The First Webinar on
Effects of Climate Change on the Indian Ocean Marine Environment
(Online)

May 10, 2021 at 11:00-16:00 Tehran time (GMT +4:30)

https://www.iora-rcstt.org/node/129

Introduction

The workshop series entitled as "Effects of Climate Change on the Indian Ocean Marine Environment" are planned to be organized by the Regional Centre for Science and Technology Transfer (RCSTT) in cooperation with the Iranian National Institute for Oceanography and Atmospheric Science (INIOAS) and Regional Education and Research Centre on Oceanography for West Asia (RCOWA) under the auspices of UNESCO. The workshop series will focus on the effects of climate change on the physical, chemical, biological and meteorological properties of the Indian Ocean and adjacent seas. The workshops will aim to bring together scientists and policymakers with an interest in climate change and marine environments. During the workshops, the scientists of climate change will present their latest findings, knowledge and information on different aspects of climate change, its impacts and also the related policies

Topics

- Potential effects of climate change on the extreme events
Dr. Nafiseh Pegahfar

- Modelling, observing and understanding variability in the Indian Ocean
Dr. Juliet Hermes

- Variation of atmospheric parameters and related outcomes
Dr. Parvin Ghafarian

- Understanding and monitoring climate change in the Indian Ocean
Dr. Roxy Mathew Koll

- Advances and challenges in climate predictions on sub-seasonal to decadal timescales and projections of future climate change
Dr. Alizadeh Choobari

- Observed spatio - temporal patterns in tropical cyclone activity in the Arabian Sea
Prof. James Terry

- Biogeochemical processes in littoral waters and the influence of anthropogenic activities within time and space
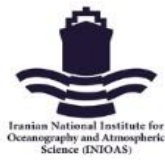Dr. Gholamreza Mohammadpour

Target Participants

Experts from IORA Member States/Dialogue Partners, R&D institutions, scientists and students with wide interest and experience in climate change and marine sciences

Registration

The IORA Member States and Dialogue Partners are invited to nominate their representatives to participate in the programme. For registration , please fill the attached registration form and send them to the organizers

- fereshteh.moradi@gmail.com
- fahimeh.foroughi@gmail.com
- hq@iora.int
- info.rcstt@gmail.com

by latest 1 May 2021.

Workshop Series on

Effects of Climate Change on the Indian Ocean Marine Environment

The First Webinar on

The Effects of Climate Change on the Indian Ocean Marine Environment

11:00 to 16:00 at Tehran time (GMT+4:30)

10 May 2021

Organizers:

IORA Regional Centre for Science & Technology Transfer (RCSTT)

The Iranian National Institute for Oceanography and Atmospheric Science (INIOAS)

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
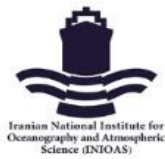
In Cooperation with:

Iranian Research Organization for Science and Technology (IROST)

The Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO)

Regional Education and Research Centre on Oceanography for West Asia (RCOWA) under the auspices of UNESCO

IOC Regional Committee for the Central Indian Ocean (IOCINDIO)

Introduction

Obviously, the ocean is truly the central player in our climate system. The problem of understanding and predicting climate change represents a significant challenge in observing and understanding the ocean. The basic physics of the climate system assures a significant place for the ocean because it dominates the planetary reservoirs of heat, water, and CO_2. However, oceanographers have arrived late to the climate problem. And now, in the last 30 years, there has been great progress in expanding ocean observations to the point that we can start to address climate problems.

Following the request of the 22nd CSO meeting on December 2020, RCSTT joined hand with other members of the Working Group on Blue Economy. It submitted its plan to hold three consecutive webinars in May, September and December 2021 on the different dimensions of climate change and oceanography to share knowledge and raising awareness of this very important issue.

The First Webinar on the Effects of Climate Change on the Indian Ocean Marine Environment was held on 10 May 2021 (Please see the report below).

The Report of

The First Webinar on The Effects of Climate Change on the Indian Ocean Marine Environment

11:00 to 16:00 at Tehran Time (GMT+4:30)

10 May 2021

The workshop series entitled as "Effects of Climate Change on the Indian Ocean Marine Environment" planned to be organized by the Regional Centre for Science and Technology Transfer (RCSTT) in cooperation with the Iranian National Institute for Oceanography and Atmospheric Science (INIOAS) and Regional Education and Research Centre on Oceanography for West Asia (RCOWA) under the auspices of UNESCO. The Workshop Series has been commenced with holding the **"First Webinar on the Effects of Climate Change on the Indian Ocean Marine Environment"** virtually on 10 May 2021. The first webinar's theme was the Overall View of climate change issues and their impacts on the Indian Ocean Marine Environment.

The webinar was very welcomed by the IORA Member States and Dialogue Partners and more than 150 applicants from different IORA countries registered to attend this event. The attendees were from Australia, Bangladesh, China, Egypt, Germany, India, Iran, Iraq, Korea, Madagascar, Malaysia, Maldives, Mauritius, Oman, Pakistan, Seychelles, Sri Lanka, South Africa, Tanzania and Yemen.
The speakers were from India, South Africa, United Arab Emirate and Iran.

The Webinar welcome speech was presented by Dr. Miremadi, the Director of RCSTT. In her speech, she indicated to the unprecedented participation (about 150 applicants) from different IORA countries at this webinar and emphasized that this workshop is a timely response to the concerns that pervade our region about climate change as a cross cutting subject, affecting all six priorities of IORA including science and technology.

Dr. Abtahi, the INIOAS Director was the second speaker in the opening section. He also indicated to the critical importance of climate change phenomena and its undeniable effects on environment, economy and industries on at least 2 billion people in the world directly and indirectly. Welcoming the participants he gave the floor to the lecturers of the webinar.

➤ The webinar continued then with two sessions and 7 presentations as below:

1-**Modelling, Observing and Understanding Variability in the Indian Ocean**

By: Dr. Juliet Hermes

Assistant Professor, University of Cape Town, South Africa

Abstract:

This presentation was a compilation of work done by South African scientists and students highlighting some key features in the western Indian Ocean.

Following an overview of some of the key science the programs being run in South Africa to address these questions were noted along with other key research topics. The importance of making the science relative to society as well as the need to incorporate indigenous knowledge as part of this was discussed. The need to engage with industry is one way to further enhance research and some examples from SA were given. On top of this, a transdisciplinary, co generative approach to ocean observing was highlighted, alongside ocean literacy and outreach.

The presentation was finished with some suggestions for the future - the importance of the ocean to society is becoming better understood. How to address the many real challenges we are faced with is still not understood. Science needs to provide the foundation for that understanding. Open knowledge sharing, including transparency and acknowledging uncertainties and gaps is ever more important. Ocean observing is not just technology, it is people, and it is a community of many cultures and capabilities.

We need to strengthen and broaden leadership and community for sustained observing, and provide the tools for that community to interoperate. This includes documented best practices, training and an open collaborative environment. We need to create a new, diverse generation of informed ocean scientists where ocean boundaries are not considered. We need to ensure that experience is passed onto this new generation and that opportunities are open to them to lead and have their voices heard. We need to teach and mentor them in the methods we use and how to create methods that will be for the next generation.

2- Variation of Atmospheric Parameters and Related Outcomes

By: Dr. Parvin Ghafarian,

Assistant Professor, Head of Department of Atmospheric Sciences, Iranian National Institute for Oceanography and Atmospheric Science (INOAS)

Abstract:

The effects of global climate change on surface temperatures, droughts, floods, and the severity of weather events including monsoons and tropical storms have been gradually rising. The Persian Gulf is situated in a subtropical high-pressure area with an arid climate. In particular, the climate and society are vulnerable to the consequences of global warming due to the combination of high evaporation and low precipitation rates. For detecting climate change over the Persian Gulf basin, we use observation data, reanalysis and satellite data, and radar products. Also, we have the Persian Gulf explorer that is unique for the Persian Gulf environment monitoring. The results showed that the temperature increased about 0.2 degree Celsius per decade over the northern Persian Gulf from 1979 to 2018. Also, the sea surface temperature (SST) has increased in the study are, that the consequence is acidification. Due to climate change, the frequency and intensity of extreme events increased. We monitor, evaluate, and simulate these events that occurred in the Persian Gulf and coastal areas. We detected some rare phenomena such as Waterspout and meteotsunami in the northern Persian Gulf in a recent decade. Finally, we recommend the development of the monitoring network, Sharing data, and Establishment Early Warning system. Robust early warning systems play a critical role in reducing the impacts of potential disasters and enable populations to protect lives and some property and infrastructure.

3-Understanding and monitoring climate change in the Indian Ocean

By: Dr. Roxy Mathew Koll

Scientist, Centre for Climate Change Research, Indian Institute of Tropical Meteorology, Ministry of Earth Sciences, India

4-Advances and Challenges in Climate Predictions on Sub-Seasonal to Decadal Timescales and Projections of Future Climate Change

By: Dr. Alizadeh Choobari

Associate Prof., Institute of Geophysics, University of Tehran, Iran

Abstract:

In spite of the chaotic nature of the atmosphere and involvement of complex nonlinear dynamics, due to the interaction between the atmosphere and the slowly varying underlying surfaces, forecasting climate fluctuations on different timescales is feasible. Different sources of uncertainty in climate predictions are discussed, including internal variability uncertainty, which is large for short-term predictions of 1-2 decades, model uncertainty for predictions at all timescales and scenario uncertainty for projections of several decades. Climate models have been significantly improved in recent decades mostly through improved parameterization of unresolved processes and enhancement of the spatial resolution, while ensemble forecasting has been also developed to capture strong predictable signals. The aim of future research should be reducing uncertainties of climate predictions. Application of high-resolution climate models can reduce the uncertainty. However, the sub-grid scale features still need to be parameterized. This underlines the need for further improvements of physical parameterizations to account for sub-grid scale processes. There is also a need for improvement and extension of the current observing system, which will greatly advance understanding of the key processes and features in the climate system. The advanced observing system in the future will be also beneficial for more accurate representation of the initial states of the components of the climate system to obtain more accurate climate predictions. In spite of progresses in model development, the spread of projected precipitation by different models under a specific radiative forcing of greenhouse gases is still large on the regional scale.

Improving future projections of regional precipitation requires reducing the internal variability and model uncertainties, which can be partly achieved by improvement and extension of the observing system.

5- Observed Spatio-temporal Patterns in Tropical Cyclone Activity in the Arabian Sea

By: Prof. James Terry

Professor at College of Natural and Health Sciences, Zayed University, Dubai, UAE

Abstract:

Using an established metric for cyclone track sinuosity (CTS), the shapes of cyclone tracks and their patterns across the South West Indian Ocean (SWIO) and the Arabian Sea (AS) are examined from the 1980s to the present decade. Original cyclone position data from RSMC La Réunion and RSMC New Delhi areas of responsibility were accessed from the IBTrACS archive maintained by NOAA. CTS was measured within a GIS environment and the results filtered and normalised to reduce positive skew. Key findings from spatial and temporal analysis of track shape, based on calculated SI (sinuosity index) values, indicate the following benefits of this approach: 1. Mapping tracks within quartile categories (straight, quasi-straight, quasi-sinuous and sinuous tracks) reveal those coastal areas in the SWIO and AS basins more likely to be affected by storms following sinuous tracks, which are more difficult to forecast in real time. 2. Over the past decades, the temporal CTS pattern shows a high degree of variability. However, a number of conspicuous episodes of relatively magnified or subdued track sinuosity are easily recognised compared to long-term averages. This presents opportunities for examining regional climatic or oceanic controls/drivers on cyclone migratory behaviour during past anomalous seasons. 3. Within the average yearly cyclone season, specific months (e.g. January for the SWIO) tend to experience a shift towards more sinuously-moving cyclones. 4. Cyclones steering less predictable sinuous courses are often those that tend to survive for longer durations, therefore posing greater risks for greater areas. Overall, the CTS approach is therefore of value in coastal vulnerability assessment for cyclone affected regions.

6- Potential Effects of Climate Change on the Extreme Events

By: Dr. Nafiseh Pegahfar,

Assistant Professor, Department of Atmospheric Sciences, Iranian National Institute for Oceanography and Atmospheric Science (INOAS)

7-Biogeochemical Processes in Littoral Waters and The Influence of Anthropogenic Activities Within Time and Space

By: Dr. Gholamreza Mohammadpour

Assistant Professor, Department of Atmospheric Sciences, Iranian National Institute for Oceanography and Atmospheric Science (INOAS)

 Key points presented:

- About 40% of the population of the world's human population live within about 100 kilometers of the shore.
- Land-sea flows carry suspended and dissolved particulates towards coastal waters. Those flows include river runoff, groundwater discharge, and the influence of seawater intrusion into coastal aquifer, and tourism.
- Those phenomena can cause coastal hazards such as erosion, winds, flooding by hurricanes and cyclones.
- Suspended and dissolved particulates may cause bacterial spread, turbidity, and causing extremes in primary productivity.
- Particulates also participate in the formation or intensification of cyclones.
- Remote sensing can be an asset to monitor and predict biogeochemical processes in coastal waters and their influence on extreme meteorological events such as tropical cyclones, thunderstorms, and heavy waves.
- Using this asset, policymakers and stakeholders will be able to plan for controlling the future anthropogenic activities in coastal and littoral waters.

Participants' Feedback

The participants' feedback to the Webinar was evaluated by sending out a questionnaire to all. The main criteria for evaluation of the participants' satisfaction with the webinar was categorized as follows:

1- The webinar content
2- The instructors' knowledge and expertise
3- The way the material was presented
4- The participants' interest in taking part in the upcoming events on the subject
5- The time and length of the webinar

According to the survey performed, the participants found the webinar useful and satisfying (more than %90). The webinar was successful to cover the information about the subject at the basic and intermediate level (%90). The instructors were knowledgeable and expert (90%) and the way they presented their material was excellent (%70). The participants indicated their willingness to take part in the upcoming events (80%), however, they have suggested that the next event be more concise (95%). The quality of the technical service was satisfactory (85%).

Finally, some of the participants placed some suggestions. The RCSTT has collected all the constructive suggestions and sent them to the organizing committee to be considered for the next events.

Upcoming Programmes

The themes of the upcoming two programmes in the series will be "Oxygenation and Acidification" which may happen in September 2021 and the last one in the series will be focused on "Ecology of Marginal Seas" which is planned to be held in December 2021.

Note: The time, duration and holding modality of the next workshops will be determined considering the COVID-19 pandemic conditions in due course.