for the purpose.**

Dr T S Kumar presented a talk titled: Ocean Observations in India. He outlined the organisational structure of the Indian Ministry of Earth Sciences in this context and the vision and services of INCOIS. He also briefed delegates on the INCOIS-based Indian Ocean Forecasting System (INDOFS) for open and coastal ocean forecasting. INDOFS is being used by the shipping sector (eg port and harbours, fisheries), coast guard (eg Navy and State Administration), oil companies, other coastal industries, consultants, academia etc. He also referred to various specific models being run at INCOIS for ocean state forecasting. The presentation included information on the Indian Ocean Observing System with details of the status of various observing platforms such as moored buoys networks, CALVAL, wave rider buoys, ADCP moorings along the coast, XBT/XCTD, drifting buoys, current meter moorings

in the EIO, tide gauges, the Bay of Bengal Observatory, CODAR networks, Argo profiling float networks, IndOOS and the associated RAMA network, satellites (eg Oceansat) etc. He also outlined the plans for establishing a HF Radar network along the entire Indian coastal zone, and imminent plans for other national ocean observing platforms. Dr T S Kumar also briefed the group on the societal and scientific applications of the ocean colour data being acquired through various Indian led programs. Dr Mazaheri queried whether vandalism was an issue and in the same context sought information on the maintenance regimes for the observing infrastructure. Dr Kumar advised that the Indian National Institute of Ocean Technology (NIOT) of the Ministry of Earth Sciences has one dedicated ship for maintenance of the buoys and that the Potential Fishing Zone service of INCOIS interacts closely with the ocean fishing community and that through this programme an awareness program of the vital nature of these buoys to that same community has resulted in a significant reduction in vandalism. Dr. Rudolf Hermes, BOBLME, sought further detail on the Bay of Bengal Observatory and specifically whether biological observations were part of the Observatory. **Dr Masumoto added that as part of IOP and SIBER collaboration, the addition of biogeochemical sensors to selected moorings was planned.**

Dr. Masoud Moradi, INIO, Iran, presented a talk titled "Satellite Oceanography Database". This database is being developed at INIO. He advised that the database is a web based portal for accessing the information relevant to the Iranian seas. He briefed the meeting on the architecture and processing suite for MODIS data, being the primary source for the database. He referred to the satellite altimetry processing toolbar that has been developed. He also provided information on planned developments including more processing routines (eg for red tide monitoring, time-series data processing), greater functionalities (eg REST-full accessing data, web GIS capabilities), new data sources (eg Quick Scat wind field, etc.) and additional tools for integration of complementary data from varied sources. **He advised that all related products are available online at http://SatOcean.IRIMO.IR.**

6. Working Group Meetings

The working group meetings were held in series, allowing all delegates to contribute to the deliberations.

6.1 Working Group 1: Modelling for Ocean Forecasting and Process Studies

DR D'Adamo, as project leader of the IOGOOS Pilot Project: Modelling for Ocean Forecasting and Process Studies, Dr D'Adamo delivered a presentation outlining the status and progress achieved for this project since IOGOOS-VII. Key progress was reported as:

- The preparation of a draft project plan as part of the report from the IOGOOS-VII

meeting. That draft report was sent to IOGOOS and stakeholders a month before the IOGOOS-VIII for comment.

- The report was also sent for information, reference and comment to SEAGOOS and IOC WESTPAC leaders to facilitate collegial integration with the evolving SEAGOOS ocean forecasting project.
- Dr D'Adamo's report was subsequently revised based on the feedback received and will be sent to the IOGOOS Secretariat during the current meeting.
- The detail of the report was discussed in terms of key aspects requiring resolution, such as:
    - Consolidation and confirmation of the sub-regional demonstration areas for the project;
    - Exploring funding mechanism and avenues for in-kind support;
    - Linkages with neighbouring ocean forecasting development projects (eg SEAGOOS).

During the discussions on the potential financial mechanisms to support the project, Dr. Rudolf Hermes, BOBLME advised that the process of obtaining funds from the Global Environmental Facility (GEF) usually involves a minimum of two years of planning work before any firm of funding can flow. Keeping in view of this, it was recommended that the project group should do whatever it can ahead of any possible funding, focusing on task that involve minimal cash costs.. In this regard, Dr D'Adamo advised that the IOC Perth Office would be able to fund a relatively small workshop for later in the year (2011) whereby regional participants could gather together and further develop the project proposal, with a view to developing a GEF compatible proposal. **Dr D'Adamo also advised that in meeting with the GEF in Washington during October 2011 he was encouraged to continue his dialogue with GEF and was asked to submit background documents on the pilot project. The revised project plan (this meeting) will form part of that follow up communication.**

Dr Hermes further noted that an 'implementation plan' component is required in the eventual final project plan. He also reminded members that during IOGOOS-VII sub-regional demonstration project groups were formed within the overall IO project framework and then added that he believed it critical for each sub-regional group to undertake appropriate surveys or investigations on the site specific priority objectives for their respective sub-regions of interest (including the nature and level of capacity building required in each sub-region). **The meeting agreed to Dr Hermes' recommendations in respect to an 'implementation plan' component being added to the project plan and to the identification of priority objectives for each sub-regional demonstration area.**

Dr. Vahid Chegini, INIO, Iran asked for clarification on which hydrodynamic variables were planned to be modelled in the pilot project, whether different sub-regions would focus on different variables and then whether an assessment of the required observational needs had been undertaken to support modelling/forecasting aspects of the project. Dr Hermes advised that for BOBLME SST and fisheries related variables would be of greatest interest. Dr Hermes also added that BOBLME had a strong interest to see the BOB Observatory maintained and enhanced. INIO, through Dr Chegini, indicated that it welcomed the pilot project's incorporation of the Arabian Sea and adjacent marginal seas into the overall demonstration region for the NIO, currently led by India and that it offered to participate in the NIO demonstration region as a key partner, offering to provide personnel contributions to the project team and assist with modelling, related observations, project design etc. INIO expressed some of the motivating issues that underline its interest, including the prospect of improving regional capacity to model and forecast pollution transport, red tide propagation, etc. INIO indicated that it may be possible to obtain Iranian Government support for its involvement. **It was resolved among the Indian, Iranian and BOBLME interests present at the meeting that the NIO demonstration area could be considered as three components, being led overall by India but championed collaboratively in respect to the NWIO, NIO and NEIO (eg BOBLME region) by, respectively, Iran, India and BOBLME, through the respective agents of INIO, INCOIS and BOBLME Secretariat. In this context, a user requirements study (to identify specific objectives and priorities for each of the three sub-demonstration areas) will be led by INCOIS in collaboration with INIO and BOBLME. For this task it was resolved that INCOIS would resource its central-NIO component, BOBLME could be approached for specific funds required to achieve its BOB component and INIO would underpin the NWIO aspect,**

Dr D'Adamo asked members whether now they wanted the overall pilot project proposal to split into separate proposals for the various sub-regions, or whether we should maintain the structure of having one integrated proposal, with sub-regional proposals embedded in a coherent fashion within the main proposal, for example, with the sub-regions forming individual chapters or sections. **The latter model (ie integrated overall project proposal was favoured, allowing sub-regional project groups to express their own plans as sections within the main proposal.**

Members felt it would be timely and useful that the next meeting of the IOP include an examination of how IOP could assist the project in respect to the potential of the IndOOS data set for validation and data assimilation. **Dr Masumoto noted this desire and undertook to recommend to IOP that at its next meeting (Chennai, India, July 2011) it**

include an agenda item to discuss the relevance of IndOOS to the IOGOOS Pilot Project: Modelling for Ocean Forecasting and Process Studies.

In respect to the development of the 'ocean scale' objectives of the overall pilot project, with a view to facilitating the objective of model inter-comparisons within the framework of the IOGOOS pilot project, the sense and merit of engaging with GODAE OceanView was discussed. **Members recommended that the Project Leader, Dr D'Adamo, establish a relationship with GODAE OceanView to facilitate the objective of inter-model comparisons under the pilot project framework, and that this liaison should begin through contact with Dr Andreas Schiller (IOGOOS Officer; Co-Chair of GODAE OceanView).**

In respect to the SWIO sub-regional demonstration area, it was re-affirmed that Mauritius continue to lead this component of the overall project. **Dr D'Adamo was asked to continue liaison with Mauritius in regard to further development of the pilot project.**

In respect to the NEIO sub-regional demonstration area, it was re-affirmed that WAGOOS continue to lead this component of the overall project. **Dr D'Adamo was asked to continue liaison with WAGOOS in regard to further development of the pilot project.**
In respect to continued collegial integration with the SEAGOOS Ocean Forecasting Demonstration project, it was recommended that IOGOOS write to SEAGOOS to advise of the status of the IOGOOS Pilot Progress and re-affirm the invitation to SEAGOOS for collaboration. **Dr D'Adamo was asked to liaise with IOGOOS Chair to formulate a communiqué from IOGOOS Chair to SEAGOOS / IOC ESTAC in regard the ongoing development of synergies between the respective IOGOOS and SEAGOOS projects.**

6.2 Working Group 2: Indian Ocean Core Remote Sensing Project

Dr T S Kumar chaired the workshop, beginning with a brief recap of the related materials presented in earlier sessions of the meeting. Dr T S Kumar reminded members of the most recent workshop held in Kota Kinabalu, Malaysia, December 2008, at which the proposal was drafted (to underpin a funding proposal) for the integrated concept of an integrated Remote Sensing / Shoreline Change / Keystone Ecosystem Monitoring project

Dr D'Adamo recalled that the report from the Kota Kinabalu workshop was delivered by the workshop consultant to IOC HQ Paris and that at the time a request was to have been made by IOGOOS to the relevant section at IOC (Capacity Development) for ongoing funding to further develop the proposal. **Members resolved that the IOGOOS should write to the**

IOC Capacity Building section for further support (sponsorship) to take the integrated Remote Sensing / Shoreline Change / Keystone Ecosystem Monitoring project proposal to the next level.

With reference to the Keystone Ecosystem Monitoring component, Dr. Peyman Eghtesadi Araghi, INIO, Iran expressed interest in the project and queried how Iran could become engaged in the project. **INIO was welcomed to participate in the project and requested to identify the aspects of the draft project proposal that it was most interested in, and/or suggest new areas of work, and that INIO nominate a focal point(s) for its involvement.**

Members suggested mapping of coral reefs remain a key aspect of the project. Dr Hermes, BOBLME, added that in this context a number of relevant reports from other international studies could provide useful insight, and suggested that the **project leaders consult the web for information on projects: relating to corals including CTI, CORDIO, EARTHWATCH, UNEP Programmes; for mangroves - World Atlas on Mangroves; and for seagrasses - SeagrassNet and Seagrass-Watch**. It was noted that projects could provide useful data relevant to the IOGOOS project and in addition remote sensing initiatives in the region are likely to provide useful biologically related maps relevant to the project. .

Dr. Margareth, Tanzania added that it is important that the Indigenous knowledge relating to the project's objectives be prominent in the project. **Member's agreed that the project leader be advised that the project should continue to consider the issues of human impacts on keystone ecosystems and that it should add to its brief the need to review and document related traditional knowledge. INIO added that the Geological Survey of Iran has relevant information on mangroves that could be introduced to the project and invited the project leader to liaise with INIO in this regard.**

In summary, it was recommended that (i) the draft proposals developed in Kota Kinabalu should be further developed to a final proposal stage for submitting to potential donor agencies; (ii) IOGOOS be tasked with writing to the IOC Capacity Development section to fund a workshop to further develop the proposal to ideally a final form, ready for submission to potential project sponsors; and (iii) The Secretariat write to historical project focal points and seek from them an update on who the relevant national focal points currently are for the project.

In respect to the Shoreline Changes component: Drs D'Adamo and Khokiattiwong noted that this aspect of the overall project appeared to have a very localised flavour to it, and perhaps lacking in objectives that provided generic applicability to IOGOOS's constituency as a

whole. They queried whether members believed that this aspect required revision in terms of its objectives, the capacity of stakeholders to continue to have time to develop the project and; whether it needed to be broadened out in terms of the regional relevance of its objectives. more regional / global character. Members indicated that it would be useful for the project to develop methods and technologies for shoreline monitoring, albeit through locally designed tasks, that would have generic transferability and applicability across the IOGOOS region. It was also suggested that capacity building in data analysis and modelling could be made a component of the project, with a view to building capacity across IOGOOS. **It was recommended that the Shoreline Changes project component be reviewed as part of the overall review and assessment of the full suite of IOGOOS projects that is to be undertaken during 2011 (see above), noting the points discussed in this discussion. As part of this review process however, the Secretariat was asked to contact the key focal points for the project, to facilitate their involvement in the review process.**

In respect to the ChloroGIN / Chlorophyll-a Mapping Project, members indicated that they believed the project to be progressing well and that it continued to provide useful products to the IOGOOS community. **To add value to the project and continue to build its usefulness to IOGOOS members, it was recommended that the capacities of participating countries in the field of coastal/shelf in-situ observations relevant to calibration of remote sensing images be a continued focus, and to that end the Secretariat was tasked with writing to project focal points in this regard.**

Dr. Rudolf Hermes, BOBLME enquired as to linkages between the project and SIBER. It was clarified that SIBER focuses on the biogeochemical aspects of the Indian Ocean's ecology and concentrates mostly on the open ocean, whereas the ChloroGIN project measurements are focussed in the coastal areas and hence the two respective projects form complementary initiatives. **It was nonetheless suggested that the project should continue to pursue building relevant relationships between SIBER and ChloroGIN, and that related capacity building activities through JRC in Mauritius in Nov 2011 and NF-POGO in 2012 in India be linked into the overall project framework.**

February 24, 2011 (Day 3: Thursday)

7. Finalisation of the Work Plans and Reports

Dr. Nick D'Adamo, on behalf of Dr. Raleigh Hood, Co-chair, SIBER presented on the progress of the SIBER. The presentation outlined the genesis and maturation of SIBER, the status of the SIBER Science Plan and Implementation Strategy **(**and the proposed

implementation strategy for SIBER. The second SIBER Scientific Steering Committee meeting will be held back to back with IOP-8 and IRF-2 in Chennai, India, during the week of 25-29 July 2011, with likely joint sessions at selected stages of the week's proceedings with IOP and IRF. **The IOGOOS Secretariat received a copy of the SIBER Science Plan and Implementation Strategy (2011), and asked to distribute it to all members.**

Dr Majid Naderi, INIO, Iran indicated a strong interest for the data that will be generated from SIBER to be available to IOGOOS members and in this regard referred to the need to re-activate IOCINDIO a possible mechanism for he management of SIBER data. Dr D'Adamo indicated that it was most likely that the SIBER data would be available via the principle scientists/institutions engaged in collecting data through SIBER's range of science projects, but that the issue of a centralised data management model could also be explored. In the same regard, Dr D'Adamo noted for members that the SIBER recently received confirmation from INCOIS, Hyderabad, India, that it would provide SIBER with a supporting 'International Program Office', facilitating data management and availability. **Notwithstanding these data facilitation opportunities, members felt it entirely relevant and recommended INIO liaise with SIBER on the issue of data availability, particularly for the NWIO region**.

Dr D'Adamo presented an update on the IndOOS Resource Forum on behalf of Dr Gary Meyers, Convenor, IRF. He tabled the draft report of the IRF-1 meeting which was held in Perth on July 15, 2010. He advised that an IRF website was under development as a portal of the UNESCO IOC Perth Office website (www.iocperth.org). He mentioned that the website will comprise information such as the status of IndOOS observations, a summary of resources provided by the main agencies supporting IndOOS and a report on the availability of ship time to support RAMA. Dr D'Adamo advised that IRF-2 would be held back to back with IOP-8 an SIBER-2 in Chennai, Indian, on 29 July 2011, and that in addition to its regular business, the IRF-2 meeting will include a mini-science symposium, with science-review talks by leading researchers on research issues that can be addressed with IndOOS data. The topics will focus on: (i) surface layer heat budget, SST and climate; (ii) ocean structure and climate predictability (intra-seasonal to decadal); (iii) ocean structure (e.g. circulation, pH) and ecosystems; and (iv) the role of ecosystems in climate. IRF-2 will again provide SIBER and IOP with a forum to highlight operational priorities and needs, with a view to IRF facilitating solutions to problems and resourcing requirements relating to implementing the respective SIBER and IOP science and implementation plans. The IRF also provides a forum for SIBER and IOP to continue to explore synergies and efficiencies through collaboration.

Iran expressed an interest in engaging with IRF and to that end it was recommended that Iran (i) identify a focal point for such engagement and (ii) contact the IRF convener directly to explore potential modalities for engagement, including a role on the IRF.

Members were encouraged to use the avenues now available (eg IRF Convener, IOC Perth Office, IOGOOS Secretariat) to express their interests in IRF and its related entities of SIBER and IOP, in respect to potential opportunities for engagement, training, capacity building etc.

8. Strategic Discussions: exploring further collaboration with I.R. Iran within the IOGOOS framework.

Dr. Vahid Chegini, INIO, Iran expressed INIO's willingness to cooperate and collaborate with other member countries of IOGOOS, especially in projects focused in their own specific region of interest in the NWIO (including the Persian Gulf, Oman Sea). INIO advised IOGOOS that it is soon to have an Ocean Research Vessel (within the next 3 years) and that Iran would welcome proposals for potential collaboration in tasking the vessel for IOGOOS related projects. Furthermore, Dr Chegini advised that Iran was developing models for prediction of tsunamis, storm surges, pollution, and red tides and that it was willing to collaborate within IOGOOS in the areas of satellite oceanography, adding that Iran expects to launch a satellite in the near future for oceanographic research purpose. Dr Chegini also advised of Iran's plans to submit a proposal to IOC/UNESCO to establish a regional oceanography training centre, likely as a Category-2 UNESCO Centre, which would thence enable Iran to expand its engagement and collaboration with IOGOOS members and their related institutions, such as INCOIS India. Dr Chegini emphasized Iran's appreciation of the environmentally sensitive nature of the NWIO and its marginal seas (eg Persian Gulf and Sea of Oman) and that it is well understood nationally in regard to the need for collaboration to address some of the key related issues in the oceanographic sphere. Dr Chegini then referred to the Indian Ocean Rim Association for Regional Cooperation (IOR-ARC) and pointed out that Iran hosts the Secretariat of the IOR-ARC Regional Centre for Science and Technology Transfer (RCSTT) and that this may be considered as a potential avenue for IOGOOS to express collaborative project ideas consistent with the objectives of IOR-ARC / RCSST, such as for example the IOGOOS Pilot Project: Modeling for Ocean Forecasting and Process Studies, with a view to garnering support for such concepts at a high international and political level. Finally Dr Chegini expressed his and INIO's appreciation to IOGOOS members for accepting INIO's invitation to hold the 8th IOGOOS meeting in Iran request to host the IOGOOS 8th annual meeting in Iran.

Final plenary discussions on IOR-ARC and possible IOGOOS linkages, and general strategic opportunities to advance IOGOOS project developments:

Dr Mahmoud Molanejad, Director, IOR-ARC Regional Center for Science and Technology Transfer, I.R. Iran welcomed discussion and exploration of linkages between IOR-ARC and IOGOOS. He indicated Capacity Building as a theme was consistent and aligned with the objectives of IOR-ARC and its RCSST. He expressed his view that the development of an ecological science program under the ambit of the RCSST would be worth exploring through IOGOOS and the discussion focused this idea into a potential Marine Ecosystem Project, which then translated into an early idea for the development of a new IOGOOS Pilot Project: Ecological Programmes in the North West Indian Ocean as a science based program that would have strong societal application and benefits. **Without being specific or detailed at this juncture, members indicated their support for IOGOOS to develop this idea into a concept plan for a potential pilot project under the IOGGOS framework.** In this regard, Dr D'Adamo indicated that it might be possible to find some underpinning financial support for its development through IOC Perth and Dr Hermes suggested that even IRF could be advised of such a proposal with a view to facilitating the project. Dr Hermes further noted that GEF does have a process whereby it provides Project Identification Funds to proponents of proposals that align with GEF objectives. Members thanked INIO for their offer to facilitate such a prospect and also noted the inclusion of NGO's in the framework. Dr Chegini added that for Iran a relevant NGO would be the Marine Science and Technology Association.

On the matter of SIBER's growth, Dr Hermes indicated that BOBLME would like to engage with SIBER, through joining as a member or other effective mechanism. Dr D'Adamo advised that SIBER had earlier (through communiqués to IOC Perth) that it would welcome an approach from BOBLME in this regard. **To this end it was recommended to Dr Hermes to approach SIBER directly in regard to enlisting the involvement of BOBLME in SIBER.**

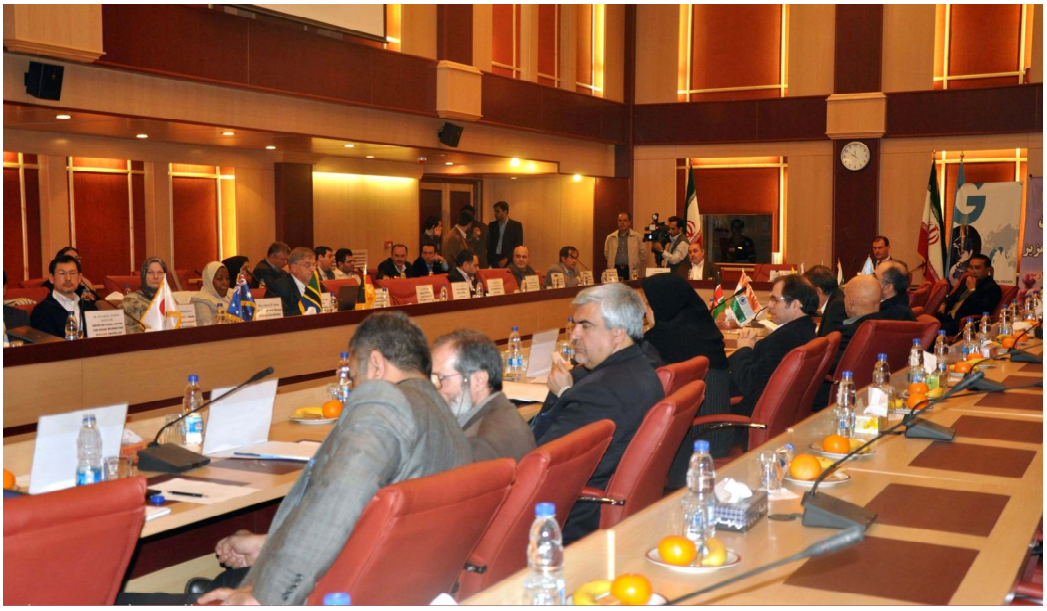
Dr T S Kumar proposed that IOGOOS seek to make a presentation to IOR-ARC / RCSTT, responding with appreciation to the encouragement given by Drs Molanejad and Chegini during the meeting, to inform IOR-ARC of IOGOOS's role in the region and of its range of activities, current and planned. **IOGOOS Secretariat has been tasked to communicate to IOR-ARC in this regard and seek an opportunity to present an overview of IOGOOS, with focus on potential project(s) that may be of interest to IOR-ARC / RCSTT**.

9. Closing of the Meeting

The IOGOOS 8th meeting was seen as highly successful in regard to the breadth and depth of issue discussed over three days. Dr. Somkiat Khokiattiwong, acting Chair, expressed deep appreciation at the host institute and the IOGOOS Secretariat for their coordination and facilitation of the arrangements for the IOGOOS 8th meeting in Iran . Dr. Vahid Chegini expressed his appreciation that IOGGOS accepted Iran's invitation to host the IOGOOS 8th meeting and thanked all the delegates for visiting Iran and ensuring that the meeting was an extremely productive one. Then members Drs T S Kumar, Dr. Margareth and Dr Hermes conveyed their respective appreciation to the host institute for facilitating the diplomatic arrangements, for making wonderful arrangements for the meeting, for their excellent hospitality provided for the past three days and for their willingness to cooperate in various regional programmes. The delegates thanked one and all who have involved in the successful organisation of the meeting.

Dr. Nick D'Adamo gave his closing remarks and thanked the hosts and members, including those who travelled far to participate in the meeting. He especially thanked the IOGOOS Secretariat, through Mr Nagaraja Kumar. He then also thanked Drs Chegini and Nobakhti of INIO and their close colleagues for the overwhelming welcome and kindness shown to all concerned at the meeting, making the event a most memorable one from many points of view, including professionally, culturally and personally.

The meeting ended with the vote of thanks by Mr Nagaraja Kumar, Secretary, IOGOOS. Mr Nagaraja Kumar in his vote of thanks expressed appreciation to the Iranian National Institute for Oceanography (INIO) for their hosting, excellent hospitality, and support extended to all the delegates in the conduct of the IOGOOS 8th meeting, making it entirely successful. He especially thanked Dr Vahid Chegini, Director, INIO, Dr Abbas Nobakhti, Executive Director, INIO and the staff of INIO, including Mr Nima Kiani, Mr Majid Naderi, Ms Fahimeh Foroughi and others involved in organisation of the successful meeting. He also thanked Dr D'Adamo for his continuous support, guidance and financial help through IOC Perth extended to enable the participation of the delegates and organisation of the meeting. He also thanked all the IOGOOS Officers, Members and other delegates for giving of their valuable time and for sharing their views in the meeting deliberations. He gave special thanks to Dr Somkiat Khokiattiwong for accepting the request to Chair the IOGOOS 8th annual meeting in place of Chair Dr Mitrasen Bhikajee. He also thanked his Indian colleagues Dr T Srinivasa Kumar and Dr S S C Shenoi, Director, INCOIS for their guidance and support in running the day to day IOGOOS Secretariat activities. He thanked one and all who played active roles in what was the successful organisation of a successful and productive meeting.



IOGOOS -8 Inaugural Function

IOGOOS Annual Meeting Group Photo

ANNEXURE 1

IOGOOS Workshop and Eighth Annual Meeting (IOGOOS-VIII)

February 22 – 24, 2011 at Tehran, Iran

Agenda

February 22, 2011 (Tuesday)	
09 00 to 09 30 Hrs	**Registration**
09 30 to 11 00 Hrs	**Opening Ceremony** 1. Welcome address by Dr. Vahid Chegini, Director, INCO 2. Inaugural address by the Dr. Kamran Daneshjou, Minister of Science, Research and Technology, I.R. Iran 3. Opening Remarks by Dr. Somkiat Khokiattiwong, IOGOOS Officer 4. Opening Remarks by Dr Nick D'Adamo, Head, IOC-Perth Office 5. Remarks by Dr. Moulanejad, Director, IOR_ARC Regional Center for Science and Technology Transfer 6. Remarks by Dr. Mohamadreza Saeed-Abadi, General Director of I.R. Iran UNESCO national commission. 7. Remarks by Mr. Qun Li Han, Director of UNESCO Tehran Cluster Office and Representative of UNESCO to the Islamic Republic of Iran
11 00 to 11 30 Hrs	**Tea Break**
11 30 to 12 00 Hrs	**Transferring to IROST**
12 00 to 13 30 Hrs	Organization of IOGOOS Meeting, Dr. Somkiat Khokiattiwong on the behalf of Dr. Mitrasen Bhikajee, IOGOOS Chair
	Plenary Talks relevant to IOGOOS Activities • IOGOOS Pilot Project: Modelling for Ocean Forecasting and Process Studies – Dr.Nick D'Adamo • Science talk on IOP activities and science highlights – Dr. Yukio Masumoto • Global HF Radar Network – GEO Work Plan (N D'Adamo) • BOBLME Activities – Dr. Rudolf Hermes
13 30 to 14 30 Hrs	**Lunch Break**

<table>
<tr><td>14 30 to 17 00 Hrs</td><td>IOGOOS Annual Meeting
1. Report by Chairman, IOGOOS
2. Presentation of Secretariat Report
3. Discussions on IOGOOS Pilot Projects
4. Nomination of Working Groups
5. Accounts and Financial Summary
6. Next Meeting and any other Item
7. Conclusion</td></tr>
<tr><td colspan="2">February 23, 2011 (Wednesday)</td></tr>
<tr><td>10 00 to 13 00 Hrs</td><td>IOGOOS Projects & New projects (20 minutes including Q & A)
<table>
<tr><th>Proposed Title</th><th>Status Report by</th></tr>
<tr><td>Water circulation modelling in Persian Gulf and Gulf of Oman</td><td>Dr. Majid Noranian</td></tr>
<tr><td>Coral Reef Monitoring in Iran</td><td>Dr. Hamid Rezae</td></tr>
<tr><td>IO Core Remote Sensing and ChloroGIN</td><td>Dr. T. Srinivasa Kumar</td></tr>
<tr><td>Report of JCOMM Storm Surge Modelling Workshop</td><td>Mr. M. Nagaraja Kumar</td></tr>
<tr><td>Iranian Sea Wave Modelling (ISWM)</td><td>Dr. Said Mazaheri</td></tr>
<tr><td>Ocean Observation System in India</td><td>Dr. T. Srinivasa Kumar</td></tr>
<tr><td>Sea Surface Temperature (SST) measurements in Iranian Water bodies using remote sensing</td><td>Dr. Masoud Moradi</td></tr>
</table></td></tr>
<tr><td>13 00 to 14 00 Hrs</td><td>Lunch Break</td></tr>
<tr><td>14 00 to 17 30 Hrs</td><td>Working Groups Discussions in Serial session
WG1: Modelling for Ocean Forecasting & Process Studies
WG2: Indian Ocean Core Remote Sensing Project</td></tr>
<tr><td>19 00 to 21 00 Hrs</td><td>Dinner Hosted by IOGOOS / IOC</td></tr>
</table>

February 24, 2011 (Thursday)	
0900 to 1200 Hrs	**Finalization of the work plans** • Presentation on IOP Progress • Presentation on SIBER progress - Dr. Nick D'Adamo • Presentation on IRF Progress - Dr. Nick D'Adamo • Presentation on Modelling and Process Studies - N D'Adamo • Discussions on Indian Ocean Core Remote Sensing Project & Chl-a Mapping Project – Dr. T. Srinivasa Kumar • Discussions on Keystone Coastal Ecosystems Project • Discussions on Monitoring Shoreline Changes Project
1200 to 1300 Hrs	Strategic discussion: exploring further collaboration with I.R. Iran within the IOGOOS framework. Facilitator to be advised.
1300 to 1330 Hrs	Closing remarks

ANNEXURE 2

List of Participants for the IOGOOS Workshop and Seventh Annual Meeting

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Annexure 3

Opening speech by
Director of
Iranian National Institute for Oceanography (INIO) and
President of Iranian Committee for Oceanography
Dr. Vahid Chegini
On the occasion of IOGOOS Vlll meeting
Tehran, I.R. Iran, February 22, 2011

Distinguished guests,
Excellencies Dr. Mahdi Nejaad,
Dr. Ghorbani,
Dr. Matkan,
Excellency Mr. Gunawan,
Dr. D' Adamo,
Dr. Kumar,
Honorable officers and Secretary of IOGOOS,
Members of Iranian National Committee for Oceanography,
Ladies & Gentlemen;

First of all I would like to welcome all of the participants to the IOGOOS Workshop and its 8th Annual Meeting.

Utilization of the oceans and seas, with the different purposes is of great importance in the world today. But more important to pay attention is how to safeguard this great body of water encircles the globe. So we can see the significance of constant observation and studying the situation of ocean.

Since 1992, Iranian National Institute for Oceanography (INIO) in close cooperation with member organizations of Iranian National Committee for Oceanography tried to fully accomplish its duty regarding studying marine areas. INIO with its two research centers and three research stations in the Caspian Sea, the Persian Gulf, and the Gulf of Oman is working in different field of oceanography such as marine living and non- living resources, ocean engineering and technology, oceanographic data and information, and ocean policy.

INIO through convening different meetings, seminars and workshops continues its efforts to develop marine related knowledge within academic and professional society as well as

marine culture within the society as general.

I would like also to point out to one of our policies which is to conduct oceanographic activities in the Indian Ocean with exploitation of the first INIO research ocean-going ship in the near future.

Generally, the oceans are of central importance to the life system of the earth. They regulate global climate by redistributing the heat and freshwater across the geosphere. They also sustain an important fraction of global living and non- living resources and, in contemporary times are also the largest reservoirs for man- made pollutants. Since time immemorial, the oceans and the seas have thus played a crucial role in the evolution and spread of civilizations across the globe.

The Indian Ocean is the third largest ocean in the world and excluding the marginal seas, occupies an area of about 73.44 million km.

Considering the significance of oceans and specially the Indian Ocean for its rim countries, draws our attention to this reality that it is impossible for any one nation to collect all the information it needs for safeguarding its marine environment. All these are strong arguments for synoptic and sustained observations of oceans and their properties at local, regional and global scales.

GOOS –Global Ocean Observing System- internationally and IOGOOS regionally, respond to this need. Iranian National Institute for Oceanography as the Iranian focal point of IOGOOS has done various activities in the related fields in close cooperation with other related bodies, such as Oceanographic Cruise organized on the occasion of the 50^{th} anniversary of IOC in the framework of Iranian National Committee for Oceanography.

INIO regularly perform marine observations cooperating with Iranian Ports & Maritime Organization, Iranian Fisheries Research Organization, Geological Survey of Iran, National Cartographic Center of Iran, Iran Meteorological Organization, Marine Universities (like Khoramshahr, Chabahar, Hormozgan, Persian Gulf, Guilan, Mazandaran, and Golestan Universities), and other related organizations which provide worthy and considerable assistance to promote oceanographic research.

At the end, I would like to appreciate the IOGOOS secretariat and all of my colleagues in Iranian National Institute for oceanography who worked hard to organize such a meeting.

I also appreciate the Ministry for Science, Research & Technology, Center for International Scientific Studies and Collaboration (CISSC), IOR_ARC Regional Center for Science and Technology Transfer, Iranian National Commission for UNESCO, and Center for International Scientific Studies and Collaboration for their considerable assistance.

I wish all of dear participants a successful 3 day workshop and meeting and also wish a nice stay for our guests from the IOGOOS region.

Thank you.

ANNEXURE 4

Opening Speech by
the Deputy Minister for Research & Technology of
Ministry of Science, Research & Technology of Islamic Republic of Iran,
H.E. Dr. Mahdi Nejaad Nouri
on the occasion of IOGOOS VIII meeting
Tehran, I.R. Iran, February 22, 2011

Distinguished guests,
Excellency Mr. Han,
Honorable Chairman, Officers and Secretary of IOGOOS,
Dr. D' Adamo,
Dr. Kumar,
Dr. Saeed-Abadi,
Dr. Moulanejad,
Dr. Sadri,
Dr. Doustdar,
Dr. Chegini,
Members of Iranian National Committee for Oceanography,
Ladies and Gentlemen;

Today we are gathered here to take another step in the way which was found by our predecessors with the International Indian Ocean Expedition in 1960 and named Intergovernmental Oceanographic Commission. Regarding the significance of Oceanography and its role in prevention and reduction of one of the important issues of mankind in contemporary era which is the phenomenon of climate change, we need tighter efforts to safeguard ocean through international cooperation and coordination of various programmes in marine research, service, observation systems, hazard mitigation and capacity development in order to better manage the nature and resources of the ocean and coastal areas.

Through more than past 50 years IOC has a great share in improving management practices and the decision-making process of its Member States, to foster sustainable development and protect the marine environment. In addition, The Commission strives to further develop ocean governance, which necessitates strengthening the institutional capacity of Member States in marine scientific research and of ocean management. Establishing different working groups and projects such as GOOS and IOGOOS will help IOC and its Member States to foster protecting ocean for future generation.

Islamic Republic of Iran with its 2700 km coastal lines in the northern and southern parts of its territory which are Caspian Sea, Persian Gulf and Gulf of Oman as a responsible member of the world community, consider its responsibility in safeguarding the health of marine environment. Iran through its active participation in international and regional institutions and mechanisms such as Intergovernmental Oceanographic Commission always tries to accomplish its international obligations and responsibilities and support further international and regional cooperation in order to safeguard marine environment.

Here I would like also emphasis on the important role that Islamic Republic of Iran plays in the peace and stability of the seas it shares with neighboring countries and generally in the region. And all of us are fully aware that peace and stability is an important prerequisite for the health of any marine system. Thus Iran wants Caspian Sea, Persian Gulf, Gulf of Oman, Indian Ocean and generally all marine areas around the globe to be the sea of peace.

Iran also has an active role in its regional grouping of IOC that is IOCINDIO and extends its hands toward other IOCINDIO countries for further cooperation within bilateral and multilateral frameworks; and considers projects such as IOGOOS a fruitful platform for better learning and then implementing the results in policy makings to safeguard our ocean. We also declare our readiness to establish in Iran a category z regional center for development of Oceanographic activities in the region.
Hereby, I would like to welcome all of the guests, especially from IOCINDIO countries and wishing the Eighth IOGOOS meeting a successful and fruitful experience.

Thank you.

ANNEXURE 5

Opening Remarks by Dr. Somkiat Khokiattiwong,
IOGOOS Officer, North Eastern Indian Ocean
On the occasion of IOGOOS 8th Annual Meeting
Tehran, Iran
Tuesday 22 February 2011

Dr. Mahdi Nejaad Nouri, Honorable Deputy Minister, Ministry of Science, Research & Technology of the Islamic Republic of Iran nister), Dr. Vahid Chegini, Director, Iranian National Institute for Oceanography, Dr. Abbas Nobakhti, Executive Director, Iranian National Institute for Oceanography, Dr. Moulanejad, Director, IOR_ARC Regional Center for Science and Technology Transfer, Dr. Mohadreza Saeed-Abadi, General Director of I.R. Iran UNESCO, Dr. Nick D'Adamo Head of IOC Perth Office, IOGOOS colleagues, Distinguished Delegates, Ladies and Gentlemen,

It is my great pleasure to have the IOGOOS-VIII annual meeting and workshop in Tehran. I would like to thank Iranian government to kindly host the IOGOOS-VIII annual meeting and workshop here and also thank to our host colleagues to give us a very warm welcome since we arrive at Tehran airport. On behalf of the IOGOOS, I would like to apologies for the IOGOOS's chair who could not come to join the meeting due to the problem in getting VISA. As many of you might know that each year IOGOOS annual meeting and workshop will be held in different countries that are part of Indian Ocean by rotation around the Ocean rime, from one side to the other side, this year is time to be in the central part of the ocean. It is great honor and opportunity of IOGOOS to have a meeting and workshop in Tehran, which is offered by Iranian Government. To rotation of the meeting venue around the ocean will give an opportunity to member country to visit the home of our member colleagues and friends in the region and to encourage young scientist in the country to work in ocean science. Since there are many projects that are going on and some are under development and some still need more input from the member countries in this region, It would be a good chance for IOGOOS to to get more opinion, commend, and contribution from our colleagues in Iran to make better scientific projects of IOGOOS.

We are going to work very close together in next few days. I expect that we will be able to get a successful and good outcome from the meeting and workshop.
Thank you.

ANNEXURE 6

Opening Remarks by Dr. Nick D' Adamo,
Head, IOC Perth Regional Programme Office, Australia
On the occasion of IOGOOS 8th Annual Meeting
Tehran, Iran
Tuesday 22 February 2011

Dr. Vahid Chegini, Director, INCO
Dr. Mitrasen Bhikajee, IOGOOS Chair
Dr. Somkiat Khokiattiwong, IOGOOS Officer
Dr. Alfonse Dubi, IOGOOS Officer
Dr. T. Srinivasa Kumar, IOGOOS Officer
Dr. Moulanejad, Director, IOR_ARC Regional Center for Science and Technology Transfer
Dr. Mohamadreza Saeed-Abadi, General Director of I.R. Iran UNESCO National Commission.
Mr. Qun Li Han, Director of UNESCO Tehran Cluster Office and Representative of UNESCO to the I.R. of Iran
Dr. Kamran Daneshjou, Minister of Science, Research and Technology, I.R. Iran
Members, guests, ladies and gentlemen.

I add my sincere appreciation to the I.R. Iran, INIO, Drs Chegini and Kiani, and their local INIO and science agency colleagues for hosting IOGOOS-8, helping us all with local and diplomatic arrangements to be able to come here, the warm spirit of friendship and collaboration extended to all of us and our partners, the wonderful introduction to this fascinating country and historically rich culture and its beautiful capital Tehran.

IOC Perth continues to be proud to have the opportunity to sponsor IOGOOS and these annual meetings and acknowledges the great advances that have been made in the IOGOOS portfolio of projects. To this end, I would like to thank my Office's own sponsors in UNESCO IOC, Western Australian Government and the Bureau of Meteorology of Australia for their underpinning resources and support.

As always, I cannot go on without acknowledging the tremendous effort and energy that has been put into making this meeting a reality by our new Secretary, Mr Nagaraja Kumar. I have been in Nagaraja's email traffic, and while I know I have been exposed to only a subset of those emails, I can assure you I am aware of the many more interactions Nagaraja has had across the administrative and technical coordination of this meeting, much of it in his own time out of working hours.

Finally, my thanks to IOGOOS members for their support of the alliance, our Iranian delegate and member Dr Abbas for making the offer to host this meeting, to all members for attending this meeting and last but not least to our Executive Officers, our Secretariat (represented and strongly supported by Dr S Shenoi, Director INCOIS, India) and our Chair in Dr M Bhikajee.

ANNEXURE 7

IOGOOS Workshop and 8th Annual Meeting (IOGOOS-VIII)
February 22 – 24, 2011 at Tehran, Iran

Agenda Item (2) of the IOGOOS Annual Meeting held 1430-1700 hrs, 22 February 2011

IOGOOS Secretariat Report: Actions since the IOGOOS VII Meeting (July 2010 – January 2011)

Sl. No.	Item	Status / Progress
1.	**IOGOOS Annual Meeting**	
1.1	IOGOOS VII Report	• Finalised and circulated the IOGOOS VII Annual Report.
1.2	Conduct of IOGOOS VII	• Circular, Invitations, Agenda, Funding for IOGOOS VIII. • Funding from IOC Perth Office (USD 15,823) to partially / fully sponsor 07 participants.
2.	**Capacity Building**	
3.	**IOGOOS Projects**	
3.1	IOGOOS Secretariat to write to participating members of the KEY project component of the Indian Ocean Core Remote Sensing project and seek their participation to be part of the core working group.	Action has been initiated. The Secretariat will collect the list of the members and request their active participation.
3.2	IOGOOS Secretariat to contact IMS, Tanzania to request for an alternative nomination due to the retirement of Dr. Greg Wagner from the group.	Action Completed. Director, IMS, Tanzania has nominated Dr. Charles Lugomela, a Senior Lecturer at the Department of Aquatic Sciences and Fisheries, College of Natural and Applied Sciences, University of Dar es Salaam, Tanzania
3.3	IOGOOS Secretariat to circulate the draft project document on the KEY	Action partially completed. Secretariat has sent a invitation email to all the

	project and Shoreline Changes project to focal points from participating countries and IOGOOS-VII working group participants, requesting their active engagement in the project or for appropriate nominations of alternative member. IOGOOS Secretariat to obtain and update contact details of members from the participating countries	members of Shoreline Changes project and sought their active participation and/ or for nomination of alternative expert.
4.	**Governance**	
4.1	IOGOOS Secretariat to reflect the new elected positions in its communications and communicate to all the members	• Action Completed
4.2	IOGOOS Members	• Bay of Bengal Large Marine Ecosystem (BOBLME), a project of FAO, has joined IOGOOS as Associate Member. • Sultan Qabbus University, Sultanate of Oman has been communicated about the acceptance of the change in nomenclature.
5.	**Finance**	
5.1	Membership Fees for 2009-10	• Requests are to be sent to the Members for remittance of the Annual Membership fee for the period 2010-11. Contacts are to be established for few member countries as the original signed dignitaries are not available.
5.2	Audit	• Completed Financial Accounting and Audit for the Period July 2010 – February 10, 2011). • Statement of Account is being submitted for verification and approval. Will be tabled as Agenda Item xi of the Annual Meeting

Specific actions with respect to IOP, SIBER, Modelling and Remote Sensing project initiatives will be presented by the respective project leaders.