International Meeting of Doctoral Students in Civil Engineering
EIDEIC 2023 - 19 May

Methodology for a coastal flooding risk assessment in Pacific Atolls

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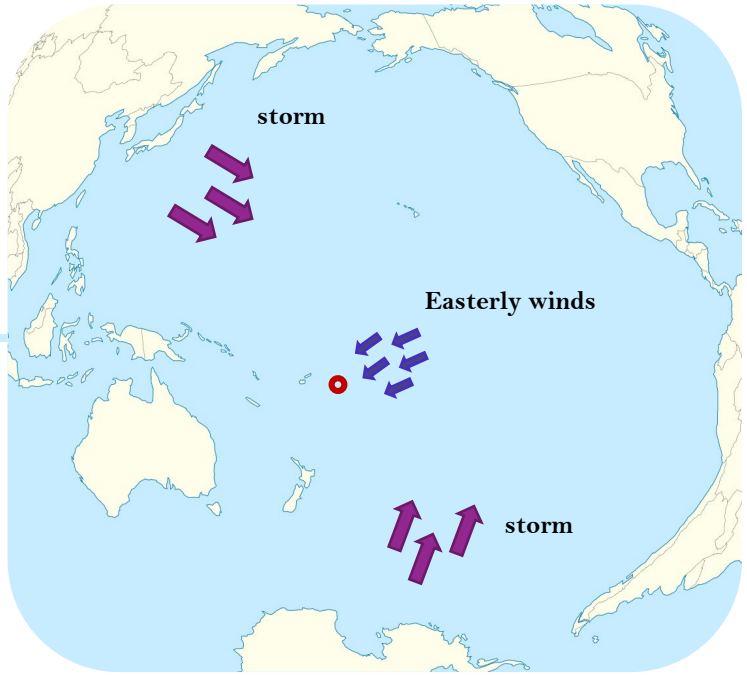
Content

- Research Development
- Training and competences
- Timetable

Research Development

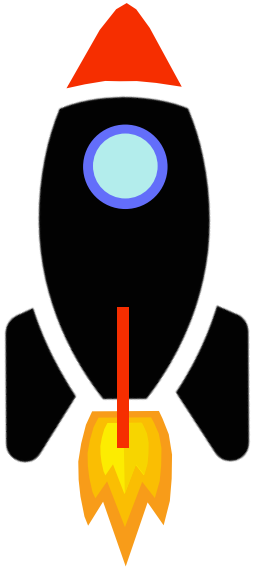
Motivation

Including the **multimodality of wave systems** in the development of **hybrid** local and high-resolution hindcasts



Research Development

Research Lines



1 HyWaves

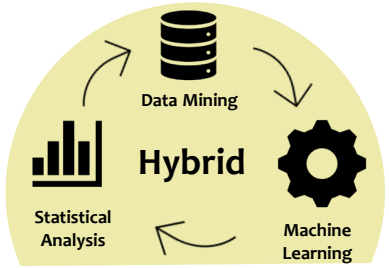
Hybrid downscaling of multimodal wave conditions from offshore to intermediante waters

Local Scale (100 m)

2 HySwash

Hybrid downscaling of multimodal wave conditions and water levels along coral reef profiles

High-resolution Scale (1 m)



3 Hybrid Spectral Hindcast

Historical spectral reconstruction of wave climate using HyWaves

Research Developement

1.HyWaves

Hybrid downscaling of multimodal wave conditions from offshore to intermediante Waters

ELSEVIER

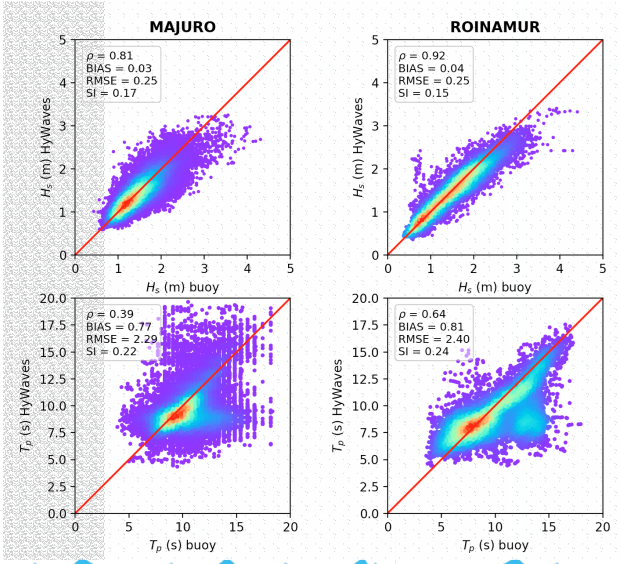
Ocean Modelling

Available online 15 May 2023, 102210

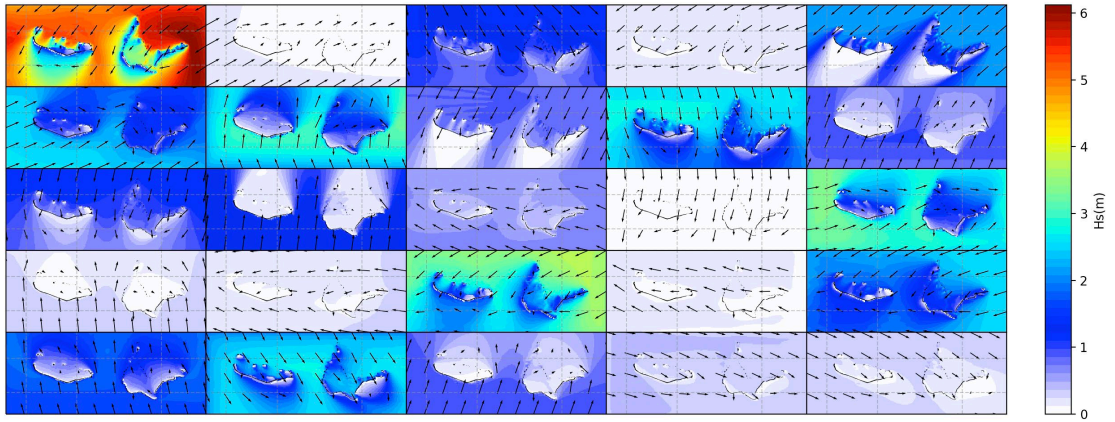
In Press, Journal Pre-proof What's this?

HyWaves: Hybrid downscaling of multimodal wave spectra to nearshore areas

Alba Ricondo [a], Laura Cagigal [a], Ana Rueda [a], Ron Hoeke [b], Curt D. Storlazzi [c], Fernando J. Méndez [a]



1. Clustering Methods for selecting representative offshore wave conditions
2. Library of pre-run simulations



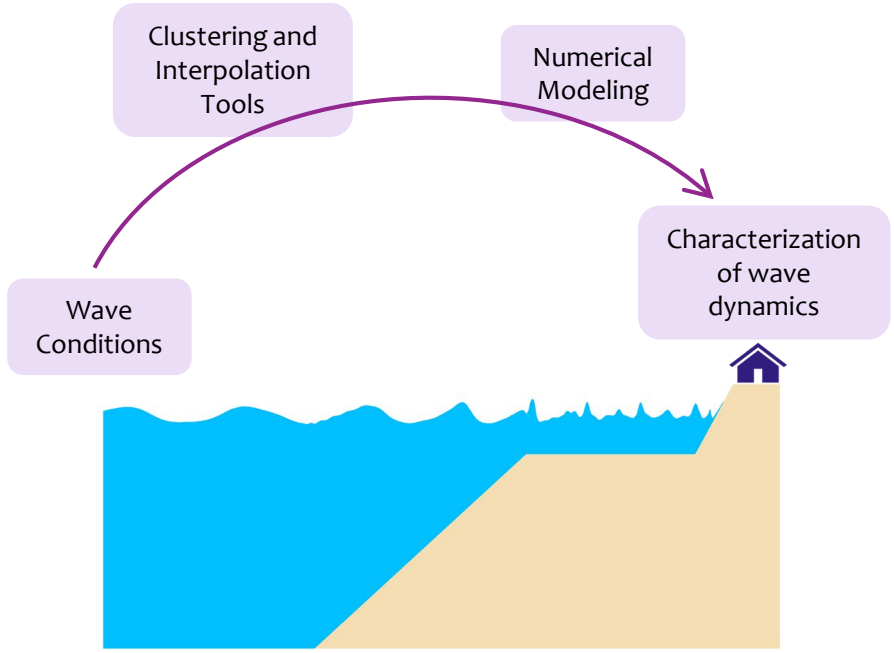
3. Interpolation Techniques for reconstructing historical wave climate
4. Validated in Majuro, Roi-Namur, Kwajalein, Samoa and American Samoa

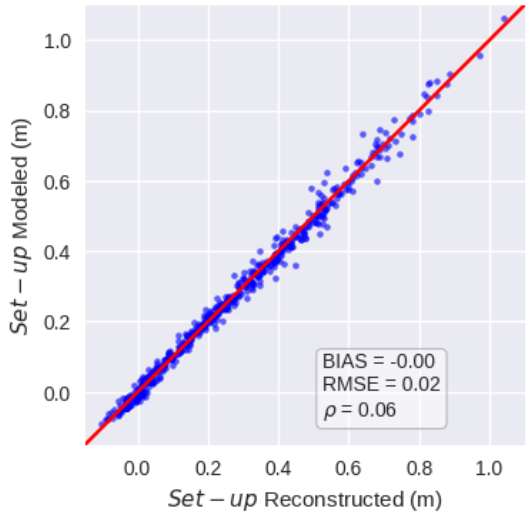
Research Developement

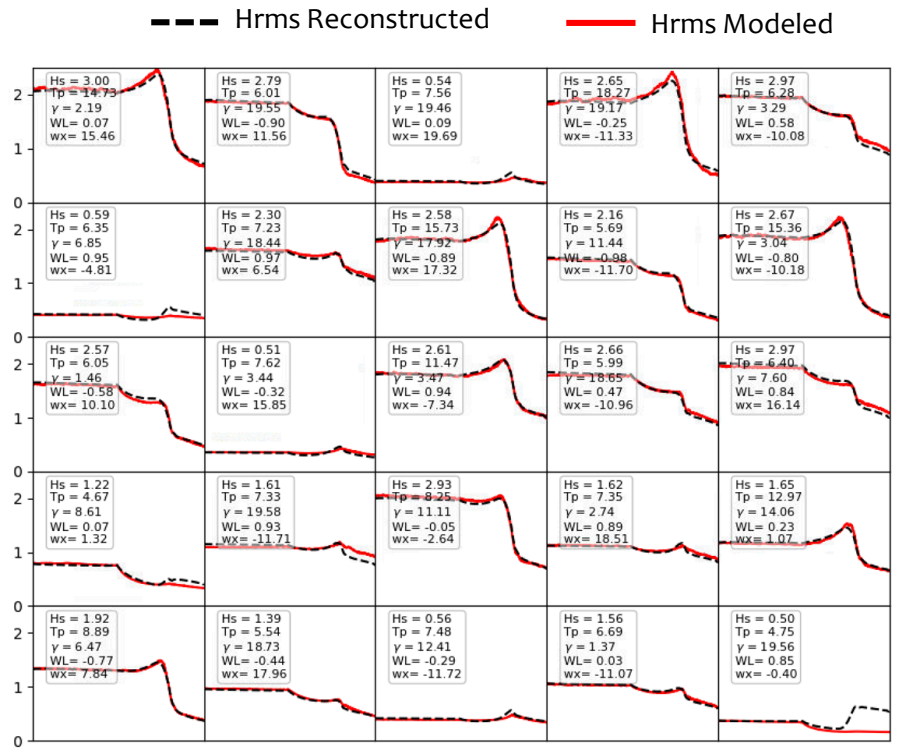
2. HySwash

Hybrid downscaling of multimodal wave conditions and water levels along coral reef profiles

Goal: Establishing a direct relationship between external hydrodynamics, reef morphology, and inundation



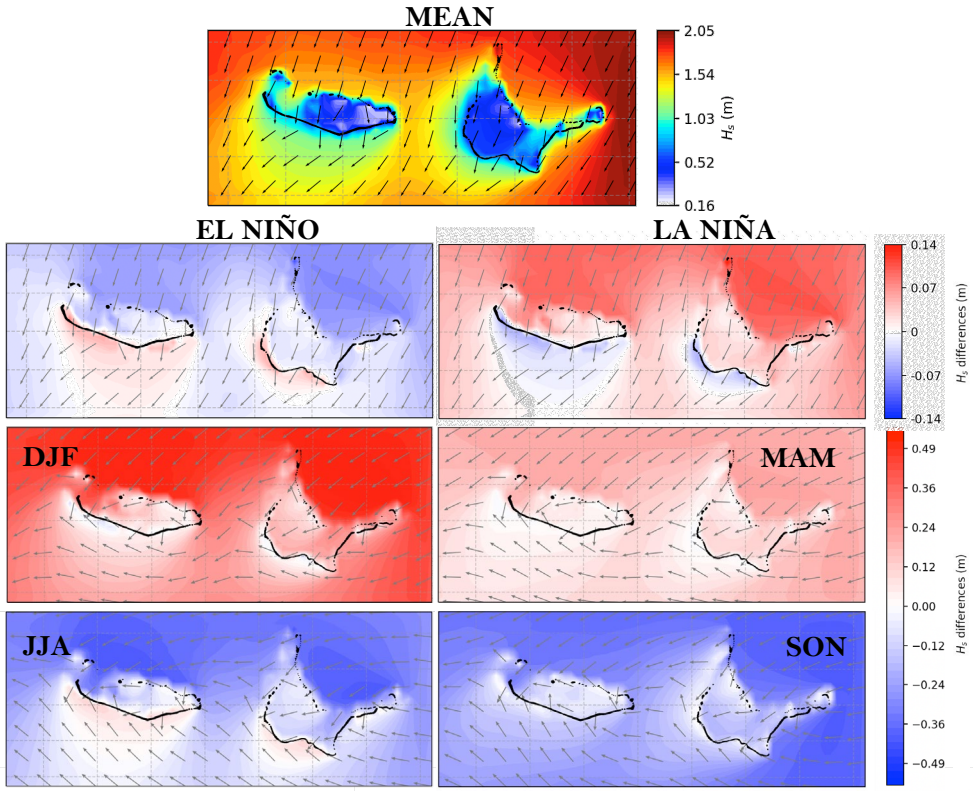


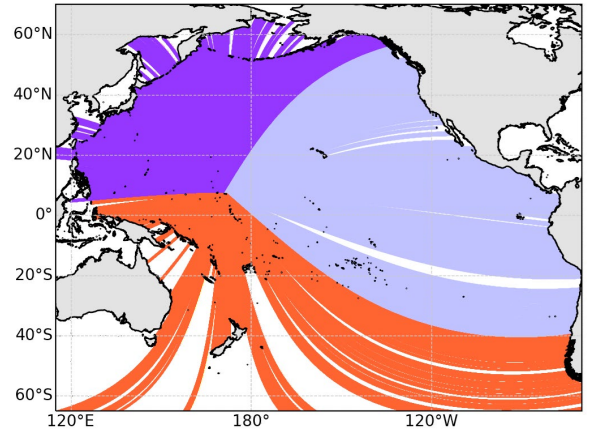


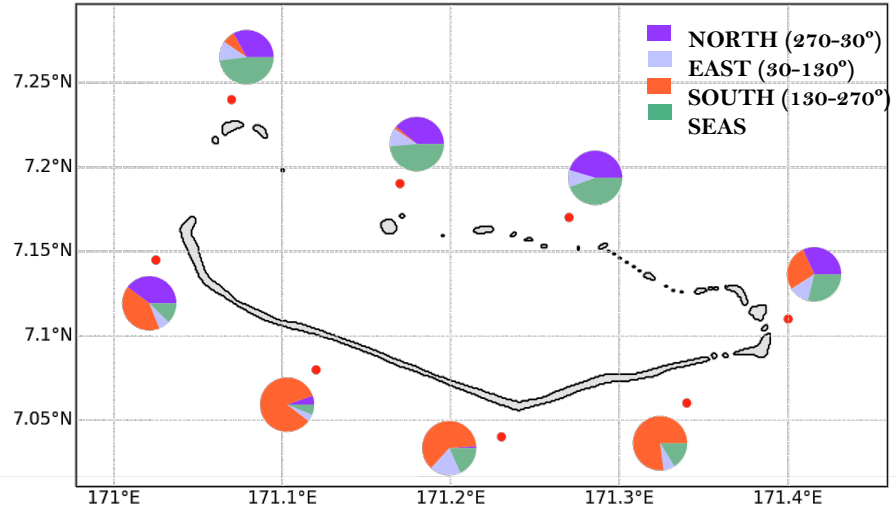
Research Developement

3. Hybrid Spectral Hindcast

Historical reconstruction of wave climate using HyWaves
Analysis of interanual and intranual variability





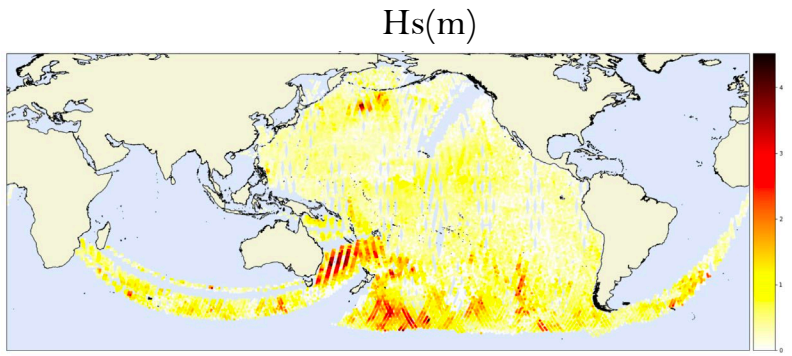


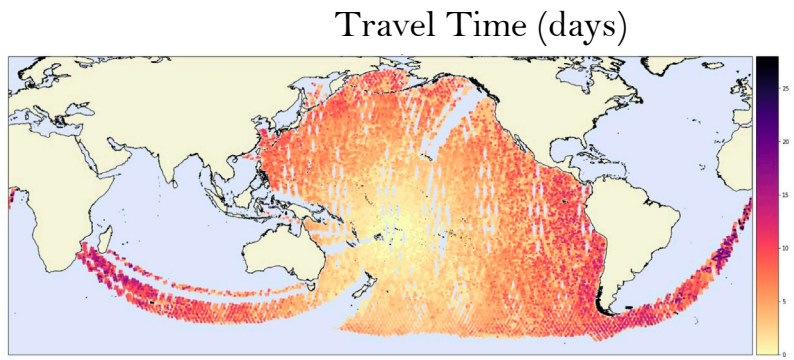
Training and Competences

International Mobility

Laboratoire d'Océanographie Physique et Spatiale (LOPS)
IFREMER, Brest, France
15 May – 15 August 2021 (3 months)

CFOSAT Based Forecast System applied to Samoa Island





CFOSAT-COAST project
P.I Guillaume Dodet

Training and Competences

Conferences

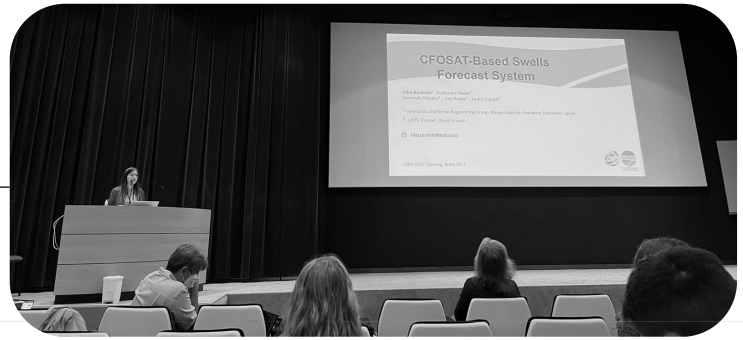
- **GeoPython & PyML 2020 Martin Christen** - September 21-22, 2020, **Online**
  Hybrid Dowscaling of Swells in Small Islands

- **Sea State User consultation meeting 2021** Plymouth Marine Laboratory 26/03/2021, **Online**
  HyWaves: A Hybrid method to downscale swells in small Pacific Islands

- **Coastal Dynamics 8th edition, Online**
  Hybrid methods to downscale swells to coral reef-lined costas

- ***XV1 Jornadas Españolas de Ingieneria de Costas y Puertos, Vigo, Spain***
  HySwash: Un metamodelo para la estimación de niveles de inundación y caudales de rebase en costas de arrecife

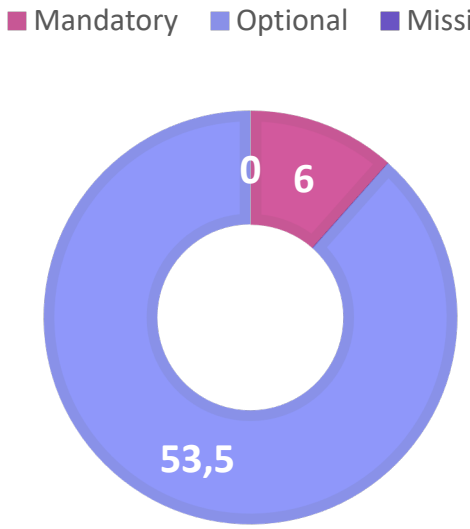
- ***28th WISE Meeting, Brest France***
  CFOSAT-Based Swells Forecast System



Training and Competences

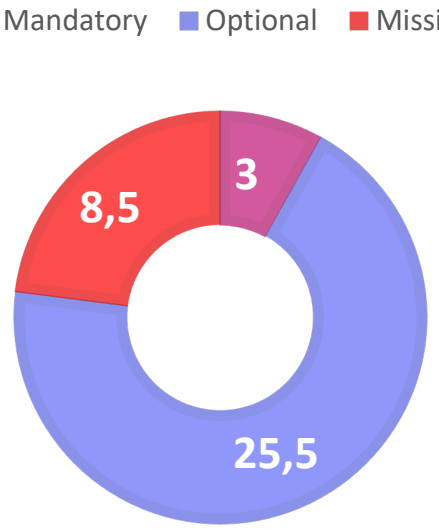
Transversal

BASIC TRAINING (HOURS)



60,5/34

ADVANCED TRAINING (HOURS)



28,5/37

Training and Competences

Specific

- Challenger Society of Marine Science Surface Waves Special Interest Group, UK National Oceanography Centre (8 Hours)
- Managing climate risks by leveraging Nature in engineering (Borga Reguero) (2 Hours)
- Towards predicting coastal hazards and impacts: from extreme storms to water quality (Maitane Olabarrieta) (2 Hours)
- Artificial Intelligence (AI) for earth monitoring (18 Hours)
- Teledetección como herramienta global, UIMP (30 Hours)
- Workshop "Oxy-jeunes" in Air-Sea Fluxes interactions (40 Hours)

École de Physique des Houches, Alps, France

Training and Competences

Teaching

- **Master's Degree in civil Engineering, Canal and Port Engineering (UC)**
  - Computing in Civil Engineering (M2090)
  - Coastal Engineering Ampliation (M2161)

- **Master's Degree in Coasts and Ports (UC)**
  - Waves, swells and sea level (M1851)
  - Hydrometeorological Risk Analysis: Coastal and River Flooding, Climate Change (M1861)
  - Process and activities in transition waters M(M1855)
  - Risk Analysis of Contamination of Surface Waters (M2066)

- **Master's degree in integrated management of water systems (UC)**
  - Analysis of hydrometeorological risk Coastal and river flooding (M2056)

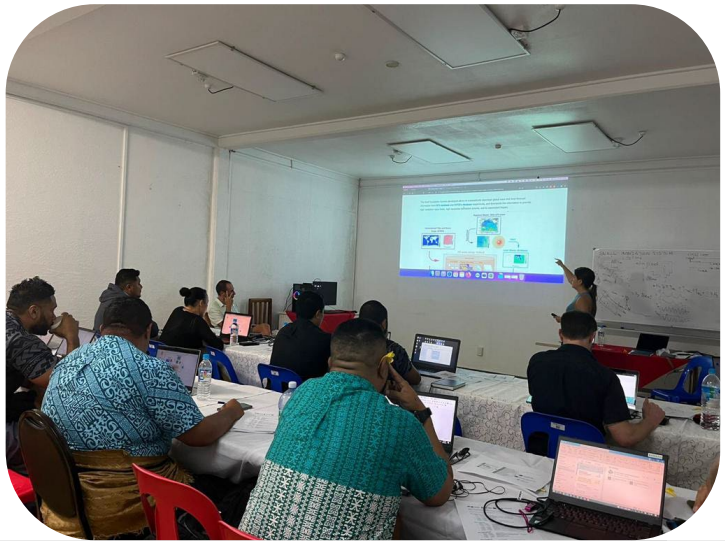
From 2020 to 2024

Training and Competences

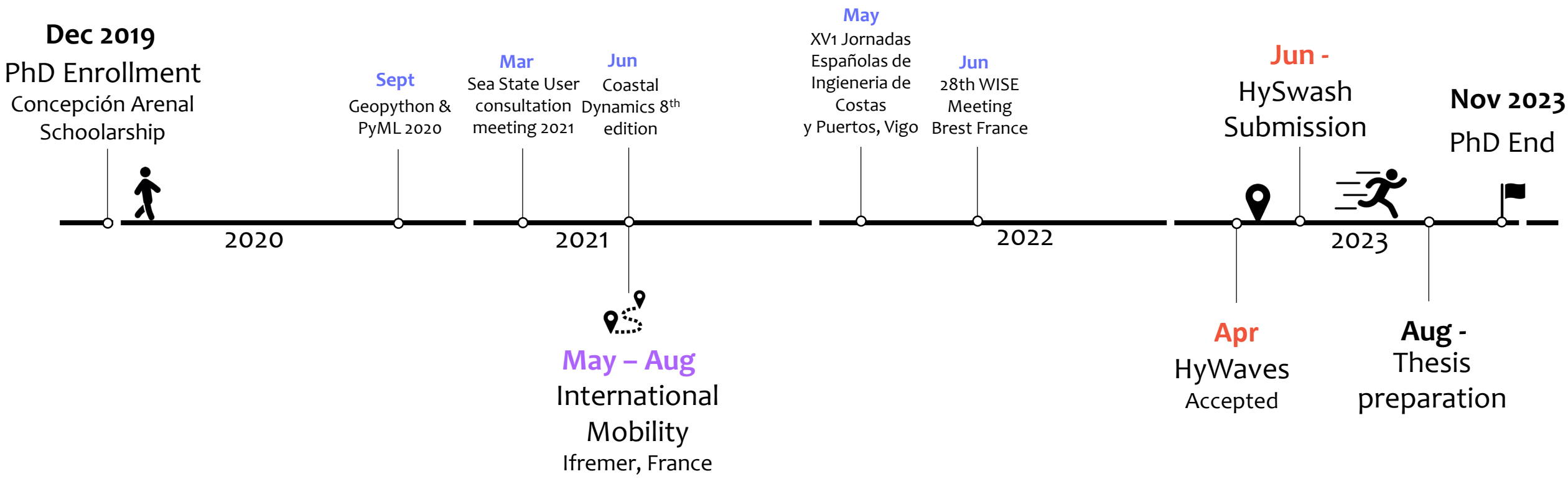
Projects involvement

- **Advancing Best Practices for the Analysis of the Vulnerability of Military Installations in the Pacific Basin to Coastal Flooding under a Changing Climate** – RC-2644
  Funded by U.S. Department of Defense Strategic Environmental Research and Development Program

- **Impact Forecasting Consultancy in Samoa and Tonga**
  Funded by World Bank



Timeline



International Mobility Conferences (Oral Presentation) Journal Publications

https://geoocean.unican.es/

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