Sargassum 2 Joint call 2021: Understanding and predicting Sargassum Blooms

1. General background of the call

Before 2010, the brown algae *Sargassum* only bloomed in the tropical North Atlantic in the Sargasso Sea, while they have recently been observed off the Brazilian coast, down to the Mexican coast and throughout the whole Caribbean Sea. On the Western side of the Atlantic Sargassum is blooming on the African coastline from Sierra Leone to Ghana, thereby creating the so-called '*Great Atlantic Sargassum Belt*' (GASB) with some continuity between the Eastern and Western parts. The reasons for the increasing incidence of blooms are not fully understood and need further investigations. For the Caribbean and the American coastlines, the hypothesis of Amazon nutrients in relation with deforestation and agricultural intensification driving *Sargassum* blooms is still under discussions and subject of controversies. In addition, the proposed influence of climate change on hydro-dynamical conditions in the equatorial zone including possible changes of wind drift patterns and shifts in precipitations are not sufficiently elucidated in relation to the recent increase and the geographical changes of GASB.

The large influxes of *Sargassum* seaweed currently affecting the Caribbean and Americancoastlines worsened markedly since 2011, with 20 million tons of *Sargassum* in 2018 and with a GASB of more than 8800km long. The economic impact of *Sargassum* accumulating on beaches and coastlines can be counted in millions of euros, especially in the tourism and fisheries industry. Moreover, the associated emissions of hydrogen sulphide (H2S) and ammonia (NH3) have a significant effect on the health of coastal residents. Major marine ecological impacts have not yet been reported.

Improving the management of *Sargassum* influxes urgently requires a better and more detailed comprehension of the hydro-dynamical conditions in the region. This knowledge will provide a solid basis for understanding and predicting *Sargassum* occurrence and its inter-annual variability in the GASB. These topics form the central theme for the present joint call.

The joint call will support collaborative international research and development projects that will (1) foster our understanding of the reasons behind the increase in *Sargassum*–blooms, (2) allow for the elaboration of management strategies for the medium and long term and (3) create a scientific basis for informing local decision makers who are responsible for mitigating the impact of *Sargassum* through innovative, cost-effective solutions. This call will support joint initiatives from different countries, including regional authorities and institutions from Caribbean islands and the American region with the aim of gaining a better understanding of the causes of *Sargassum* blooms in order to improve forecasting and mitigation of these harmful events.

Funding will be available thanks to the funding partners from France (ANR), Brazil (FACEPE), Mexico (CONACYT), and the Netherlands (NWO).

2. Scientific Framework

The main goal of the call is to stimulate research and innovation projects carried oud by scientists from the Caribbean region, from mainland France, Mexico, Brazil and The Netherlands. Other countries like the USA and partners from Africa are welcome to join the projects on their own costs. The results are expected to increase our knowledge of *Sargassum* bloom events, further the understanding of their causes and origins and increase their predictability. Important features to be considered include for instance:

- the geographic and genetic population structure of the *Sargassum* floating banks between Africa to American coast;
- the role of nutrient inputs from large rivers such as Niger, Congo or Amazon for stimulating *Sargassum* blooms in comparison with the Eastern and Western upwelling;
- the role of climate change for modifying the equatorial hydro-dynamics patterns such as the North Equatorial Current, South Equatorial Current and their trajectories.

Modelling exercises should be directed towards the following topics:

1) Development of a **common data set** to feed the different hydrodynamics models with:

- High resolution sea bed mapping of the Caribbean regions;
- Develop a set of indicators on abundance of *Sargassum* in the region for the last decade with tracers of *Sargassum* origin like isotopic markers, trace metals, genetic markers;
- Inventory of satellites images for tracking the *Sargassum* banks for validation of trajectories planed by the models and development of assimilation technics;
- Identification of hydro-dynamical models available and comparison of the accuracy of residual trajectories for middle term duration (several months).

2) **Biological *Sargassum* model** for coupling: this process should involve mechanistic models informed by input of *Sargassum* biology such as growth rates and population dynamics in relation to relevant biotic and abiotic factors using appropriate physiological, biochemical, morphological, demographic techniques. Bloom-increasing factors, such as nutrients or metals.

3) **Development of an integrative model** coupling hydro-dynamic features with the biology of *Sargassum* in order to explain the variability of *Sargassum* events during the last decade. Occurrence, accumulation of *Sargassum* banks, their trajectories in the open sea will be outputs of the model and can be validated by tracking the algal banks with satellites, Argos buoys, in situ observations. Sensitivity to metrological conditions should also be incorporated.

The results from the models are expected to help the design of the strategies of mitigation and improve the use of the innovative solutions. In order to accomplish this, the models should:

- provide reliable information on the expected yearly quantity of *Sargassum* along coasts and/or washed up shorelines;
- be supported by appropriate reliability indices;
- be made available as ready to use open sourced web-based tools (if possible);
- contribute to improving the reliability and precision of existing *Sargassum* forecasting tools.

3. Procedures and criteria

Details for applicants are given in Annex 1 (Instructions for Proposals) including the submission forms to be filled out and submitted online to the **ANR submission site (see webpage)**.

Please remember that proposals will be assessed by an interdisciplinary panel of reviewers. Therefore applications should be easily understandable. Peer reviewers and the members of the expert panel will be chosen to cover the breadth of the call topic. Applications should be prepared to demonstrate how the project will increase synergy between teams across countries and how such a collaboration adds value to the research that could be done nationally.

Each partner of a proposal has to select the requested funder and verify its eligibility in relation with the guidelines in the relevant National Annex.

3.1.Eligibility

The call is open to proposals that meet the following criteria:

3.1.1. Global requirements

Applications must be submitted is English.

Applications must be submitted complete by the deadline, and meet all formal requirements set in the call (see additionally ANNEX 1: "Instructions for Proposals").

Each collaborative proposal must involve applicants from at least two different countries participating to the call and eligible for funding. Co-applicants from the same laboratory, research unit or university cannot be considered as different partners, even if they are located in different territories

If a partner is found ineligible in light of the specific eligibility criteria of the funding organization from which it seeks support, the entire application may be rejected without being evaluated or further evaluation.

3.1.2 Coordination

The lead PI (LPI) is the PI that coordinates the project and submits the proposal, he/she must be eligible for funding. A person is allowed to be LPI of one proposal within this call and can be involved as partner in a maximum of one more proposal. A person can be a partner in two proposals without being the LPI.

Each consortium submitting a proposal shall specify the selected topic(s) and the requested funding shall not exceed the indicative budgets of the funding partners guidelines.

3.1.3 Requirements for collaboratives projects

A one-stage procedure (i.e. only full proposals, no pre-proposals) for joint applications will be followed.

In-kind contributions from third parties / countries will be welcome. Researchers or research teams who are willing to contribute in kind to the proposed project will be considered part of the consortium and they will be requested to sign the consortium agreement. They should be mentioned in the proposal and they should provide a letter of support from their organization.

At the end of the first eligibility check, projects whose partners have been declared ineligible by the funder they are applying for are informed by the call secretariat and given the opportunity to remedy the factors leading to ineligibility within a given timeframe (48h). **Only administrative corrections are allowed**.

3.2.Evaluation Criteria

Proposals found eligible will be evaluated by scientific and technical experts (Scientific committee) according to the following scientific and technical criteria. The 3 main criteria will be given equal weight. Each of the 3 main criteria will be rated and given a grade from 0-5 (see appendix). The sum of the 3 grades must at least be 11 to pass the threshold of being fundable:

Scientific and technical quality of the proposal:

- Scientific excellence in terms of progress of knowledge with respect to the current state of the art, conceptual breakthrough including methodology;
- Innovation level of the project and methods, multi- and interdisciplinary approach;
- Integration of the different disciplinary fields;
- Inclusion of relevant societal and ethical aspects.

Quality of the consortium and feasibility:

- Quality and international competitiveness of participants in the field(s) of the project proposal;
- Quality and efficiency of the project management;
- Quality of the consortium and collaboration;
- Feasibility of the project – human, technical and financial resources: adequate work package structure and work plan; adequate equipment and manpower resources; quality of the coordination plan;
- Cost-efficiency of the project plan compared with the budget. Appropriateness and justification of the requested funding, justification of investments and equipment purchases, justification of the other financial items;
- Probability of success of the project based on description of risks and the contingency plan.

Impact:

- Scientific impact
    - Dissemination activities and expected impact for end users: strategy for knowledge transfer and for exploiting the potential of the project results;
    - Potential for utilization or integration of the project results by the scientific, industrial or societal stakeholders; impact of the project in terms of knowledge acquisition;
    - Openness to stakeholders.
- Expected impacts in terms of capacity building
    - Mobility and/or training actions; direct involvement of regional (i.e. Great Caribbean) scientists, students, institutions;
    - Education initiatives/courses on new identified skills/to fill an educational gap
    - Specific initiatives (e.g. on-field training) linking human capacities and research infrastructures;
    - Actions supporting jobs, including non-academic, in concerned sectors.

3.3.Funding and duties of funded project

Each eligible partner will be funded by the relevant funding organisation according to the Terms and conditions set for this call by this organisation (see national appendixes).

Funded partners will report administratively to the funding organisation from which they receive funding according to their relevant "Terms and conditions" and scientifically to the Call Secretariat of the Sargassum 2 Joint call. Funded projects will have to fill in a mid-term and a final scientific report, according to a format forwarded to them by the Call Secretariat. Additionally, the coordinators of the funded projects must attend 3 meetings (kick off meeting, mid-term and final monitoring meetings), which will take place either online or in the Caribbean region. Costs necessary to attend these meetings may be included in the budget requested by each partner, subject to the eligibility of these costs according to the Terms and conditions of the relevant funder, as available on the webpage of the call : https://anr.fr/Sargasses-2

Each project will be required to provide a consortium agreement within 6 months of the project launch.

4. National Guidelines and National Contact Points (see annex 2-6)

1. Indicative timetable

Action	Scheduled
Launch of the Call	**November 23th, 2021**
Deadline for submitting project proposals	**June 3rd, 2022**
Eligibility check by Call Secretariat and NCPs	**June 15th, 2022**
Rebuttal by applicants to the reviews	**September 2022**
Scientific committee (meeting)	**September 2022**
Funding decision (meeting)	**September 2022**
Notification letters	**October 2022**
Contract negotiation	**October 2022**
Kick-off meeting	**January 2023**
Start of projects	**January 2023**

The Call will be announced on the websites of the different funding partners as **SARGASSUM**

2 Joint Call

List of annexes available on : https://anr.fr/Sargasses-2

Annex 1: Sargassum Joint call: Instruction for Proposals

Annex 2: Guidelines ANR

Annex 3: Guidelines NWO

Annex 4: Guidelines FACEPE

Annex 5: Guidelines CONACYT