

Project Endorsement Form

1. PROJECT TITLE

Full title	Geology and Geophysics of the Eastern Indian Ocean (geodynamics, tectonics and evolution of unique intraplate features)
Acronym	G&GEIO
Website	
Keywords (up to 10, describing the project research)	seafloor spreading, lithosphere, magmatism, sediments, intraplate deformation, Ninetyeast Ridge, Kerguelen plume
New initiative or continuing programme?	new

2. APPLICANTS

Lead applicant / Project Leader / key research contact person:

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

First name	Yulia
Last name	Marinova
Role in the project	scientific researches and administrative work
Affiliation	P.P. Shirshov Institute of Oceanology Russian Academy of Sciences
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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)

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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.

Eastern Indian Ocean is characterized by numerous peculiar geological and geophysical phenomena and highly complex tectonics. Numerous unique geological features, such as volcanic intraplate aseismic rises (Ninetyeast Ridge, 85°E Ridge, Afanasy Nikitin seamount and others) as well as exclusive Intraplate Deformation Area to the south of India were aroused due to several critical reconstruction of plate kinematics after the breakup of Gondwanaland in the Early Cretaceous. Origin and evolution of all of them are generally enigmatic till now. Origin of the deepest Indian Ocean Geoid Low m south of Sri Lanka is also not clearly known yet. The project study aims to understand the regional geologic structure and tectonics to understand the evolutionary process. The different approaches of analyses add to the understanding of the peculiarities of bottom topography, tectonics, faulted and folded deformations, anomalous geophysical fields and character of magmatism and geodynamics in the Eastern Indian Ocean. The main fundamental problem of the project within the framework of the specified problem is study of the Ninetyeast Ridge - the longest linear bathymetric and the most enigmatic feature in the Indian Ocean and a unique recent oceanic intraplate deformation zone characteristics including the highest oceanic intraplate seismicity and thermal flow. Structure and evolution of lithosphere of the Eastern Indian Ocean, which in respect to formation and history of development is one of the most uncertain and debatable regions of World Ocean.

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.

Theme 4: Circulation, climate variability and change. Identification of main events altered regional sediments structure as well deciphering of geological history documented in the sedimentary section allow to specify characteristics of palaeoceanology, palaeogeography, palaeoclimatology, palaeoecology etc.

Theme 5: Extreme events and their impacts on ecosystems and human populations. Seismological observations in the highly seismic area in the North-Eastern Indian Ocean, where catastrophic mega earthquake off Sumatra occurred in 2004 and caused huge tsunami with more 300 000 victims, are important for forecasting of human safety.

Theme 6: Unique geological, physical, biogeochemical, and ecological features of the Indian Ocean. The project is aimed at study of unique and exclusive geological and geophysical features in the Eastern Indian Ocean - one of the most uncertain and debatable regions of World Ocean.

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).

Studying of the crust/lithosphere peculiarities and analysis of geophysical fields near large volcanic aseismic ridges and rises in the Eastern Indian Ocean: generalizations of the geological-geophysical data near of the Ninetyeast Ridge, 85°E Ridge, Afanasy Nikitin Seamounts and others revealing of its nature. Syntheses of the seismic profiling data and determine sequence stratigraphy and their geochronology as age data are available. Recognition of ages of faults patterns shall be utilized in knowing crustal processes of the

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lithosphere and structure and propose constraints on ongoing tectonics within the Intraplate Deformation Zone south of Sri Lanka. Integrate geochronological and geophysical results for understanding of kinematics of the hotspot and intraplate deformation in the area since inception. The comparative analysis of geochemical features of basalts long-living mantle plums and hotspots which accompanied with break-up of Gondwana, and definition of their contribution in modern magmatism of the Eastern Indian Ocean for an establishment of the main stages of tectonic and magmatic evolution of the lithosphere. Though the most part of this territory settles down within the single Indo-Australian plate, its different sites differ sharply under geophysical and structural characteristics. A riddle there is a nature of the Ninetyeast Ridge occupying the central position inside the plate - one of the most extended (~5000 km) linear rise in the World Ocean. It divides the Central Indian Basin and Wharton Basin, which are characterized by different tectonics and lithosphere structure. The largest geoid low in the World Ocean as well as a unique recent oceanic intraplate deformation zone is located in the Central Indian Basin. For reconstruction of a history of development of the Eastern Indian Ocean, it is necessary to reveal structure and evolution of lithosphere as well as tectonics for its each feature and to explain all of them within the same geodynamic model.

6. TIMETABLE OF THE PROJECT

Start date:	End date:
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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:

Program of the Presidium of Russian Academy of Science «World Ocean: multidisciplinary researches», Section: «Ninetyeast Ridge – magmatism, tectonics, geodynamics», project leader Dr. O.V. Levchenko; RFBR № 14-05-00395 «Structure, origin and evolution of the Ninetyeast Ridge with regarding to global problems of intraplate tectonics and plume magmatism of the World Ocean», project leader Dr. O.V. Levchenko; RFBR № 16-35-60023 «Geological history of the Ninetyeast Ridge – largest linear intraplate volcanic rise in the World Ocean», project leader Dr. Yu.G. Marinova

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.*

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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.

Yes, but small (insufficient); funding/resourcing from IIOE-2 endorsement would be significantly aid in prospects

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 SC could fund partly our participation in scientific expeditions in the Indian Ocean, for example in cruise # SO258 of RV Sonne in 2017, where we are invited.

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.

Originality of the project and expected results is caused by some factors. First, it is supposed to carry out generalization and complex interpretation of all accessible available geological-geophysical information from the Eastern Indian Ocean. As shows the analysis, the main geological-geophysical data in the Eastern Indian Ocean has been collected by different institutes till 1990. The main results for conclusions about lithosphere evolution and tectonics of this region have been received in 70-80th of the last century. Analysis, interpretation and generalization of geological and geophysical data collected in the Eastern Indian Ocean during cruises of Soviet (Russian) research vessels as well available observed data of other international expeditions and the Internet recourses are in a basis of the project. The high resolution data collected in cruise # KNOX06RR RV Roger Revelle in 2007 at participation O.V. Levchenko will be used in the project. These data provide a good covering along the Ninetyeast Ridge with geophysical surveys (detailed multibeam bathymetry, high resolution acoustic profiling, multichannel seismic profiling, magnetometry and gravimetry) from the Site 758 ODP in the north up to the Site 253 ODP in the south. The dredged samples of basalts at nearly equidistant 33 geological stations along the Ninetyeast Ridge provide with the necessary data for representative definition of geochemistry and absolute age of its volcanic rocks. Second, novelty and originality of expected results is caused by new methods developed by the project participants on processing, interpretation and the analysis of observed geophysical data and to the mathematical modeling which is carried out on their basis, including the original approved computer programs. Original modern methods of the geochemical and isotopic analysis of magmatic rocks will be applied also.

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2nd International
Indian Ocean
Expedition
2015-2020



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