CoastPredict
with The Global Ocean Observing System

GlobalCoast: the Global Coastal Ocean Experiment

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Discussed by, and evolved from, the CoastPredict General Assembly 18-19 Jan, 2023

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

This programme is endorsed by the **UN Decade of Ocean Science**

CoastPredict:
Observing and Predicting the Global Coastal Ocean

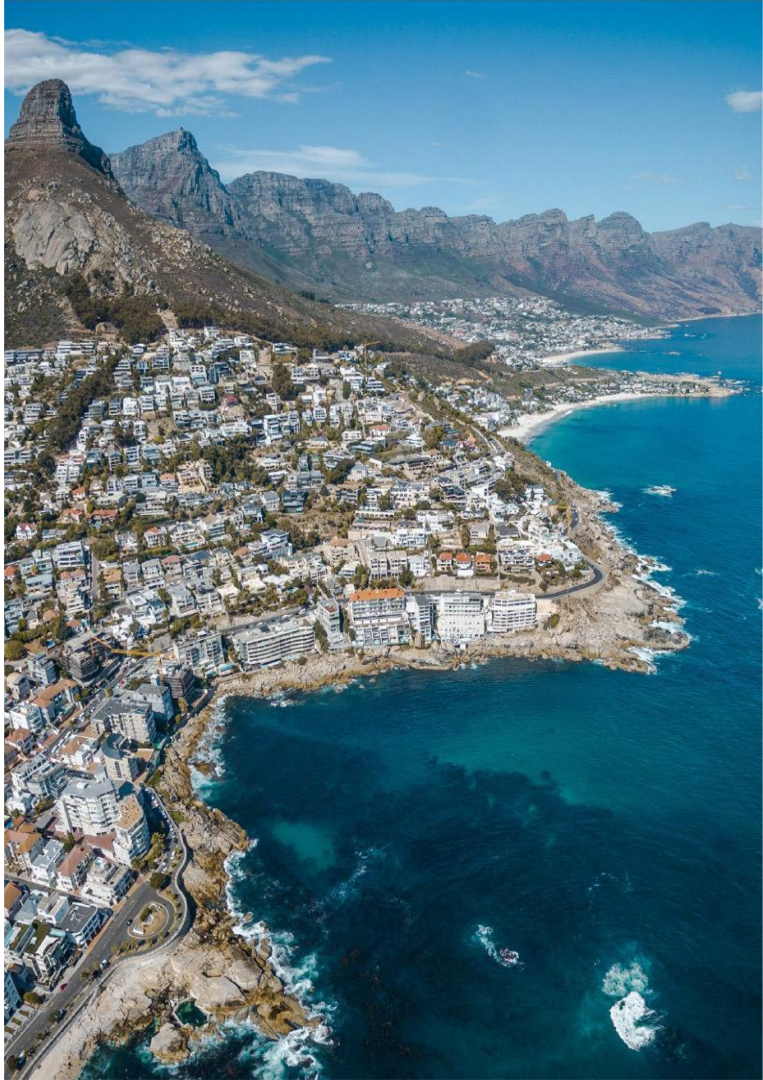
http://CoastPredict.org

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

DCC-CR Coastal Resilience

- Based in Department of Physics and Astronomy, UNIBO
- Funded by Emilia-Romagna Region
- Managed by dedicated personnel:
  - Director
  - Senior Programme Specialist/Chief Scientist
  - Junior Programme Specialist
  - Senior Communication Officer
  - Information System Officer
  - Administrator
- Thematic focus on **Decade Challenge 6: Increase community resilience to ocean hazards**

Ocean Cities Network (OC-NET)	Institut de Ciències del Mar - CSIC (Spain)
Global Estuaries Monitoring (GEM)	City University of Hong Kong
Mega-Delta	East China Normal University



2021 2030 United Nations Decade of Ocean Science for Sustainable Development

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CoastPredict strategic planning: Focus Areas

Focus Area 1
Integrated observing and modelling for short term coastal forecasting and early warnings

Focus Area 2
Earth system observing and modelling for coastal climate monitoring and downscaling

Focus Area 3
Solutions for integrated coastal management

Focus Area 4
Coastal ocean and human health

Focus Area 5
International open and free access to coastal information

Focus Area 6
Equitable coastal ocean capacity

✓ CORE and AFFILIATED Projects have been established/endorsed under the FAs

Why a GlobalCoast vision?

- Coastal areas are where most of the world's population lives and where the response to the UN Decade's challenges will have the largest impact.
- Coastal communities face urgent challenges that are amplified by climate change.
- Solutions are required on the "Global Coastal Ocean" level, to leverage methods and assets, to provide reliable tools to policy-makers and managers, based on cutting-edge, smart and efficient technologies

CoastPredict implementation plan

CoastPredict: revolutionarizing the global coastal ocean observing and predicting

FA1, FA2, FA3, FA4, FA5, FA6

Global Coast experiment

~20 world coastal areas
as demonstration sites for
new technologies (obs and mod)
that have IMPACT on coastal resilience

New Global Coastal Ocean concepts and standards, networks for a Coastal-resilience-ready community

“Global Coast”:
the Global Coastal Ocean experiment

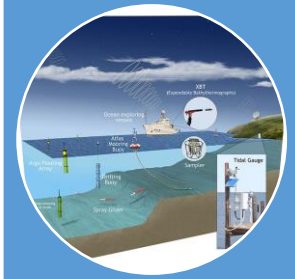
GOAL

- GLOBAL COAST will establish and implement the CoastPredict projects and guidance principles in several world ocean coastal areas to demonstrate and test **fit-for-purpose coastal observing and prediction systems for contrasting and comparing coastal processes, aiming to the design of innovative products and services for coastal resilience**.

- *the Global Coast initiative coordinates the planning of demonstration sites where FAs technologies and methods will be implemented following a general strategy*

Basic principles

Global Coast will contribute to the whole Coastal Ocean Value Chain



Coastal observation and prediction products/information

Digital Platform for on-demand data analytics and user-oriented transformation

End-user tailored products and decision support systems for coastal resilience

Training and outreach

Global Coast Platforms

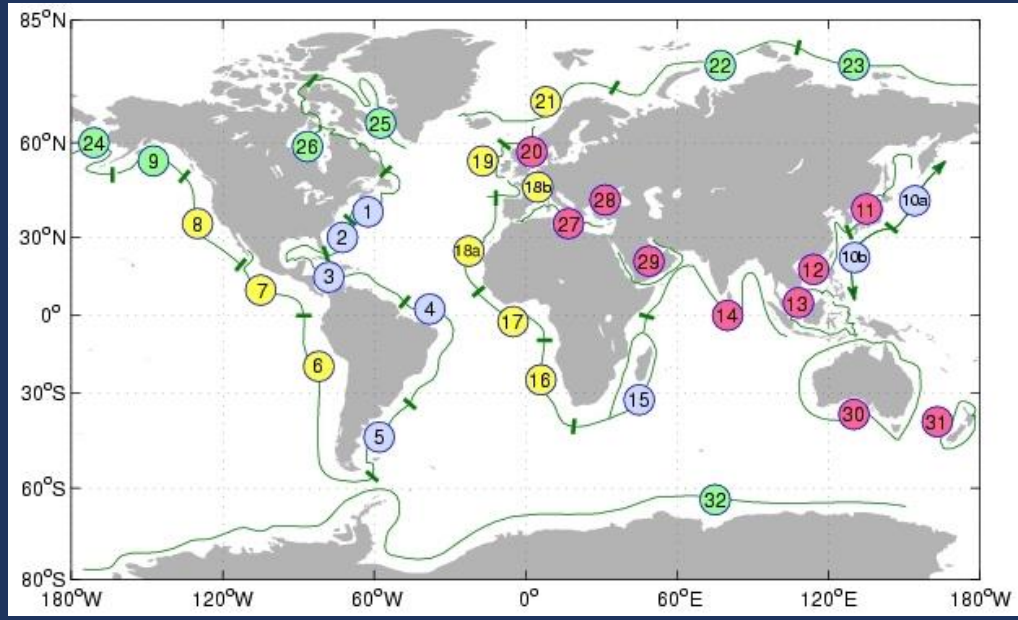
First step: define the sites

- **EACH SITE SHOULD**
  - Define challenges for coastal resilience at the site
  - Produce a characterization matrix
  - Arrive at the "required/target" resolution in the coastal area
  - Use multi-purpose, relocatable observing and modelling science methods and technologies (from forecast to projections)
  - Involve multi-national science community
  - Involve stakeholders/end-users
  - Produce end-to-end products/services
  - Define a matrix of success for the demo activities in terms of fitness-for-purpose of the challenge products (feasibility, usability, value, etc.)

First Classification of subregions done by geomorphology, geography and dynamical processes

(The Sea Vol. 14, *eds. A. Robinson & K. Brink)*

- **4 panregions** - eastern and western boundaries, polar, semi-enclosed seas/islands;
- **5 physical processes** - boundary layers, tides, **rivers,** wind and buoyancy forcing, boundary currents;
- **6 offshore zones** - near shore, **freshwater influence**, well mixed, tidal fronts, thermally stratified, shelf-edge;
- **7 biogeochemical processes** - subtropical shelf pumps, temperate shelf: biology or physics dominant, upwelling: biology or physics dominant, coral reefs, polar ice pump;



Western boundary – blue
Eastern boundary – yellow
Polar boundary – green
Semi-enclosed seas and islands- red

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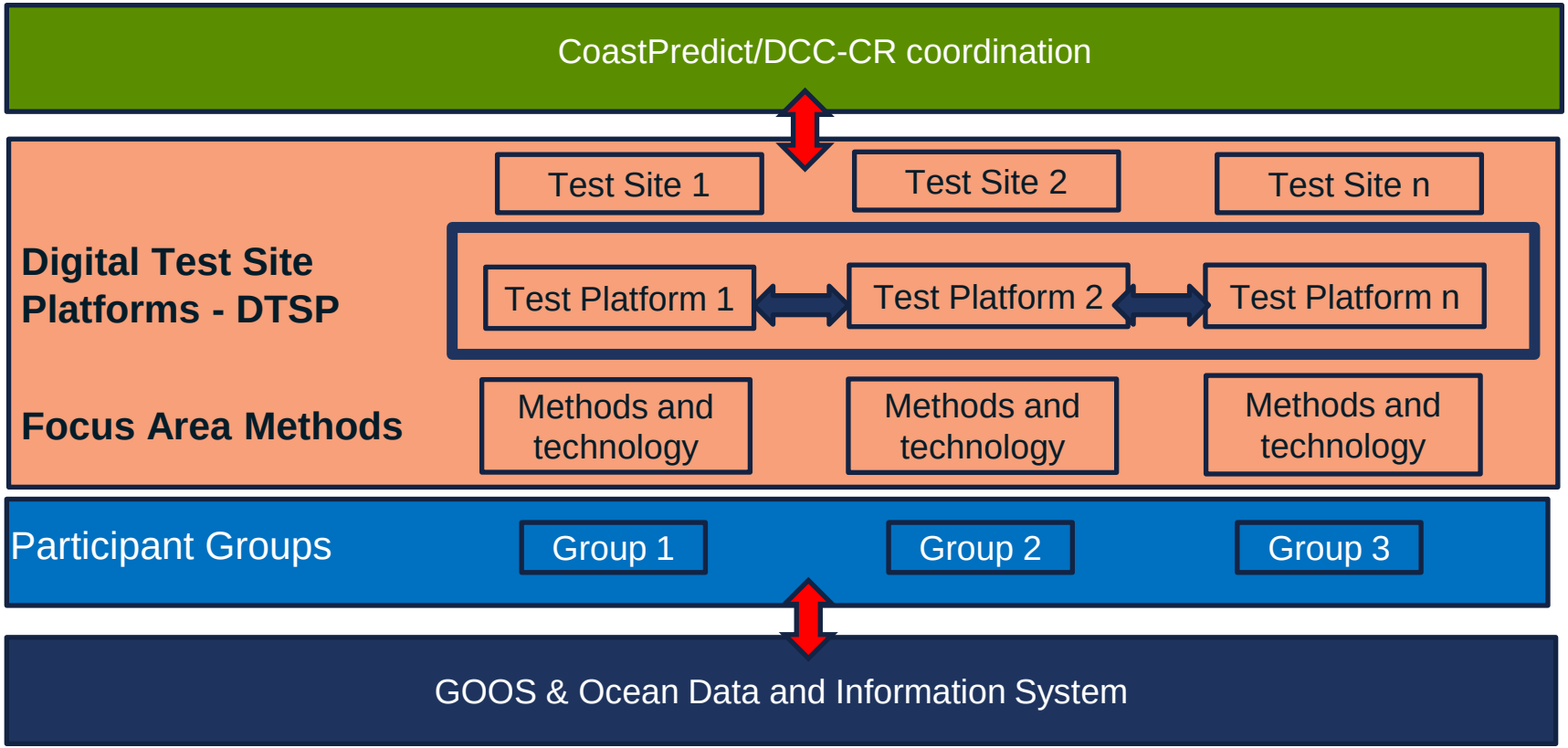
Example of site characterization matrix elements

Key element	Description at the specific test site	Focus Area contributions
Geographic/ Demographic/ oceanographic characteristics	Regional box extension	
	Coastal geomorphological characteristics	
	Coastal and continental shelf ecosystem and circulation dynamics	
	Land water connections	
	Off-continental shelf oceanographic regimes	
	Sediment dynamics and benthic habitats	
	Coastal urban area characteristics	
User Focus	Economic activities in the area	
	Key Stakeholders for co-design	
	Coastal management issues	
	Cross-border issues and cooperation	
	Maritime Spatial Planning implementation level	
Challenges	Target products	
	Target services	
	Expected contributions to coastal resilience	

Example of site characterization matrix elements

Key element	Description at the specific test site	Focus Area contributions
Present technology/ infrastructure	Essential Coastal Variable of interest	
	Present status of coastal monitoring	
	Data management practices	
	Present status of coastal forecasting	
	Present status of coastal projections	
	Present status of atmospheric forcing	
New technologies	Design of integrated observing system	
	Numerical/AI modelling strategies	
	Data assimilation/fusion/blending strategies	
	Uncertainties evaluation	
	Digital infrastructure for data management and computing resources	
Solutions	Definition of the Value chain	
	User-oriented technical products	
	User-oriented solutions	
	Citizen awareness	
	Training/educational	



- ✓ Collaboration and coordination with CoastPredict partners (OceanPredict/COSS-TT, ForeSea/SynObs, OceanPrediction DCC, DITTO,…)
- ✓ Specific action item with COSS-TT: contribution to the GlobalCoast site selection survey and projects implementation

Timeline

PHASE 1 PERIOD: 2023-2024

- Analysis of ~5/10 site challenges with existing FA communities, development of scientific plans and DTSP implementation and funding
- In 2024 open calls to a larger community on the basis of acquired experience

PHASE 2 PERIOD: 2025-2026

- Assessment of first implementation, intercomparison of site experiments

PHASE 3 PERIOD: 2027-2029

- Expansion to 20 sites using lessons learned
- Legacy after the Decade: science based coastal management services and evolution pathways