

Project Endorsement Form

1. PROJECT TITLE

Full title	Dust Stimulated Nitrogen Fixation in the Arabian Sea – an assessment of HNLC region hypothesis
Acronym	DUSTNIF
Website	-
Keywords (up to 10, describing the project research)	N ₂ fixation, Biogeochemistry, Primary Production, HNLC, Iron, Phosphate, Upwelling, Arabian Sea
New initiative or continuing programme?	New Initiative

2. APPLICANTS

Lead applicant / Project Leader / key research contact person:

First name	Arvind
Last name	Singh
Affiliation	Physical Research Laboratory, Ahmedabad
Postal address	Geosciences Division, Physical Research Laboratory, Navrangpura, 380 009, Ahmedabad, India
Country	India
Telephone	+91 79 2631 4153
Email address	arvinds@prl.res.in
Institutional or personal website	www.prl.res.in/~arvinds

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.

IIOE-2 Joint Project Office (JPO)

Perth Australia Node
IOC Perth Programme Office
c/o Commonwealth Bureau of Meteorology
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3. ABSTRACT– Brief description of the project: (1/4 page maximum)

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

The oceans act as a major sink for anthropogenic CO₂ through primary production. Though the Arabian Sea (area ~6.2 × 10⁶ km²) covers only about 1% of the global ocean surface but contributes up to 5% of the global marine primary production², partly due to high influx of ‘new’ nitrogen via diazotrophic N₂ fixation. Iron, whose main source in the ocean is atmospheric transport of dust, is an essential nutrient for sustaining N₂ fixation. Despite being in the vicinity of the *Thar* desert on the east and the *Arabia* desert on the west, the Arabian Sea has been recently hypothesized to be an HNLC (high nutrient low chlorophyll) region (Naqvi et al., Biogeosciences, 2010).

One of the most spectacular biological phenomena is the occurrence of annual spring *Trichodesmium* blooms in the Arabian Sea. There is a north-south gradient in dust deposition. We hypothesize (i) that this gradient plays a major role in *Trichodesmium* distribution, and (ii) the HNLC region could be limited just to the south Arabian Sea. In order to test our hypotheses, this project aims a comprehensive study of N₂ fixation rates, chemical characterization of the dust and sea water, primary production and community structure analysis along the three transects in the Arabian Sea during April 2017 onboard FORV *Sagar Sampada* (cruise already allotted) and on a couple of cruises in coming years.

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.

My project matches well with theme 6 (Unique geological, physical, biogeochemical, and ecological features of the Indian Ocean). The Arabian Sea is unique basin where Nitrogen loss and gain processes co-occur. Expansion of oxygen minimum zones are going to affect these N cycle processes in a complex way. Nitrogen loss might increase in future and N₂ fixation can increase – as diazotrophy flourishes in low oxygen waters. Although my this project just aims to understand the role of dust on N₂ fixation, but my upcoming projects will address (i) the role of N:P stoichiometry on N cycle (ii) role of upwelling (less oxygenated) waters in N₂ fixation (iii) fate of nitrogen cycle when ocean is acidifying. All my objectives will contribute for theme 6 of IIOE-2.

5. 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 a figure as an addendum to your proposal).

I will lead this cruise during 15 April – 5 May 2017 onboard FORV *Sagar Sampada* in the central Arabian Sea (embarking and disembarking point: Goa). I have already a team of 8 persons and 7 berths are still open if any of our Early Career Scientist Network (ECSN) group members of IIOE-2 want to join. I am focusing on ECSN as I am already part of this group and have close interactions with this group. My future cruises will be in the western and eastern Arabian Sea, and the Bay of Bengal.

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6. TIMETABLE OF THE PROJECT

Start date: 1 January 2016	End date: 31 December 2020.
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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:

At the moment, it is not part of national or international activity (formally), but I take consultations from researchers of my field informally. Before we start the April cruise, I believe it would have become national project. With IIOE-2's endorsement, it has potential to be an international programme.

Is your project part of, or affiliated to, another SCOR, IOC or IOGOOS activity or project?

If "yes", please indicate which activity or project:

No

8. DATA MANAGEMENT

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

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.

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. Arvind Singh, PRL Ahmedabad, Email: arvinds@prl.res.in, Phone: +91 79 2631 4153

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.

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Already funded. Funding Source: 1. INSPIRE faculty funded from the Department of Science & Technology (DST), India 2. Institute funding from Physical Research Laboratory, Ahmedabad (Department of Space), India 3. Cruise will be funded by Ministry of Earth Sciences (MOES), India

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.

Biogeochemistry is an interdisciplinary subject hence requires expertise from all the oceanographic field. To have a holistic knowledge of the ocean biogeochemical cycles, collaboration is utmost importance. From IIOE-2's endorsement, this project will get international recognition and reputable researchers might join the project at some stage.

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.

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