

## Project Endorsement Form

### 1. PROJECT TITLE

Full title	Indian Scientific Expedition to Southern Ocean
Acronym	ISESO
Website	www.ncaor.gov.in
Keywords (up to 10, describing the project research)	Indian sector of Southern Ocean, Antarctic Circumpolar Current, Ocean-Atmosphere interaction, Fronts, Water masses, hydrodynamics, biogeochemistry, Eddies, Ocean acidification, Carbon dynamics
New initiative or continuing programme?	Continuing programme

### 2. APPLICANTS

#### Lead applicant / Project Leader / key research contact person:

First name	Anilkumar
Last name	Narayana Pillai
Affiliation	Programme Manager
Postal address	National Centre for Antarctic And Ocean Research, Headland Sada, Vasco Da Gama, Goa – 430 804
Country	India
Telephone	+91 832 2525512/513
Email address	anil@ncaor.gov.in
Institutional or personal website	www.ncaor.gov.in

#### Other key participants / research team leaders: (repeat as needed)

First name	
Last name	
Role in the project	
Affiliation	
Country	
Email address	
Institutional or personal website	

*N.B.: Please note that all these names and contact details will be added to the IIOE-2 membership database.*

### 3. ABSTRACT– Brief description of the project: (1/4 page maximum)

*This will be placed on the IIOE-2 Website after endorsement.*

*Main focus of the project*

Influence of Southern Ocean in modulating the ecosystem of Tropical Indian Ocean as well as the Indian Climate.

### IIOE-2 Joint Project Office (JPO)

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#### *Key Scientific Questions*

How do the coupled atmospheric and oceanic dynamics of the Polar Regions including Southern Ocean affect the tropical weather and climate?

How the physical processes, atmospheric aerosols and other trace gases are modulated by Biological pump / Biogeochemistry & vice versa? (North Indian Ocean (NIO) productivity and Tropical weather/climate) (ISO, seasonal, inter-annual, decadal, etc.)

#### *Abstract*

The importance of Southern Ocean (SO) for global climate change, adequate information and understanding of the processes controlling the rate of formation of water masses and its response to climate change are lacking primarily due to lack of high resolution sea truth observation. The areas east of the Crozet Plateau and the west of Kerguelen-Amsterdam Passage are the key regions where the fronts confluence and split again. The data available from this region are sparse, but remain under-investigated, which hamper our knowledge regarding the influence of SO in the climatic change scenario. Therefore, large-scale, detailed, multiship, synoptic and time series sea truth observations of this area deserve highest priority in any program of observational studies of the SO. Further the SO circulation is linked with the Indian Ocean circulation through Equatorial, Agulhas and Circumpolar current systems. Hence the exchange of heat and mass through these currents shall affect the physical and biogeochemical processes of the tropical Indian Ocean (TIO) ecosystem as well as the Indian climate. The upper-ocean variabilities, the mechanism of ocean-atmosphere interaction, hydrodynamics, carbon dynamics, marine productivity, food web dynamics and the multi-scale interactions between various weather and climate processes over the study region (between 40°S & 69°S, 40°E & 80°E) will be the major research topics. We plan to conduct field observations, dynamical analysis, studies on biogeochemical cycles, marine productivity and numerical experiments using both the oceanic general circulation model and the coupled general circulation model. The results of this project is expected to improve our understanding about the impact of SO on regional climatic variabilities, mechanism of the seamless climate system, and to improve the performance of local and global coupled model. Moreover, the data generated from these studies shall be a major input for the improved understanding of the future predictions of Indian climate.

#### **4. LINKS TO IIOE-2 SCIENCE PLAN: (1/2 page maximum)**

How do you anticipate your project to contribute to the IIOE-2 strategy and science delivery, with reference to which (either one or more) of the six IIOE-2 Science Plan themes that your project responds (The IIOE2 Science Plan and the Implementation Strategy Document are available at <http://iioe-2.incois.gov.in/IIOE-2>

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[http://iioe-2.incois.gov.in/IIOE-2/pdfviewer\\_pub.jsp?docname=IIOE-2-DOC\\_AD\\_2.pdf](http://iioe-2.incois.gov.in/IIOE-2/pdfviewer_pub.jsp?docname=IIOE-2-DOC_AD_2.pdf)

*The present project shall be linked with the following IIOE2 themes*

Theme 4: Circulation, climate variability and change (How has the atmospheric and oceanic circulation of the Indian Ocean changed in the past and how will it change in the future? How do these changes relate to topography and connectivity with the Pacific, Atlantic and Southern oceans? What impact does this have on biological productivity and fisheries?)

Theme 6: Unique geological, physical, biogeochemical, and ecological features of the Indian Ocean (What processes control the present, past, and future carbon and oxygen dynamics of the Indian Ocean and how do they impact biogeochemical cycles and ecosystem dynamics? How do the physical characteristics of the southern Indian Ocean gyre system influence the biogeochemistry and ecology of the Indian Ocean? How do the complex tectonic and geologic processes, and topography of the Indian Ocean influence circulation, mixing and chemistry and therefore also biogeochemical and ecological processes?)

[http://iioe-2.incois.gov.in/IIOE-2/pdfviewer\\_pub.jsp?docname=IIOE-2-DOC\\_AD\\_3.pdf](http://iioe-2.incois.gov.in/IIOE-2/pdfviewer_pub.jsp?docname=IIOE-2-DOC_AD_3.pdf)

*The present project shall be linked with the following IIOE2 major question*

What is the nature of surficial and deep exchanges between the southern subtropical gyre of the Indian Ocean with the Southern Ocean and how do these exchanges impact the heat, nutrient and oxygen budgets in the basin?

*The present project shall partially contribute for addressing the following IIOE2 major questions*

How do remote and local forcing interact to drive variations in Agulhas Current transport and upwelling and how does this, in turn, influence nutrient supply, larval transport and fisheries productivity?

What can comparative studies tell us about the relative roles of the remote vs. local forcing in driving these currents and their associated upwelling and downwelling circulations and how does this influence nutrient supply and ecosystem dynamics?

What are the consequences of the exchanges between the ITF, SEC, the Leeuwin Current and the southern subtropical gyre of the Indian Ocean for nutrient biogeochemistry, primary production and fisheries productivity in the southeastern Indian Ocean?

## 5. INTERNATIONAL COLLABORATION(S):

Is the project part of a related multi-national activity? **YES/NO** **YES**  
If No, would you welcome international collaboration in your project? **YES/NO**

## 6. REGION(S) OF STUDY

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Provide a description of 'where' the research is to be conducted (for field based activities) and/or the region or regions to which the research pertains (you are encouraged to consider providing either the coordinates of the area of studies or the coordinates of the planned cruise tracks, as well as a figure as an addendum to your proposal).

Indian Sector of Southern Ocean [Between 40°S & 69°S, 40°E & 80°E]

## 6. TIMETABLE OF THE PROJECT

Start date:

This is a long term project.

The expedition to Southern Ocean is being implemented every year during austral summer (between December and March).

End date:

## 7. LINKAGES WITH OTHER PROJECTS / PROGRAMMES / INITIATIVES

Is the project part of a related national or multi-national activity?

Yes

If yes, provide the related activity title and website for reference, if available:

*The major projects under this programme*

Sr. No.	Title of The Projects [2017-18]	Name & address of the Institution	PI
1	Hydrodynamics & Biogeochemistry of the Indian Ocean Sector of Southern Ocean	NCAOR, Goa	Dr. N. Anilkumar
2	SOCCOM (Southern Ocean Carbon and Climate Observations and Modeling)	Scripps Institute of Oceanography, USA	Ms. Lynne Talley
3	High-resolution, long-term temperature measurements to quantify near-bottom internal wave mixing in the Prydz Bay.	IIT Madras, NIOZ, Netherlands & Ecole Centrale, France	Mr. Manikandan
4	Biogeochemical response of Southern Ocean due to melting of Antarctic glaciers.	CAOS, IISc, Bangaluru	Dr. Prosenjit Ghosh

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5	Quantitative and Qualitative Evaluation of Microplastics from the Southern Ocean	KUFOS, Kerala	Dr. Anu Gopinath
6	Oceanic volatiles and their impact on atmospheric halogens and cloud-forming aerosols in the Southern Ocean.	IITM, Pune, & Institut de Ciències del Mar, CSIC, Barcelona, Spain	Dr. Anoop S. Mahajan
17	Aerosol dynamics in the Indian Ocean sector of Southern Ocean (between 40°S and 65°S) in association with the spatial variability of marine atmospheric boundary layer.	Goa University	Prof. Harilal B. Menon
8	Paleoclimatology and paleoceanography of the Indian Sector of the Southern Ocean	NCAOR, Goa	Dr. Rahul Mohan
9	Quantitative Reconstruction of Past Southern Ocean and Southern Indian Ocean Climate and its Teleconnection with the Indian Monsoon.	NCAOR, Goa	Dr. Manish Tiwari

Is your project part of, or affiliated to, another SCOR, IOC or IOGOOS activity or project? Yes  
If "yes", please indicate which activity or project:

GOSHIP & SOOS

## 8. DATA MANAGEMENT AND SHARING

1. Will new data be collected as part of this project ? **Y/N**

Yes

2. Contact information if any, of the person in charge of the data management from whom the metadata can be accessed by interested IIOE-2 stakeholders.

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*Please note that for all IIOE-2-endorsed projects, IIOE-2 will have developed its own metadata portal. Once the project is endorsed, the project leader will be asked to provide the metadata information of the project.*

**Dr. N. Anilkumar** | Scientist F & Group Director (Ocean Sciences)  
ESSO-National Centre for Antarctic and Ocean Research |  
Earth System Science Organization | Ministry of Earth Sciences |  
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3. Recognizing the need for an initial period of exclusive data use, would you be willing to provide timely access to all data generated under this project and associated metadata in accordance with relevant national and funding agency data sharing policies? **YES/NO**

#### 9. FUNDING

*Please note that IIOE-2 strongly encourages funded/resourced projects. However, IIOE-2 may endorse projects yet to receive funding/resourcing if IIOE-2 endorsement can be clearly shown to significantly aid in prospects for funding/resourcing.*

Has funding and resources to successfully achieve and undertake the project been obtained? Indicate the sources of funding and resources that have been approached and/or secured.

Ministry of Earth Sciences

#### 10. BENEFITS FROM IIOE-2 ENDORSEMENT (1/4 page maximum)

Specify why you are seeking endorsement and how the activity would benefit from endorsement, and how the IIOE-2 SC could assist in the implementation of your project.

- IIOE-2 will need to increase our knowledge of interactions between geologic, oceanic and atmospheric processes that give rise to the complex physical dynamics of the Indian Ocean region, and determine how those dynamics affect climate, extreme events, marine biogeochemical cycles, ecosystems and human populations.
- The improved understanding that IIOE-2 will bring to fundamental physical, biogeochemical and ecological processes also has strong relevance to the ecology and human societies of Indian Ocean rim communities.
- The IIOE-2 Science Plan is ambitious and broad. It encompasses geologic, atmospheric and oceanographic

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research from coastal environments to the deep sea and trophic levels ranging from microbes and phytoplankton to top predators, including fish and humans. This plan identifies important scientific themes for consideration as potential research foci for national and international studies in the Indian Ocean, while also recognizing the coastal and regional interests of many Indian Ocean rim countries that seek to pursue research under IIOE-2.

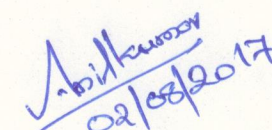
- IIOE endorsement will be obviously a strong support for the present project to achieve the main goal “the influence of Southern Ocean in modulating the ecosystem of Tropical Indian Ocean as well as the Indian Climate”. Further through the IIOE endorsement this project will get wider visibility, it will help to make international collaborations through which new scientific themes/plans/ideas shall be obtained. Accordingly the science plan shall be modified to make a wider vision.

**11. OPTIONAL: OTHER COMMENTS/INFORMATION/MATERIAL** (*length and detail may be at the discretion of and as deemed necessary by the applicant*)

Please feel free to provide any other comments, information or materials that you feel relevant to your proposal for the IIOE-2 Steering Committee’s information and benefit. You may provide this as general information or provide the additional comments/information/materials as relevant to any of the specific Sections above.

IIOE2 focus shall be extended to understand the linkage between tropical subtropical and polar regions and its influence on climatic changes

The southern ocean transect will be repeated every year and we would like to consider this transect as a part of GO-SHIP transect.

  
02/08/2017  
(Signature of the PI)

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