RÉPUBLIQUE FRANÇAISE
*Liberté*
*Égalité*
*Fraternité*

CNES
CENTRE NATIONAL D'ÉTUDES SPATIALES

20 February 2025

DS/D-2025-1005

**Creation of the "Space4Ocean Alliance"**

**Notice: The document is structured in 2 parts:**

- **i) A short Concept Note describing the concept of the Space4Ocean Alliance,**
- **ii) A Project Note providing the essential information about the issues, objectives and steps of the Space4Ocean Alliance Project.**

## i. Concept note

### Executive Summary

Recognizing the importance of the ocean for life and sustainable human presence on Earth, as well as the opportunity to benefit from data collected around the world by the space sector, the French space agency CNES ("National Center for Space Studies"), proposes to build the "Space4Ocean Alliance" (S4O) to be launched during the third United Nations Ocean Conference (UNOC)[1], leveraging this event to foster international collaboration. This Alliance aims to connect the space sector and the marine, maritime stakeholders, in order to contribute to the preservation, conservation and protection of the ocean.

Through innovative space technologies, observation data, and dedicated monitoring tools (both services and products), the S4O Alliance intends to best support countries, especially those at the frontline, to collectively contribute to the global relevant UN and other policy frameworks, including Sustainable Development Goals (SDG). To reach this ambitious goal, the S4O Alliance aims to convene and reach consensus between multiple sectors on priority needs, by leveraging the full capacity of Earth Observation, by identifying missing observations and operational services that could be provided by the space community, with support from other stakeholders.

This paper aims to define the concept of the S4O Alliance with the following objectives:

- Connect the space sector, marine, maritime and other relevant stakeholders,
- Better respond to needs and priorities for an improved management of the ocean and coastal areas;
- Advocate for implementation of innovative space missions to fill observation gaps;
- Share good practices, promote access to ocean observations (e.g. satellite or in-situ data, models and their joint use), propose proven operational applications and strengthen the underpinning ocean science for the development of tailored services;
- Develop capacity building actions and training initiatives for the benefit of ocean stakeholders both in terms of data access and operational services, especially in

[1] June 9-13 2025 in Nice, France

frontline countries such as the Least Developed Countries (LDCs) and Small Island Developing States (SIDS);

- Inform the state and health of the marine environment through the development of local and global ocean indicators to be considered by appropriate organizations and to be used by decision makers.

To achieve these ambitions, the Alliance will build on and complement existing initiatives without duplicating them. The initiative will also rely on the United Nations Office for Outer Space Affairs (UNOOSA) and on its capacity to stand for as a gateway between the international space community and broader UN entities and their Member States.

.

A steering committee will be in charge of following up on the progress and impact of the Alliance, to be reported annually.

The Alliance is not meant to be a legal nor a financial entity.

Stakeholders will have the opportunity to join the Alliance by signing a joint declaration of interest at UNOC3.

## ii. Project Note

## The Space4Ocean Alliance (S4O Alliance) proposal

### A. Rationale

1. The ocean, our world's largest biosphere, covering 71% of our planet's surface, is currently at high risk. Over three billion people depend on marine and coastal resources for their livelihoods. The state of the ocean urgently requires decisive, rapid and unified efforts to remedy its critical condition.
2. Monitoring the ocean is inherently challenging due to its vastness and constant motion. Oceanography and Earth Observation from space are invaluable assets in addressing oceanic and coastal challenges.
3. Recognizing:
    - a significant lack of coordination and communication between the space sector and marine and maritime stakeholders.
    - several gaps in addressing ocean challenges, such as:

        - Data usage ;
        - available applications to meet user needs;
        - assessments and assessment indicators;
        - space missions providing all necessary data,

    The Space4Ocean Alliance initiative is therefore proposed.

4. The United Nations Ocean Conference provides a unique opportunity to bring together the marine and maritime stakeholders and the space sector to promote the use of space-based solutions.

    For more background information, see Appendix I.

### B. Scope

5. The Space4Ocean Alliance will build a bridge between the space sector and marine, maritime stakeholders to fully harness the potential of space, bringing it to a greater number of users facing ocean and coastal challenges.

6. The Space4Ocean Alliance aims to operate as an international consultation mechanism and platform for expert-level and high-level exchanges. The Alliance will coordinate and create more synergies between actors, to avoid overlaps and get a larger impact.

## C. Objectives

7. Relying on existing upstream and downstream initiatives while filling the gaps, the S4O Alliance has the following core objectives:

    a. On the coordination front:
        i. to provide and improve a permanent dialogue between the international space sector and the global ocean community (e.g. in charge of in situ observation capacities, modelling, prediction, projections and services), under an appropriate format, to identify and discuss needs and priorities;
        ii. to provide a gateway between the international space sector and UN Member States to enable the use of space solutions and best support national needs and priorities to reach international policy targets;
        iii. to facilitate access to space data and operational services, especially in LDCs and SIDS;
        iv. to develop capacity building actions and training initiatives for the benefit of marine and maritime stakeholders both in terms of data access and operational services.

    b. On the upstream[2] segment:
        v. to gather common observational needs that ought to be addressed, notably through innovative Earth-observation space missions and applications or services dedicated to the ocean to fill data gaps and complement in-situ observing networks;
        vi. to strengthen and increase the capacity of the space community to address more operational needs and the science underpinning such services by covering more and more precisely the main essential variables of the ocean;
        vii. to increase, facilitate and communicate on space data access for all related to ocean observation.

    c. On the downstream[3] segment, to leverage the use and performance of space technologies, products (data and information), services and applications for the preservation and sustainable use of our oceans by:
        viii. on a voluntary basis, supporting the co-development of ocean services by Alliance Members;
        ix. facilitating a sustainable balance between anthropogenic maritime activities by defining and producing indicators scalable in space and time, with partners;
        x. monitoring the performance and quality of space data to assure adequacy in the operational and scientific application domains.
        xi. strengthening capacities of access to and application of space data, relying, where possible, on already existing technologies, products, services and applications;
        xii. through consultation reach consensus on priority data service needs from maritime sector and stakeholders, seek to fulfill through space and in situ partnerships;

[2] The **upstream** segment encompasses data capture, representing the scientific and technological foundations of space programs.

[3] The **downstream** segment represents the space infrastructure operations, in situ measurements and "down-to-earth" products and services that directly rely on satellite data and signals to operate and function.

xiii. providing evidence-based information only available from space to help national and local communities engaged in current and future challenges of ocean preservation;
xiv. striving to understand both the surface ocean signals measured from space and the relationship to the ocean at depth using advanced approaches based on in situ and ocean modelling tools.

d. To submit recommendations coordinated with the space community in UNOC Declarations.

8. A priority is identified on the co-development and operational use of space applications for countries that do not have space capabilities and/or enough resources or scientific expertise - in particular Least Developed Countries and Small Island Developing States.

9. Key issues to be addressed are:
   a) Ocean biodiversity protection: improved monitoring of Marine Protected Areas (MPA),
   b) Climate Changes impacts on Oceans, including Natural Disasters / extreme event,
   c) Sustainable Blue Economy (including Sustainable fishing, aquaculture, Marine renewable energy, tourism, decarbonization of maritime transport…) and Ocean governance,
   d) Marine and coastal pollution,
   e) Coastal zone management,
   f) Maritime Security and Surveillance, (including Illegal fishing and Unreported and Unregulated activities),
   g) Performance and gaps of earth observation data for ocean applications,
   h) Foundation ocean science generating the knowledge and experience necessary to implement operational services in support of stakeholder needs.

10. Overall, the Space4Ocean Alliance intends to contribute to the achievement of the global policy frameworks such as: Convention on Biological Diversity (CBD) (1992), , Global Biodiversity Framework (GBF), UNCLOS Agreement on Marine Biodiversity of Areas Beyond National Jurisdiction (BBNJ), 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDG) (2015).. Notably, in addition to SDG 14, which aims to conserve and sustainably use the oceans, seas, and marine resources for sustainable development, the S4O Alliance aligns with five other SDGs (2, 6, 12, 13, 17) and their targets.

11. The proposed governance of the Alliance is presented in Appendix 2

12. The roadmap to UNOC is presented in Appendix 3

13. An Implementation Plan is proposed in Appendix 4

## D. Anticipated potential deliverables

a. Requirement document (to be updated on a 3-year basis, at the rhythm of UNOC conferences)

b. Roadmap to fill observation gaps (to be updated on a 3-year basis, at the rhythm of UNOC conferences)

c. Roadmap to fill operational services gaps (to be updated on a 3-year basis, at the rhythm of UNOC conferences)

d. Package for a strategic promotion of EO for ocean science and operational services at international level

e. Package for capacity building

# Appendix I. Background information

## A. Ocean: our last natural environment on Earth, currently at high risk

1. The ocean covers 71% of the Earth's surface It represents the world's largest biosphere. It absorbs about 30% of the world's CO2 emissions and about 90% of the heat generated by these emissions. It is a vital element for life on Earth.
    - The ocean provides essential ecosystem services for humanity (food, energy, transport, communications, coastal attractiveness, etc.). It is acknowledged that these activities must be carried out while maximizing all efforts to limit further anthropogenic pressures and mitigate their impacts on the marine environment.
2. The ocean is experiencing significantly increasing cumulative impact, in particular due to climate change but also but also from overfishing[4], land-based pollution and shipping […] A fundamental gap in understanding how humanity is affecting the oceans is our limited knowledge about the pace of change in cumulative impact on ocean ecosystems from expanding human activities", according to "Recent pace of change in human impact on the world's ocean, Scientific Reports, BS Halpern et al., 2019"[5].
3. Fishery resources continue to decline due to overfishing, pollution, poor management, and other factors, whereas 600 million livelihoods depend at least partially on fisheries and aquaculture: the United Nations Food and Agriculture Organization (FAO), the leading inter-governmental body in the field of fisheries, estimates 32,000 people die while fishing every year, and this is a conservative number.
4. 80% of the Ocean remain unexplored and unmapped, it is our last unexplored and natural environment on Earth and it is currently under threat.
5. Oceanography and Earth Observation from space have become major assets to understand, model, forecast and project the evolution of the ocean and coastal zones due to climate and biodiversity changes, and other anthropogenic pressures.
6. Satellite data, complemented by in situ measurements and models, enables the development of solutions that are key for designing new applications and evidence-based services dedicated to ocean and coastal challenges, particularly for frontline countries like Small Island Developing States (SIDS) and Least Developed Countries (LDCs), which have often limited resources in that regard.
7. To meet the United Nations 2030 Agenda for Sustainable Development and its Goal No. 14 (SDG 14) which aims to conserve and sustainably use the ocean, seas and marine resources for sustainable development, the space community must take a step forward by maximal leverage in the use of space data and demonstrating the usefulness of advanced space technologies in addressing societal challenges.
8. In tackling the triple planetary crisis on climate change, biodiversity loss and pollution, the ocean is key. The development of observation capabilities has the potential to further improve:
    - Environmental monitoring by providing key spatial data and information (e.g. Essential Climate Variables) for the development of the International Platform for Ocean Sustainability (IPOS) initiative (e.g. indicators) for the benefit of Ocean's health.
    - Coastal and ocean management, taking into account the anthropogenic pressures (climate change, pollution, biodiversity loss and overexploitation of marine resources) on unique coastal and marine ecosystems.

- Serving society that is living and working on and with the ocean including the Open Ocean High Seas.

## B. The 3rd United Nations Ocean Conference: An opportunity for an international momentum to strengthen marine and space communities' cooperation

9. The main **ambition of UNOC3 is to further support the implementation of SDG 14 by 2030**, based on specific objectives in terms of reducing marine pollution, protecting marine and coastal ecosystems, reducing ocean acidification, promoting sustainable fishing, increasing scientific knowledge related to the ocean, and enhancing international engagements. The state of the ocean urgently requires decisive, rapid and unified efforts to remedy its critical condition.
10. The first edition, UNOC1, took place on June 2017 at the UN headquarters in New York, United States. For this momentum, the Secretary-General of the United Nations appointed a "**Special Envoy for the Ocean", Ambassador Peter Thomson**, from Fiji, to coordinate and strengthen the efforts displayed at UNOC1. **A "United Nations Decade of Ocean Science for Sustainable Development 2021-2030" was launched as part of these efforts**[6]. UNOC1 brought together governments, the United Nations system, civil society organizations, academia, the scientific community, and the private sector, to endorse the *Our Ocean, Our Future: Call for Action* Declaration (A/71/L.74), with the aim of reversing the precipitous decline of the health of the oceans and seas with concrete solutions, while promoting progress in the implementation of SDG 14.
11. UNOC2 in Lisbon in June 2022, jointly organized by Kenya and Portugal, **issued the first UNOC Declaration mentioning space. However, this mention was limited to a data-oriented minor contribution. This showed that the space community, as a key stakeholder, is not yet taking part in the UN Ocean Conferences (UNOC) statements in a coordinated way**.
12. UNOC3 is jointly organized by France, as host country, and Costa Rica. The Conference will adopt by consensus an intergovernmentally agreed declaration, which along with a list of voluntary commitments, will be referred to as "Nice Ocean Action Plan", to which the space sector and marine communities will have the opportunity to contribute.

[6] The United Nations Decade of Ocean Science for Sustainable Development (2021-2030) mission is to generate and use knowledge for the transformational action needed to achieve a healthy, safe and resilient ocean for sustainable development by 2030 and beyond, implemented by the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (UNESCO).

## Appendix II. Proposed governance

1. The Alliance is not a legal nor a financial entity.

2. The Alliance already gathers founding members which actively contribute to the design of the Alliance with CNES: UNOOSA, NOSA (Norwegian Space Agency), Monaco Space Office, UNESCO/IOC.

3. In particular, the Alliance will take advantage of UNOOSA's central positioning in the UN System

4. The Alliance is to be open to all Members States of the United Nations, institutions in charge of international, regional or national marine, maritime or space policy, multilateral organizations, relevant public and private stakeholders.

5. Stakeholders will have the opportunity to join the Alliance by signing a joint declaration of interest during or after UNOC3 on a voluntary and non-legally binding basis.

6. A Steering Committee (SC) will be established to ensure a collaborative, integrated, effective, and decision-making approach to achieve the objectives of the Alliance, raise global awareness on the initiative and facilitate international coordination. It will have to assess the Alliance's impact using predetermined criteria and report to all members.

7. It will be made up of one representative from each signatory member of the alliance, acting as focal point. One of them, as designated by the Steering Committee, will be in charge of the Secretariat for a specific term following the official launch of the Alliance.

8. A multi-annual Implementation Plan will be designed, approved, and subsequently followed by the Steering Committee (See a proposed Implementation Plan in appendix 4). The efficient implementation of the Alliance will be defined by key performance indicators designed by the SC on both medium and long-term perspectives.

9. High-level exchanges will take place through the following formats:

    a. A Steering Committee meeting at least twice a year to oversee the advancement of the priorities and progress of the Implementation Plan identified by the Alliance with one entity per member acting as focal point.
    b. An annual event to follow-up on the Alliance's achievements and way-forward;
    c. An event dedicated to space to be organized at each UNOC by the entities steering the Alliance, with the cooperation of willing host countries.

10. Technical exchanges may occur through the organization of workshops gathering the space sector, marine and maritime communities to share knowledge and expertise, showcase projects, gather the needs and priorities and follow-up on commitments made by the Alliance at each UNOC. Those exchanges will be the opportunity to follow-up on the implementation of the technical actions of the Alliance, following an implementation plan to be drafted.

## Appendix III. Roadmap to UNOC3-2025: key milestones

- April 2024: “Space Symposium”, Colorado Springs, USA: early discussions with NASA & NOAA, JAXA, CSIRO, ISRO.
- July 2nd, 2024: **“Ocean Space Forum 2” (OSF 2),** Monaco: first public announcement of the initiative.
- July 2024: bilateral discussions with **JAXA and UAESA** and presentation to **COPUOS.**
- July 2024: presentation to the **CEOS Coast WG** whose pilots are NOAA/ISRO and CNES in way to strengthen and amplify this initiative and inform about its integration into the UNOC roadmap.
- September 17, 2024: Presentation to the **CEOS SIT** in Sydney during a side event/meeting or a plenary presentation.
- October 15, 2024: **« International Astronautical Congress” (IAC), Milano, Italy**: side event to present the initiative and the first draft of the Pledge to the space community in order to gather first expressions of interests.
- December 18, 2024: **International meeting in Paris** on the invitation of CNES to promote the initiative and gather expressions of interest.
- December 2024 – May 2025:
    - **International Pledge collective consultation and review with the space community,**
    - **Draft the joint declaration of interest,**
    - **Draft the Implementation plan**.
- March 25, 2025: Space4Ocean Alliance Coordination event co-organized by CNES and Monaco Space Office, to be held in Monaco.
- April 8-10, 2025: CEOS SIT-40 Fukuoka, Japan
  Side event to promote the Space4Ocean Alliance (*tentative event*)
- June 9, 2025: Ocean Space Forum: Towards Space4Ocean Alliance, to be held at Observatoire de la Côte d’Azur, Nice, France
- June 10, 2025: Space4Ocean Alliance Launch: Building a Sustainable Future, to be held in Nice in UNOC Blue zone, as a side event (*tentative event*), with high level representation (heads of States / ministers), participation of space agencies & Alliance members.

# Appendix IV. Proposed Space4Ocean implementation plan

### a. 2-year perspective

- Enlarge and structure the Alliance (success criteria: TBD number of new members),
- Identify user needs (success criteria: requirements document),
- State of the art of the existing services and applications responding to the identified needs
- Define ocean health indicators (success criteria: TBD),
- Identify observation gaps if any
    - Establish a roadmap to fill the gaps if any (success criteria: publication of the roadmap), including (success criteria: TBD),
        - Strategic planning of future missions including pre-development of the relevant science/business case and necessary technologies
        - Recommendation for R&D activities preparing the downstream services based on EO data
- Identify missing operational services if any,
    - Implementation of 5 operational services (success criteria: 5 operational services available),
- Strategic promotion of EO for ocean science and applications on the International stage (success criteria: TBD),
- Dedicated training on ocean science (success criteria: TBD),
- Capacity building package definition and first implementation
- Organize and coordinate the space contribution at UNOC4 (success criteria: TBD in the UNOC declaration)
-

### b. 5-year perspective

- Enlarge the Alliance (success criteria: TBD new members),
- Update user needs (success criteria: requirements document update),
- Implement the ocean health indicators and inform the community about the results (success criteria: publication of the ocean health indicators),
- Start implementing the roadmap (success criteria: to be defined in the roadmap, for example 25 projects / services developed and provided to the community)
- Assess the impact of the Alliance (success criteria: impact assessment)
- Organize and coordinate the space contribution at UNOC5/6 (success criteria: TBD in the UNOC declaration).