AIMS

Artificial Intelligence to Monitor our Seas
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SHORT ABSTRACT FOR DISSEMINATION PURPOSES

Abstract | The "Communication, Dissemination, and Exploitation Plan, Second Version" revies, updates and evaluates the strategy implemented to maximizing the outreach and impact of the AIMS project. This deliverable outlines the results of our multifaceted approach to engage diverse stakeholders, including scientific communities, industry partners, policymakers, and the wider public. Through targeted communication strategies, dissemination efforts, and opportunities for exploitation, the plan has amplified the visibility of AIMS research outcomes and fostered collaboration. This deliverable also provides an outlook of the measures to be implemented after the project end, to continue promoting its results.

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LIST OF PARTNERS

N°	Logo	Name	Short Name	City
1	Politecnico di Torino	Politecnico di Torino	POLITO	Torino
2	ROMA TRE UNIVERSITÀ DEGLI STUDI	Universitá degli studi di Roma Tre	ROMA3	Roma
3	Italian National Research Council	Consiglio Nationale delle Ricerche	CNR	Firenze

ABBREVIATIONS

Acronym	Description

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EXECUTIVE SUMMARY

The Communication, Dissemination, and Exploitation Plan for the AIMS project has served as a comprehensive framework to facilitate the effective promotion and dissemination of project activities and outcomes. This document evaluates the AIMS' strategic approach tailored to engage diverse stakeholders and maximize the impact of AIMS research. It emphasizes the importance of targeted communication strategies, tailored to the unique needs and interests of different stakeholder groups. Through proactive dissemination efforts, the plan has raised awareness of the project, shared research findings, and fostered collaboration. Sections within the document provide an overview of the project key performance indicators of the communication strategy and activities performed during the project. This plan will spillover also after the project end date, to continue valuing the project results.

1. PROJECT OVERVIEW

The AIMS (Artificial Intelligence to Monitor our Seas) project represents a pioneering effort to enhance ocean monitoring and resource assessment through the integration of diverse datasets and cutting-edge AI algorithms. With the overarching goal of advancing knowledge in artificial intelligence and remote monitoring of the ocean, AIMS brings together a consortium of leading institutions including Politecnico di Torino (PoliTO), Roma Tre University (ROMA3), and the National Research Council of Italy (CNR).

Through a multidisciplinary approach, AIMS develops innovative AI algorithms capable of effectively analysing and synthesizing data from multiple sources, including numerical models, satellite observations, and in-situ measurements. These algorithms will enable more accurate and comprehensive monitoring of ocean parameters such as wave height, period, and wind speed, thereby facilitating improved resource assessment for offshore renewable energy projects.

The project is structured into four distinct work packages (WPs), each focusing on key research milestones. WP1 is dedicated to building a comprehensive metocean dataset, while WP2 focuses on the development of AI algorithms using satellite and numerical data. WP3 involves the training and validation of these algorithms using experimental data, and WP4 oversees project management activities to ensure the smooth execution and impact of the project.

AIMS is expected to have significant implications for various sectors, including offshore renewable energy, marine environmental protection, navigation safety, and climate change research. By reducing costs and time associated with offshore monitoring, the project aims to benefit stakeholders ranging from port operators to policy-makers. Furthermore, AIMS wants to foster collaboration and knowledge exchange within the scientific community, both nationally and internationally.

1. COMMUNICATION RESULTS DURING THE PROJECT

Communication within the **AIMS** project has focused on promoting the action and its results to multiple external audiences, including the media, industry stakeholders, and the general public. These activities are designed to raise awareness of the project's general vision: utilizing Artificial Intelligence to overcome the limitations of current sea monitoring and enable a faster transition to a climate-neutral economy.

1.1 Visual Identity and Project Messaging

A central component of external communication was the development of a distinct visual identity to make the project recognizable.

- **Project Logo:** The logo was designed to graphically summarize the project's main pillars: **sea waves**, **satellites**, and **artificial intelligence**. These elements are enclosed within a "bullseye" target, symbolizing the project's primary "AIMS": achieving high-accuracy environmental monitoring.

- **Unified Messaging:** The project utilizes a strategic approach to demystify complex subjects like space-based observation and AI, fostering broader appreciation for technologies that drive climate research.

1.2 Digital Public Hub

The consortium established a permanent digital presence to serve as the primary interface for external stakeholders and the public.

- **Official Webpage:** Hosted by the **MOREnergy Lab** (Politecnico di Torino), the project website acts as a centralized public repository. It provides laypeople and interested stakeholders with access to public deliverables and direct links to the project's Open Access datasets on **Zenodo**.

- **Multimedia Resources:** The communication plan includes the production of brochures and posters communicate project in a non-technical format.

1.3 Social Media Engagement and Impact

External digital communication has leveraged professional networks to engage with the offshore renewable energy sector and civil society.

- **LinkedIn Presence:** The project has maintained active outreach through the MOREnergy Lab and partners' profiles. Participation to events and results have been posted on social media pages.

1.4 General Public Outreach and Ocean Literacy

AIMS has participated in a major public event to engage directly with citizens and students, promoting social acceptance of AI-driven environmental solutions.

- **European Researchers' Night (Torino, 2024):** AIMS was presented to the general public through a dedicated outreach session. The consortium utilized a poster titled *"Usare Dati Satellitari per Effettuare la Valutazione delle Risorse Offshore"* (Using Satellite Data for performing Offshore Resource Assessment) to educate laypeople on the importance of satellite assets in preserving the planet.

2. DISSEMINATION RESULTS DURING THE PROJECT

In accordance with the **AIMS** project's strategy, dissemination activities have focused on the targeted sharing of research results with technical stakeholders—including oceanographers, artificial intelligence researchers, and offshore engineers—to foster the uptake and practical usage of developed methodologies. These efforts have been structured to ensure that the project's scientific breakthroughs in metocean monitoring are integrated into the wider European research area and the offshore industry.

2.1 Open Access Datasets and FAIR Principles

A cornerstone of the AIMS dissemination strategy is the public release of comprehensive metocean datasets. Adhering to **FAIR** (Findable, Accessible, Interoperable, and Reusable) principles, the project has utilized **Zenodo** as its primary trusted repository to ensure long-term data integrity and citability.

To date, the following technical datasets have been finalized and shared:

- **Numerical Model Data:** A regional downscaling dataset of wave data generated via the **SWAN** (Simulating WAves Nearshore) model.
- **Numerical Model Data:** A 43-year high-resolution (500 m) wave climate archive for the Tuscany region produced using **WaveWatch III (WW3)**.
- **Remote Sensing Data:** A calibrated and validated Level-3 dataset for Significant Wave Height and wind speed at 10 m, derived from multiple satellite missions including Sentinel-3A/B, Jason-3, and CFOSAT.
- **Experimental In-situ Measurements:** Real-time and processed data from a grid of **Directional Wave Spectra Drifter (DWSD)** buoys deployed offshore of Livorno.

The current cumulative Key Performance Indicators for the 5 datasets are:
- Total number of Visits: 533
- Total number of Downloads: 834

2.2 Participation in International Scientific Conferences

The project has actively disseminated technical findings through oral presentations and the organization of dedicated scientific sessions at high-impact international events.

- **RENEW 2024 (Lisbon, Portugal):** The project organized a **Special Session** titled *"Numerical methods to enhance resource assessment,"* presenting four papers to the offshore renewable energy community. This included the paper *"Interpolation techniques: A possible way to bypass offshore resource assessment limitations?"* which directly addressed the AIMS core methodology.

- **ISOPE 2024 (Rhodes, Greece):** Technical results regarding the use of **Gaussian Process Regression (GPR)** for extending in-situ wave measurements were shared with the international ocean and polar engineering community.

- **ICCE 2024 (Rome, Italy)**: 38th International Conference on Coastal Engineering, where a poster presented technical results and major updates on the project.

- **IEEE MetroSea 2025 (Genova, Italy):** A **Special Session** titled *"Multisource innovative approaches for enhancing the usability of metocean data"* was accepted, with five papers planned for presentation to specialists in maritime metrology.

2.3 Peer-Reviewed Scientific Publications and Special Issues

To foster the academic uptake of the AIMS "stage-gate" approach and its AI algorithms, the project has engaged with top-tier journals through both submissions and editorial management.

- **3 Journal papers:** A comprehensive paper on spatio-temporal regression and interpolation of offshore measurements is currently in review with **Applied Ocean Research**. Another technical study on wave field variability is being processed for the **IEEE Journal of Oceanic Engineering**. Finally, a paper has been published on the International Journal of Offshore and Polar Engineering.

- **Special Issue Management:** The project partners are managing a **Special Issue** in the journal *Applied Ocean Research* titled *"Transforming Metocean Data: Numerical Innovations for Science and Industry"*. This issue explicitly invites contributions using the **AIMS dataset** to encourage third-party usage of project results.

- **Technical Benchmarking:** Detailed reports have been published regarding the ranking of algorithms, identifying **Thin-Plate Spline (TPS)** as the most dependable choice for the significant wave height and **Random Forest (RF)** as the most accurate to infer the peak period.

3. EXPLOITATION RESULTS DURING THE PROJECT

The exploitation strategy of the **AIMS** project is designed to maximize the industrial and commercial potential of its research outcomes, specifically targeting the Blue Economy and the offshore renewable energy sector. By the end of the reporting period, several **Key Exploitable Results (KERs)** have been matured to a stage where they can support commercial decision-making, site selection, and the design of offshore infrastructure.

3.1 Key Exploitable Results (KERs) and Industrial Applications

The consortium has identified and developed four primary KERs with significant potential for commercial uptake:

- **KER-1 & KER-2: Validated Metocean Datasets:** The high-resolution numerical datasets produced via **SWAN** and **WaveWatch III (WW3)** provide a 43-year wave climate archive for the Mediterranean.
  - These datasets are essential for industrial stakeholders in performing long-term **resource assessment** and reliability studies for offshore wind and wave energy converters.
  - To foster immediate industrial uptake, these datasets have been released under an open-access license on **Zenodo**.
- **KER-3: Spatio-Temporal Gap-Filling Algorithms:**
  - Validated algorithms are now available to provide metocean data at an unprecedented resolution.
  - **Thin-Plate Spline (TPS)** has been exploited for smooth spatial reconstructions of wave height, while **Random Forest (RF)** models have been optimized for complex, non-linear peak period estimations.
  - These models serve as cost-effective "digital twins," reducing the need for expensive, long-term in-situ instrument deployments.
- **KER-4: Wave Period Inference Methodology:**
  - A successful semi-empirical technique was developed to estimate wave periods using only satellite altimetry and wind data.
  - Achieving an **R^2 accuracy of over 92%**, this result surpasses the project's initial 85% target and provides a critical tool for offshore system design where wave period is a key engineering constraint.

3.2 Economic Impact and Efficiency

The industrial exploitation of AIMS methodologies offers a significant competitive advantage for maritime operators by drastically reducing operational overhead:

- **Cost Reduction:** The project estimates a reduction of over **60%** in the costs associated with offshore surveys compared to traditional market offerings.

- **Time Efficiency:** By leveraging AI-enhanced satellite data, site selection and permitting processes for offshore renewable energy plants can be accelerated by more than **40%**.
- **Market Reach:** Primary industrial beneficiaries include **port and terminal operators**, renewable energy developers, **environmental consulting companies**, and **insurance providers** seeking accurate hurricane and storm risk assessments.

3.3 Licensing and Synergies

To ensure the long-term sustainability of the project's innovations, the consortium has opted for releasing all results in open access. Specifically, licence Creative Commons By Attribution (CC-BY) has been selected, to provide open access while retaining the right of appropriate acknowledgement.

In addition, the following synergies have been fostered:

- **Startup Synergy:** The project leverages the entrepreneurial experience of the team to share AIMS' KERs with startups active in the field of metocean monitoring.
- **Infrastructure Synergy:** Results will also be communicated to **ISPRA** (Istituto Superiore per la Protezione e la Ricerca Ambientale) to integrate AIMS results with the national wave recording network (**RON**), further embedding the project's outputs into institutional maritime infrastructure.

4. OUTLOOK BEYOND THE PROJECT

This section details the strategic updates to the plan and the project's trajectory for communication, dissemination, and exploitation after the formal funding period concludes.

4.1 Post-Project Communication and Societal Legacy

Beyond 2026, the communication strategy aims to sustain public interest in climate science and the space economy.

- **Permanent Digital Hub:** The project webpage will remain active as a long-term repository for public deliverables and educational posters.

- **Ongoing Ocean Literacy:** The results will continue to be used in science outreach activities to inform the community on how AI and space assets mitigate climate change consequences.

4.2 Technical Sustainability and Dissemination Outlook

The scientific impact of AIMS is secured through the long-term accessibility of its outputs for the global research community.

- **Persistent Data Access:** All datasets (Numerical, Satellite, and In-situ) are archived on **Zenodo** with assigned **DOIs**, ensuring they remain findable, accessible, and citable for future climate research.
- **International Research Reinforcement:** The project serves as a stepping stone for future collaborative applications under **Horizon Europe**, specifically for top-down cluster calls (Pillar 2) or bottom-up innovation mechanisms (Pillar 3).
- **Institutional Integration:** Scientific findings will be shared with **ISPRA** to potentially integrate AIMS results into the National Wave Network (**RON**), enhancing the institutional framework for maritime monitoring in Italy.