Project Endorsement Form

1. PROJECT TITLE

Full title	INtegrated heat Dynamics of the Indian and Global Oceans (INDIGO)
Acronym	INDIGO
Website	TBD
Keywords (up to 10, describing the project research)	Indian Ocean; heat uptake: global climate variability; Indonesian Throughflow
New initiative or continuing programme?	New initiative

2. APPLICANTS

Lead applicant / Project Leader / key research contact person:

First name	Alejandra
Last name	Sanchez-Franks
Affiliation	National Oceanography Centre
Postal address	SO14 3ZH
Country	United Kingdom
Telephone	+44 (0)23 8059 6180
Email address	alsf@noc.ac.uk
Institutional or personal website	http://noc.ac.uk/about-us/staff/alsf

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

First name	Janet
Last name	Sprintall
Role in the project	Collaborating partner
Affiliation	Scripps Institution of Oceanography
Country	USA
Email address	jsprintall@ucsd.edu
Institutional or personal website	http://pordlabs.ucsd.edu/jsprintall/

First name	Adrian
Last name	Matthews
Role in the project	Collaborating partner
Affiliation	University of East Anglia
Country	UK
Email address	a.j.matthews@uea.ac.uk
Institutional or personal website	http://www.uea.ac.uk/environmental-sciences/people/profile/a-j-matthews

First name	Alan
Last name	Koropitan
Role in the project	Collaborating partner
Affiliation	Bogor Agricultural University
Country	Indonesia
Email address	alan@ipb.ac.id

Institutional or personal website	http://alan.staff.ipb.ac.id/

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.

The recently recorded abrupt increase of heat uptake by the Indian Ocean has been projected to have a major impact on global climate variability. The overarching aim of this project is to describe and quantify the evolution of this Indian Ocean heat uptake and to understand its impact on the global ocean and climate. This will be achieved through the following objectives:

1. Describe and understand the time- and space-varying evolution of basin-wide heat content in the Indian Ocean using a control volume.

2. Quantify upper ocean heat transport into and out of the Indian Ocean in the Indonesian Throughflow outflow passages (Lombok, Ombai and Timor) and the Agulhas Current, and determine their overall contribution to the upper Indian Ocean heat content budget.

3. Define the role of air-sea interaction in the Indian Ocean's heat budget to understand its contribution to the Indian Ocean's heat gain and loss, and determine the processes that dominate the variability of these air-sea interactions.

4. Investigate the performance of numerical ocean models at simulating Indian Ocean heat content distribution and change, in order to elucidate the processes driving the observed variability and trends.

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.Please state the specific issues and questions addressed by your project in the context of the IIOE-2 Science Plan themes and key issues.

THE INDIGO project aims to address the first question from the IIOE-2 Science Plan relevant to the Indian Ocean circulation and climate variability: How has the atmospheric and ocean circulation of the Indian Ocean changed in the past and how will it change in the future? Thus, the INDIGO project corresponds best with Science Theme 4: Circulation, Climate Variability and Change.

The overarching objective of the INDIGO project is to describe and quantify the evolution of the heat uptake in the Indian Ocean up to decadal time scales. To carry out this goal, the project aims to build on a range of existing observational data frameworks (such as automated profiling floats from the International Argo program, hydrographic data from GO-SHIP, drifters, and moored buoy arrays) and incorporate novel targeted field campaigns to create a new, high-quality and comprehensive gridded dataset for analysis of the upper (2000 m) Indian Ocean. This dataset will be used to describe and quantify the evolution of Indian Ocean heat content in the last decade and to map the influx of heat into the Indian Ocean basin from the Indonesian seas, its transport across the Indian Ocean, and its exit in the Agulhas Current. Directed field

campaigns will be executed to provide measurements in a region that bears critical importance to Indian Ocean warming: the Indonesian Throughflow. Specifically, transport from the ITF outflow passages will be measured to estimate the contribution of the ITF directly into the Indian Ocean basin. Thus, the field experiments will focus on the source of heat transport from the ITF outflow passages, Lombok, Ombai and Timor, with the aim of quantifying the heat transport leaking in from the Pacific Ocean and investigating its variability and trends over the last decade. The new observations will then be incorporated into the new gridded dataset providing integral monitoring and insight into the evolution of the heat gain and loss in the Indian Ocean. These new measurements will provide critically needed data in regions that are currently understudied and under-sampled.

The new gridded product and the resulting analysis from the first two objectives will then be used to examine forcing mechanisms for Indian Ocean heat content variability. In the next component of the project, fluxes from reanalysis data products will be used to determine the role of air-sea interaction vs. advective processes to understand which is the largest contributing factor to the Indian Ocean's heat sink (objective 3). Finally, ocean state estimates will be used to resolve uncertainties in the results from the new gridded products and to understand Indian Ocean heat variability and impact on the climate system. The combined work packages described here will be integral in resolving components of the global heat budget, which is essential toward understanding and predicting global climate variability.

5. INTERNATIONAL COLLABORATION(S):

Is the project part of a related multi-national activity? **YES/NO. Not explicitly, but this project has partnerships with collaborators from the USA, the UK, and Indonesia.**

If No, would you welcome international collaboration in your project? **YES/NO**

6. REGION(S) OF STUDY

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).

The tropical upper Indian Ocean.

6. TIMETABLE OF THE PROJECT

Start date: 01/09/2018	End date: 31/08/2023

7. LINKAGES WITH OTHER PROJECTS / PROGRAMMES / INITIATIVES

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

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

TBD.

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

8. DATA MANAGEMENT AND SHARING

1. Will new data be collected as part of this project (yes or no?

Yes. After a standard period of principal ownership of the data, to allow for first analysis and publication, the data from the INDIGO project will be made available to collaborators. It is expected that linkages will be made between the British Oceanographic Data Centre and the IIOE-2 portal (the data and information management unit out of Hyderabad, India) to ensure full data sharing.
Metadata, however, will be made available in real time through the IIOE-2 metadata portal.

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.

   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.

The British Oceanographic Data Centre. Specific contact details to be provided at a later date.

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.

TBD

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.

The INDIGO proposal is to be submitted 03/10/2017 to the NERC Independent Research Fellowship (IRF) scheme. The NERC IRF is a prestigious and independent fellowship scheme targeted topromising early career scientists toward the development of their scientific leadership. If granted, 5 years of funding are provided to the fellow to support their research programme and to establish international recognition.

As the INDIGO project is entirely Indian Ocean based, the benefits from IIOE-2 endorsement are as follows:
-The support/endorsement of the IIOE-2 community will lend credence to the proposal
-The project will benefit from the IIOE-2 connections and its scientific community through the exchange of ideas and data sharing

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.

Dr. Alejandra Sanchez-Franks