



MERCATOR OCEAN
FRANCE



**MERCATOR
OCEAN**
INTERNATIONAL

Ocean Information for Marine Renewable Energy: Status and Perspectives

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#GEOBluePlanet4



OUTLINE

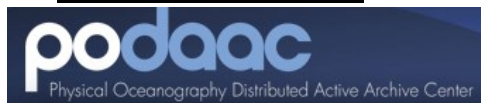
- **WHICH OCEAN DATA OFFER FOR MARINE RENEWABLE ENERGY**
- **HOW OCEAN DATA ANSWER MARINE RENEWABLE ENERGY NEED**
- **HOW IS ORGANISED INDUSTRY REQUIREMENT FEEDBACK**
- **USE CASES**
- **WHAT'S NEXT?**

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WHICH OCEAN DATA OFFER FOR RENEWABLE MARINE ENERGY

OCEAN DATA BASE TARGETING **ALL** SECTORS



And more...

OCEAN KNOWLEDGE AND DATA BASE TARGETING **MRE** SECTOR



IRENA
International Renewable Energy Agency

Global Atlas
FOR RENEWABLE ENERGY



And more...

WHICH PRODUCTS? +15 OCEAN PARAMETERS



Temperature
Salinity

Currents
Waves

Transparency
Turbidity

Oxygen

Sea surface
elevation

Sea ice
Surface Wind

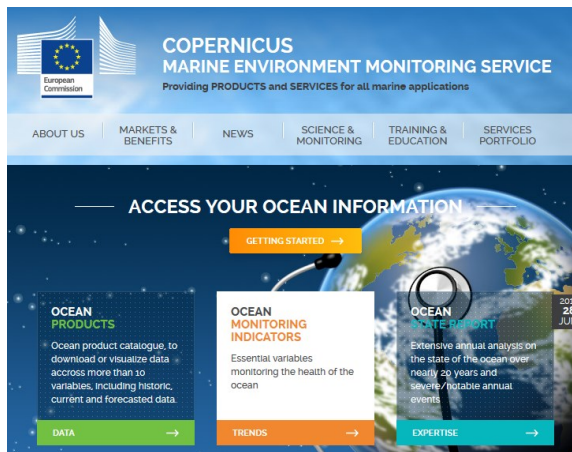
Nutrients
Plankton

Bathymetry
Sea Bed Habitats
Geology
Human Activities

Primary
production

Also
TRAINING
WEBINARS

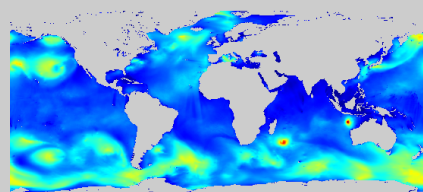
WHICH OCEAN DATA OFFER FOR RENEWABLE MARINE ENERGY



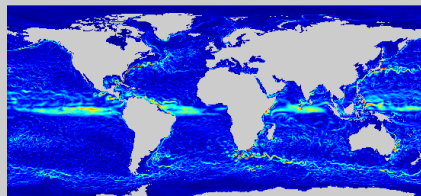
- marine.copernicus.eu
- Sustained in the long term
- Open and Free
- User-Driven

COPERNICUS MARINE SERVICE HIGH QUALITY OCEAN DATA

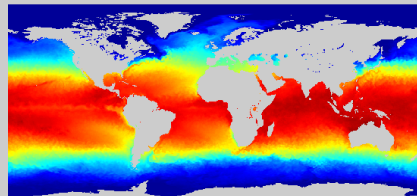
Wave Energy



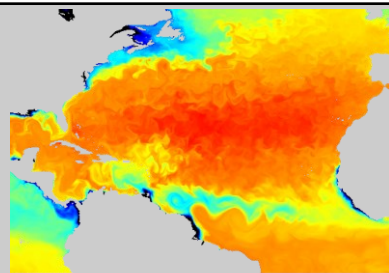
Ocean Currents



OTEC SWAC



Salinity Gradient



**Hourly and daily
surface ocean waves**

GLO : 8km

MED: 4km

NWS: 7km

**Hourly and daily 3D
ocean currents**

GLO : 8km

MED: 4km

NWS: 7km

**Hourly and daily 3D
ocean temperature**

GLO : 8km

MED: 4km

NWS: 7km

**Hourly and daily 3D
ocean salinity**

GLO : 8km

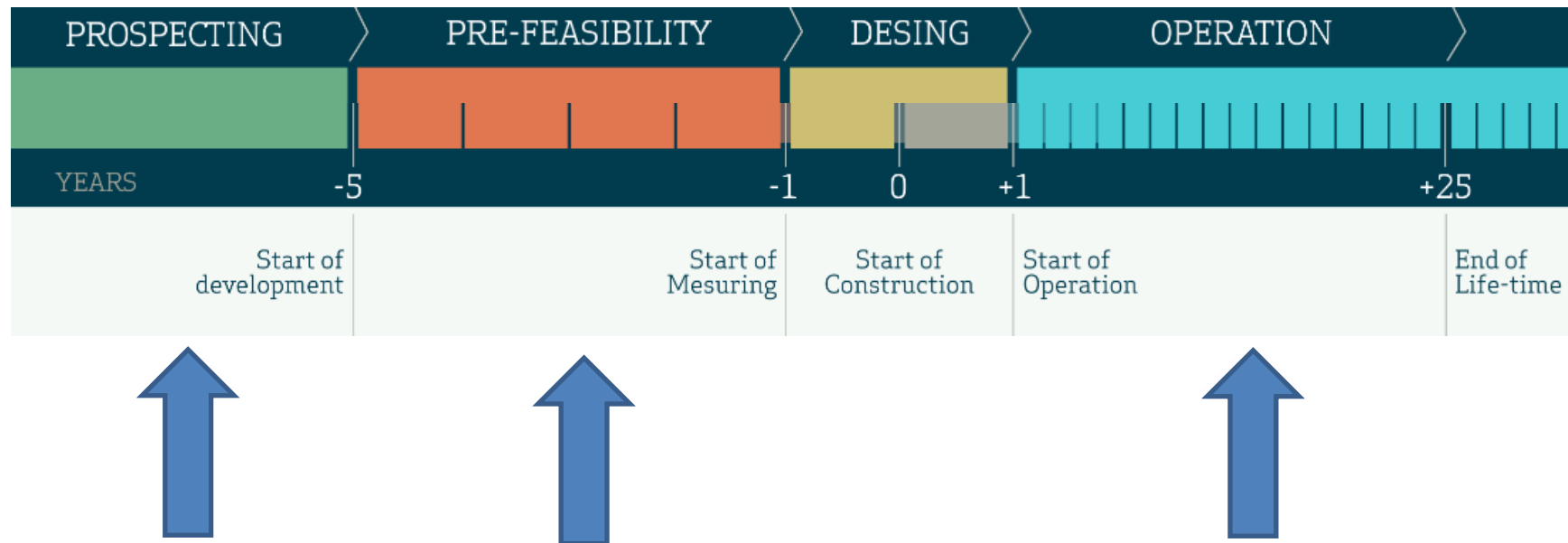
MED: 4km

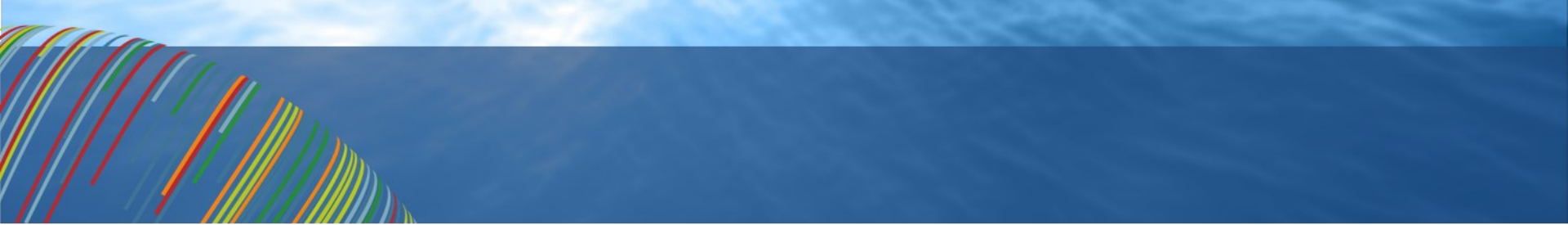
NWS: 7km

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RENEWABLE MARINE ENERGY FARM LIFE CYCLE



- 
- Same thing for Insurance/accident recovery
 - Prevention
 - Preparedness
 - Response
 - Recovery



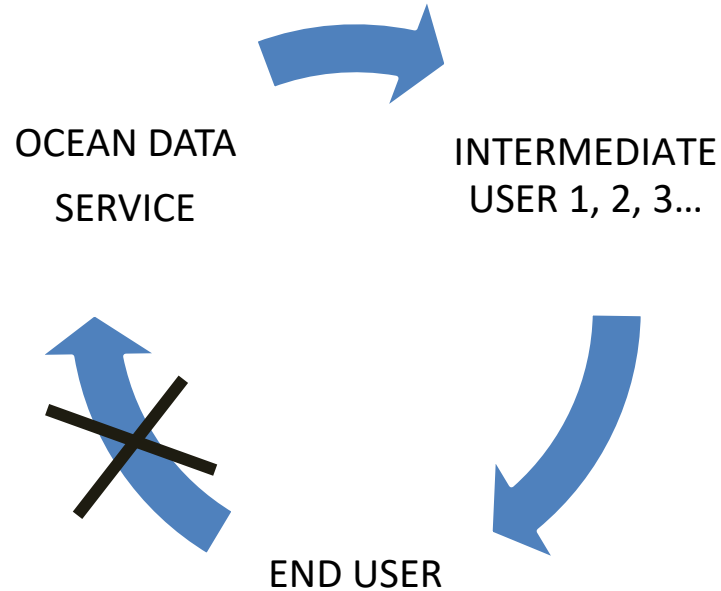
HOW OCEAN DATA ANSWER RENEWABLE MARINE ENERGY NEED

1. Evaluation of **ocean energy resources** (tidal, wave, heat, currents, salinity)
2. **Performance validation and technology certification**
3. Evaluation of met-ocean conditions for **operations at sea**
4. Evaluation of **constraints applied on the sea-exposed machines**
5. **Environmental impact assessment** of farm (before / after implementation)

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HOW IS ORGANISED INDUSTRY REQUIREMENT FEEDBACK



MERCATOR OCEAN/OEE PARTNERSHIP

Ocean Energy Europe



A leader Trade Association
for Renewable Marine Energy
<https://www.oceanenergy-europe.eu>

Mercator Ocean



Copernicus
Marine Service



Free Ocean Data Provider
<https://marine.copernicus.eu>



HOW IS ORGANISED INDUSTRY REQUIREMENT FEEDBACK

- Survey sent by OEE to its members to get feedbacks about Copernicus Marine Service data
- Information and Training session during annual OEE event.
- Webinar among OEE members

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OCEAN THERMAL ENERGY CONVERSION - OTEC

Ocean Thermal Energy Conversion (OTEC) exploits the difference in temperature between warm surface and cooler deep waters (temperature difference of at least 20 °C).

Using the ocean database of Copernicus Marine Service, **Bluerise in collaboration with TU Delft**, has evaluated the year round and ten year average ocean characteristics in the **Caribbean** analyzing the ocean currents, density and temperature profiles over depth. Particular attention was spent on ocean upwelling and seasonal fluctuations. **This enables a quick assessment of the feasibility of OTEC locations.**

Example of CMEMS user



BIMEP TEST SITE

The Biscay Marine Energy Platform (**BiMEP**) is an open sea test site with grid connection for demonstrating and validating **wave energy collectors and floating wind** platforms. BiMEP provides manufacturers with ready-to-use facilities to test technical and economic feasibility of their prototype.

BiMEP and IH Cantabria have developed a Prediction System to forecast wind, wave, currents and sea level conditions to be considered in the **planning of marine operations at BiMEP** and feed the Decision Support System developed in TRL+ project. The Copernicus Marine Service **physics and wave** models are used as forcing conditions in a very high resolution model.

Example of CMEMS user



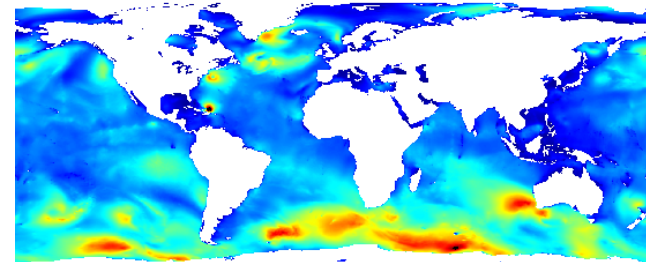
CONSTRAINT EVALUATION ON SEA-EXPOSED MATERIAL

A harsh ocean environment with strong winds and waves over decades of use causes significant wear and tear on offshore structures. The angle from which waves hit a platform, and the wave height are important factors, but in addition the wave frequency is an important factor due to the resonance frequency of the structure itself.

AHPA, Asset Health and Probabilistic Analyses, focuses on **probability analyses of fractures and strains on offshore structures**. The Copernicus Marine Service wave height combined with period is used to predict the 3-dimensional motion of floating bodies.

Example of CMEMS USER

AHPA



Wave Height Evolution during 5days in October 2017



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WHAT'S NEXT?

- User-driven Copernicus Marine Service
 - Higher spatial and temporal resolution
 - Dedicated products, trainings and webinars for RME
- Copernicus DIAS service for environmental data
 - Transform data with cloud-based processing and tools



Wekeo.eu
Poster 96



THANK YOU