



2021 United Nations Decade  
2030 of Ocean Science  
for Sustainable Development

## Call 2023-1.2

### Call for expression of interest to evaluate the potential of early warning signals to assess deep-sea ecosystem resilience

#### I. Context

1. At its first meeting, the Board of the ISA Partnership Fund endorsed the proposal to allocate some funding for the commission of a **feasibility study on the potential of early warning signals to assess deep-sea ecosystem**.
2. Early warning signals are statistical indicators that can help detect loss of resilience in ecosystems. As ecosystems approach so-called tipping points towards critical transitions, the loss of their stability is reflected in an increase in those early warning signals. Early warning signals are calculated on long time series of different ecosystem parameters.
3. The assessment of the resilience of deep-sea ecosystems is extremely valuable as it could entail a possible early detection of stability loss and impending critical transitions.
4. Early warning signals have been effectively applied to a variety of ecosystems<sup>1</sup>. The feasibility study should contribute to assess to what extent early warning signals could be applied to deep-sea ecosystems.
6. At programmatic level such a feasibility study will contribute to two strategic research priorities of the ISA Action Plan<sup>2</sup> for marine scientific research adopted by the ISA Assembly in support of the UN Decade of Ocean Science for Sustainable Development namely:
  - Strategic research priority 1. Advancing scientific knowledge and understanding of deep-sea ecosystems
  - Strategic research priority 4. Enhancing scientific knowledge and understanding of potential impacts of activities in the Area.
7. It also aligns with key result area 2 of the Capacity development Strategy<sup>3</sup>: enhancing strategic partnerships in support of capacity development as described further below.

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<sup>1</sup> Scheffer, Marten & Bascompte, Jordi & Brock, William & Brovkin, Victor & Carpenter, Stephen & Dakos, Vasilis & Held, Hermann & Nes, Egbert & Rietkerk, Max & Sugihara, George. (2009). Early-Warning Signals for Critical Transitions. *Nature*. 461. 53-9.

N. Wouters, V. Dakos, M. Edwards, M.P. Serafim, P.J. Valayer, H.N. Cabral 2015. Evidencing a regime shift in the North Sea using early-warning signals as indicators of critical transitions, *Estuarine, Coastal and Shelf Science*, Volume 152, 2015..

<sup>2</sup> [ISBA/26/A/4](#)

<sup>3</sup> [ISBA/27/A/5](#)

## II. Strategic objective and study design

8. The main objective of the feasibility study is the potential assessment of the resilience of deep-sea ecosystems with a view to increasing the scientific understanding of their stability over time linked to possible environmental changes in the Area and (in the long term), inform relevant discussions for the protection and sustainable use of areas beyond national jurisdiction.

9. Therefore, the feasibility study should enable the assessment of the potential application of early warning signals to deep-sea ecosystems. To that end, a three-tiered approach will be followed and include a cross-cutting capacity development component.

- Phase 1. Technical expert group

10. The first step the research group or consortium is tasked to form a multidisciplinary technical expert group. The composition of the technical expert group should comprise different disciplines (database managers, modellers, oceanographers, ecologists with experience in the application of early warning signals) needed for the successful completion of the feasibility study.

- Phase 2. Data synthesis and review

11. In this phase DeepData database will be screened for long time series to identify relevant ecosystem parameters. The calculation of early warning signals depends on the quality and the length of the available time series. Longer time series are the best candidates. Time series could consist of parameters on variables characterizing biological communities, biogeochemical parameters or physical or chemical oceanography variables. The database experts should collaborate with deep-sea scientists to facilitate the best choice of ecosystem parameters to be selected from DeepData. A rationale should be provided for the selection of the parameters. It is expected that in this phase, time series will be extracted from DeepData, reviewed, synthesized and curated for phase 3. For the feasibility study the geographic focus will be the Clarion-Clipperton Zone where data are most abundant. Database experts with collaborate with the ISA DeepData management team.

- Phase 3. Programming and modelling

12. Modeling experts will prepare the scripts to run the early warning signals on the collected time series using open-source software for example. At least autocorrelation and standard deviation should be calculated as early warning signals. Other early warning signals for example patchiness are optional. The trends of the early warning signals should be assessed as well as the statistical significance of their respective trends. During this phase feedback loops between the modelers and the deep-sea scientists are essential to ensure the appropriate interpretation of the modeling results.

- Cross-cutting capacity development phase

13. During all the phases the research consortium or team shall engage a minimum of 3 scientists from developing States. For this activity, it is an added value if experts from landlocked countries (LLDCs), least developed countries (LDCs) and small island developing states (SIDS) and especially women scientists are involved.

### III. Expected outcomes and outputs

14. The key outcome of the feasibility study will consist of the advancement of the assessment of deep-sea ocean health by assessing the resilience through early warning signals.

15. The following six deliverables are put forward:

- Deliverable 1. Produce a technical report on the time-series extracted from DeepData detailing the status and quality of biological, oceanographic and biogeochemical data in the CCZ including recommendations to the DeepData Management Team.
- Deliverable 2. Produce a report on the preliminary findings of the scientific analyses carried out. This deliverable will feed the discussion of a technical workshop that will be organised under deliverable 3. The report should include a list of figures, tables, the (R.) modelling scripts that can be used as a background document for deliverable 3.
- Deliverable 3. Organise a thematical workshop where the multidisciplinary technical expert group presents progress and engages with representatives of contractors, sponsoring States and the scientific community to discuss the results of the resilience assessment including methodologies and future approaches.
- Deliverable 4. Prepare a scientific publication on the scientific analyses of the potential of the early warning signals.
- Deliverable 5. Prepare a policy brief on the potential of resilience assessment of deep-sea to support the science-policy interface.
- Deliverable 6. Prepare a two pager on a potential follow-up project to apply the resilience assessment tools on other deep-sea areas and as tools for adaptive management.

### IV. Instructions for expression of interest

17. Expressions of interest must be submitted in English, should be concise but thoroughly and sufficiently demonstrate/provide:

- (i) that research team has the required competences and expertise in resilience assessment, big data treatment and analytics and oceanography or/and deep-sea ecology.
- (ii) that effective project methodology (max. 2 pages) will be followed including for all the phases specified above.
- (iii) CVs for each proponent.
- (iv) a detailed budget for the implementation

18. Proponents must complete and submit Annex A.

19. Proponents are to send requests for clarifications and the documents in support of the expression of interest no later than ~~14 September 2023~~ **30 September 2023** via email: [isapf@isa.org.jm](mailto:isapf@isa.org.jm).

20. It is the responsibility of the proponent to ensure that the necessary documents reach ISA on or before the deadline.

21. ISA implements a zero-tolerance policy on fraud and other proscribed practices, including corruption, unethical practices and obstruction. ISA is committed to preventing, identifying and addressing all such acts and practices against ISA and third parties involved in its activities.

22. ISA requests that every proponent prevents and avoids conflicts of interest by disclosing clearly to ISA any involvement or possible conflict of interest. The ISA Secretariat reserves the right to ask one or more applicants to merge their proposals for the delivery of the project.

#### **V. Timeline**

23. Expressions of interests shall be communicated to ISA by **30 September 2023** and will be thereafter evaluated by a selection committee. Selected proponents will be required to sign a consultancy contract, stick to the general conditions of contracts for the services of consultants and individual contractors and sign a non-disclosure agreement. All proponents will be informed about the outcome of the selection. Selected proponents shall commit to be able to process phase 1 of the feasibility study by the last quarter of 2023.

#### **IV. Eligibility criteria**

24. Proponents should meet the following eligibility criteria:

- (i) A track record in the required domains of expertise described above.
- (ii) A minimum of 5 years of proven previous professional experience in modelling, deep-sea ecology, big data analytics and resilience assessment
- (iii) Excellent written and oral communication skills (English).
- (iv) Good level of familiarization with the work of ISA is desired.
- (v) Ability to deliver outputs against tight deadlines.

#### **VII. Budget**

25. The budget allocated by the ISAPF to carry out the resilience feasibility study is 55,000.00 USD. This amount could be adjusted on the basis of the final contract and specific deliverables agreed.

## **VIII. Monitoring**

26. As the administrator of the Partnership Fund on behalf of the donors, ISA will enter into a contract with recipients consistent with the purposes of the ISAPF and on the terms and conditions set forth. The ISA Secretariat will be responsible for the supervision of the activities and deliverables carried out as per the term of the contract.

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to assess deep-sea ecosystem resilience**

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**ANNEX A – PROPONENT INFORMATION FORM**

Date: (day, month, year)

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1. Full name:
2. Legal address:
3. E-mail address:
4. Provide detail on a minimum of 5 years of proven previous professional experience in the scientific domains relevant to the call (max 300 words).
5. Provide detail on good level of familiarization with the work of ISA (max 300 words).
6. Confirm that the expression of interest comprises: <input type="checkbox"/> A proof minimum of 5 years of proven previous professional experience and track record in modelling, deep-sea ecology and big data analytics as per paragraph 10 of the Call for expression of interest <input type="checkbox"/> Effective project methodology (max. 2 pages) for the phases specified in paragraph 10, 11 and 12 of the Call for expression of interest <input type="checkbox"/> Detailed budget detailing the implementation of the different phases to achieve the outputs <input type="checkbox"/> Curriculum vitae of the proponent(s) <input type="checkbox"/> Copy of national ID passport(s)
7. Provide any additional information considered key in meeting/exceeding the requirements:

8. Are there any indicting circumstances of which the ISA should be aware?

Please provide details:

**DECLARATION**

By submitting this application, I confirm that I am able to commit to the terms and conditions set out in paragraphs 2, 3, 4 and 5 of the Call for expression of interest.

I acknowledge that the personal information supplied to ISA is done voluntarily to facilitate the processing of this application. I furthermore acknowledge that the information provided by me, is to the best of my knowledge both true and correct, and any incorrect or inaccurate information or documentation submitted may adversely affect the processes my application.

10. Date and Signature: