Interreg Atlantic Area

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MARETEC
MARINE, ENVIRONMENT AND TECHNOLOGY CENTER
TÉCNICO LISBOA

Impact of Seasonality on Plastic Transport around the Canary Islands

MOHIDing 2025

Institute for Systems and Robotics Lisboa

CENTER FOR INNOVATION, TECHNOLOGY and POLICY RESEARCH

MARETEC

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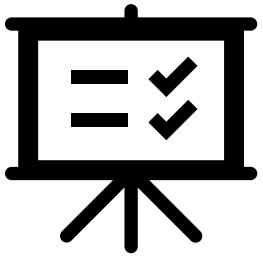
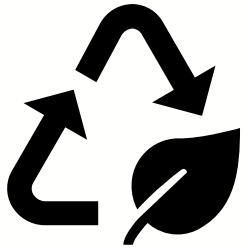


Project Goals:

- Reduce plastic pollution in the Atlantic Ocean;
- Promote the conversion of plastic waste into hydrogen and other high-value products.



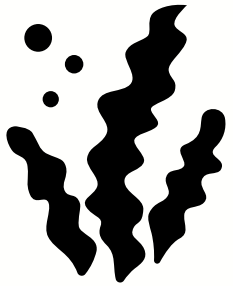
Waste Valorization:

Development of innovative technologies for:

- Hydrogen generation from microplastics;
- Hydrogen fuel-cell;
- Ecoplastic production.

Integrated Research Approach:

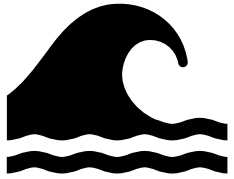
- Cleanup campaigns with waste categorization;
- Modelling plastic dispersion in the ocean and identification of accumulation zones.



Environmental Benefits:

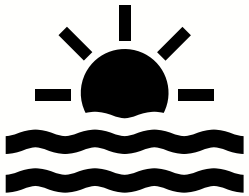
- Promotion of a circular economy;
- Create a sustainable energy source;
- Marine life protection.

Research Objectives

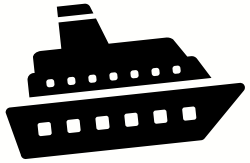


Analyze regional circulation patterns around the Canary Islands.

Identify potential source regions of plastics reaching the Canary Islands.



Assess the impact of seasonal variability on marine transport processes.



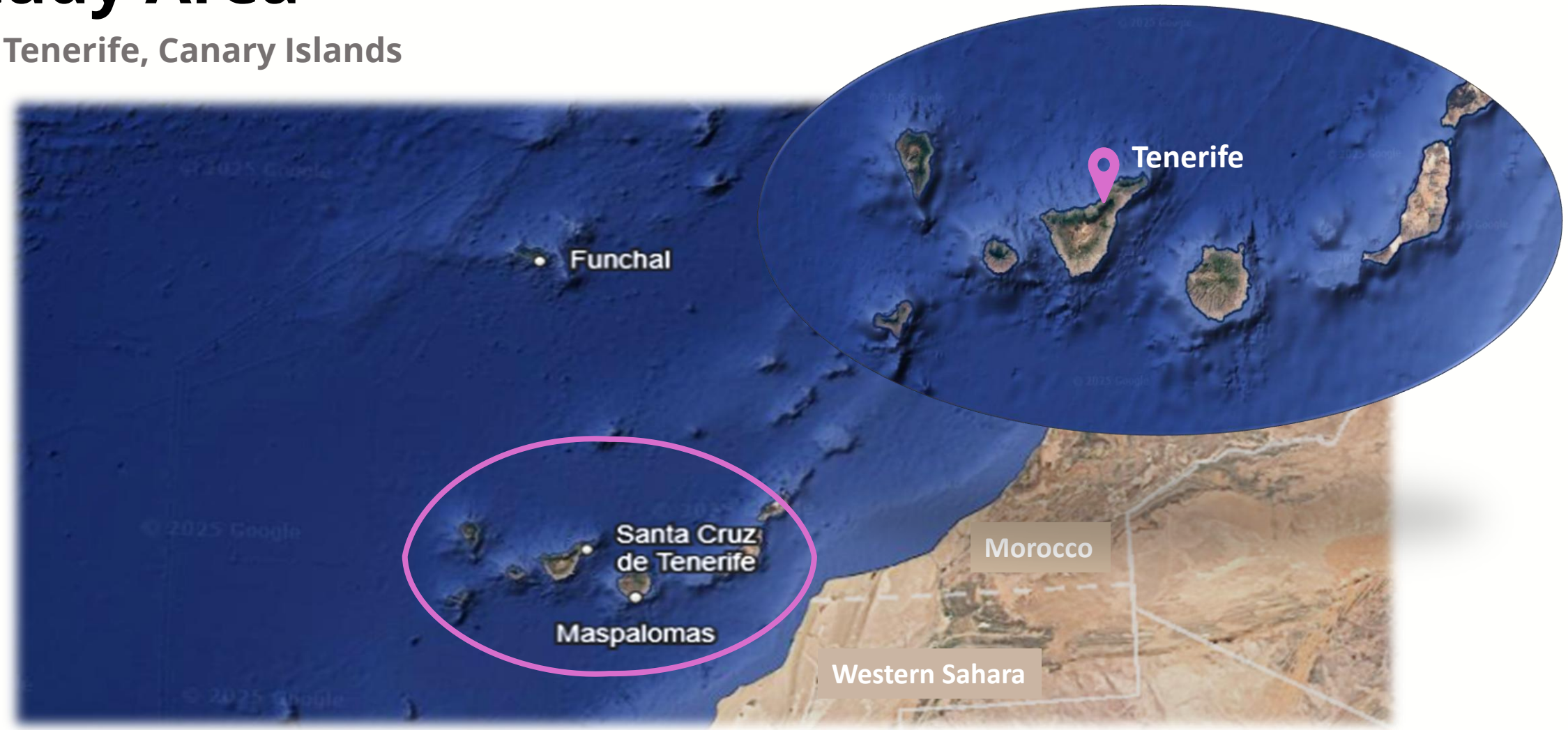
Evaluate the influence of external factors on plastic pollution.

Simulate the transport of different types of macroplastics

Accurately predict plastic accumulation zones along the coast of Tenerife.

Study Area

Tenerife, Canary Islands



Tenerife Study Case

Field Data

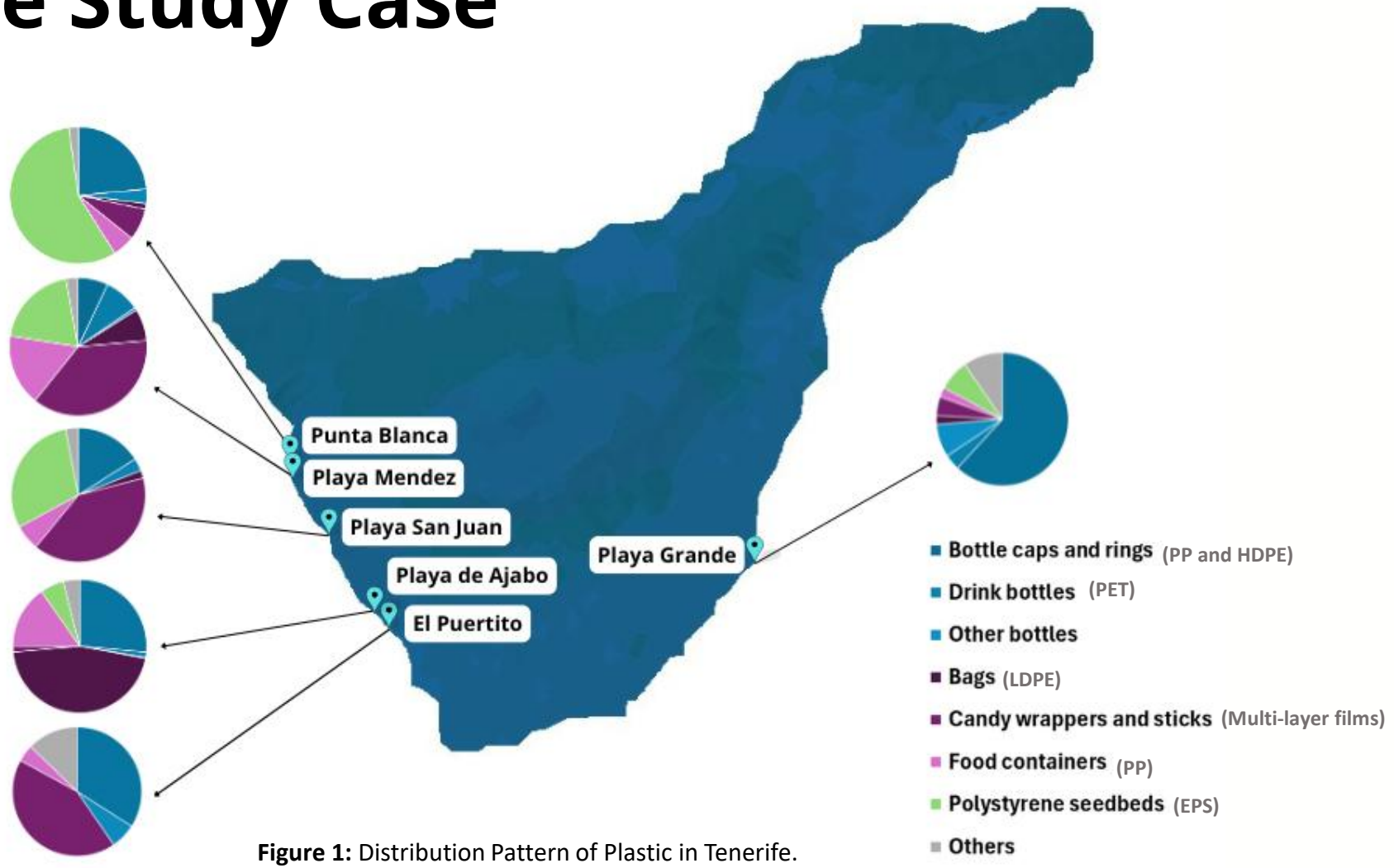


Figure 1: Distribution Pattern of Plastic in Tenerife.
Source: Innoceana

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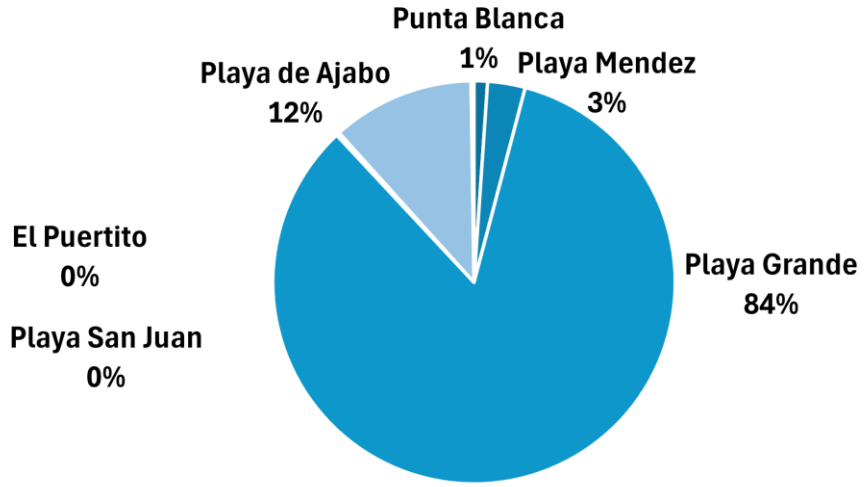
Field Data

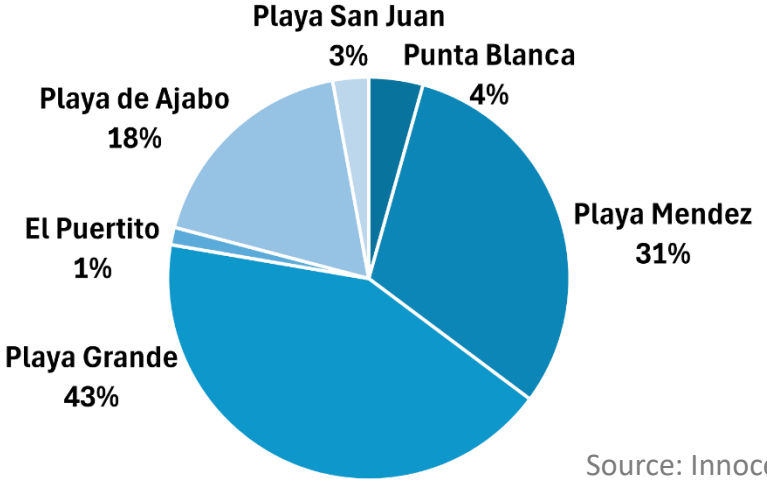
Beach	Urbanization	Cleanups	Distance (m)
Punta Blanca	Isolated	4	418
Playa Mendez	Quiet	4	51
Playa Grande	Quiet	5	180
El Puertito	Semi-urban	1	464
Playa de Ajabo	Semi-urban	1	300
Playa de San Juan	Semi-urban	3	511

Table 1: Summary of Beach Characteristics and Cleanup Activities (February–December 2024).
Source: Innoceana, Tenerife Tourism Corporation

Mass of plastics per beach:



Units of plastics per beach:



Source: Innoceana

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Hydrodynamic

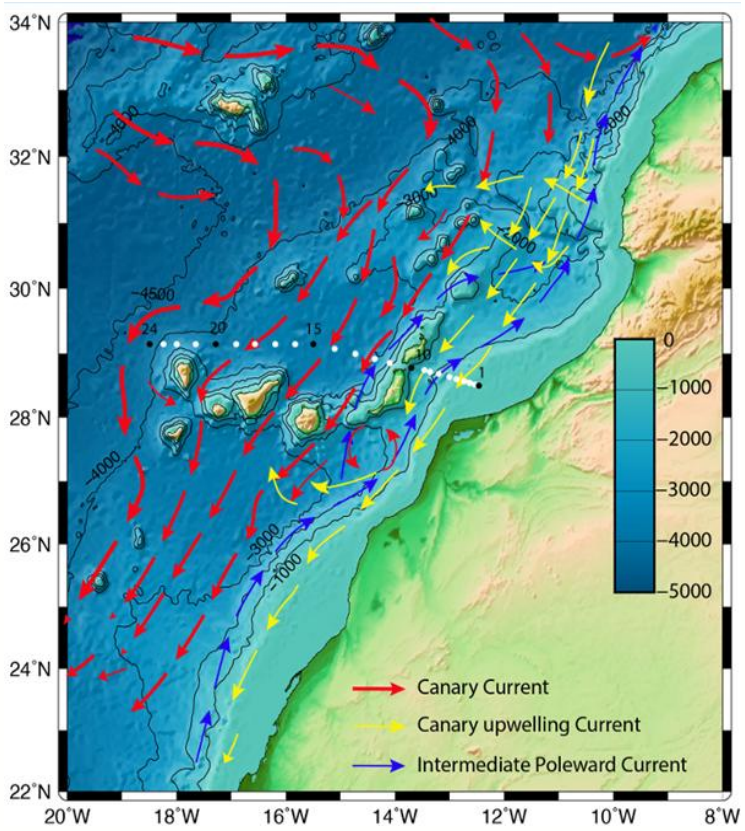
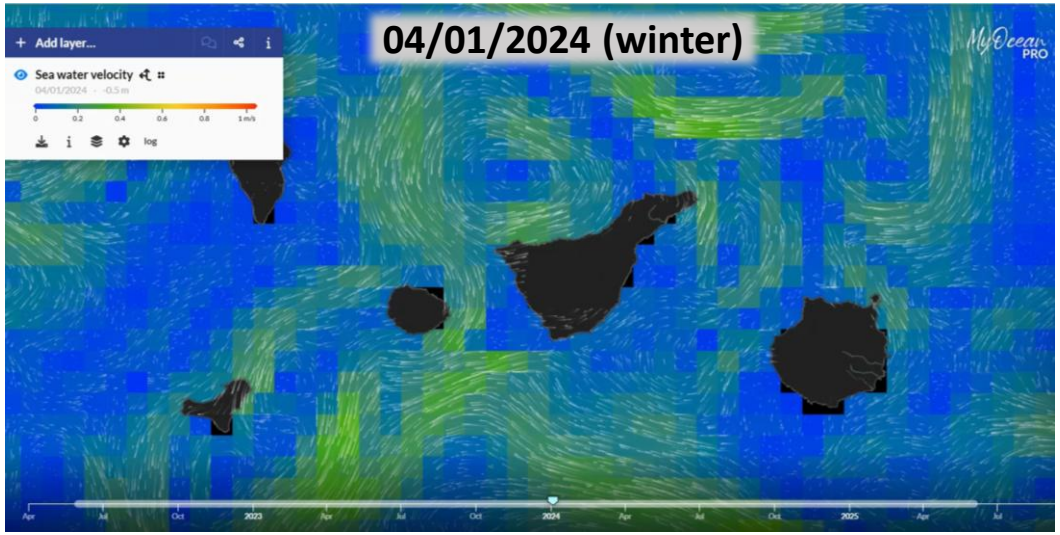
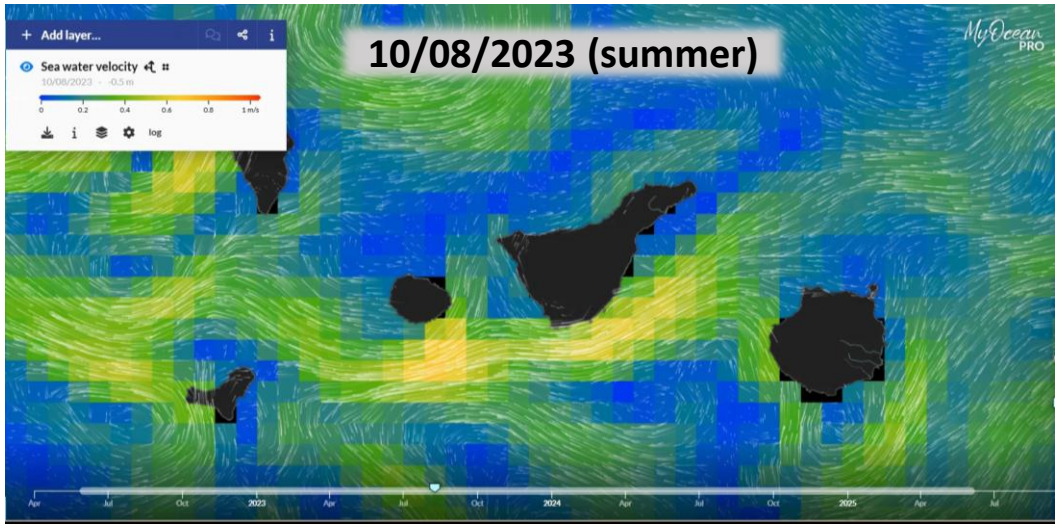


Figure 2: Circulation Scheme around the Canary Islands.

Source: ICES Report on Ocean Climate 2021





Source: Copernicus Marine

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Hydrodynamic - Seasonality

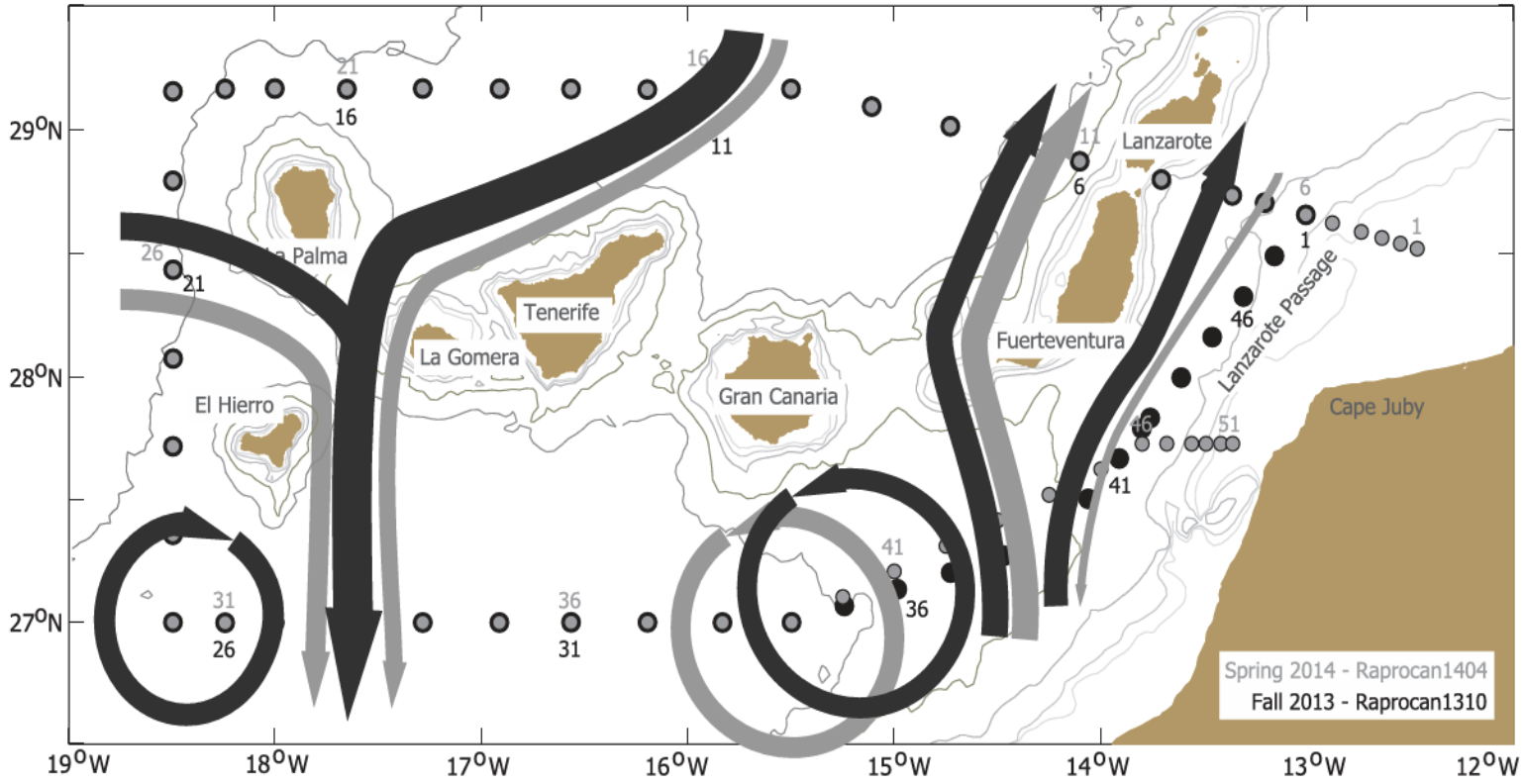


Figure 3: Mass transport variability between fall and spring.
Source: Vélez-Belchí et al. (2017), *J. Geophysical Research: Oceans*

Tenerife Study Case

Methodology

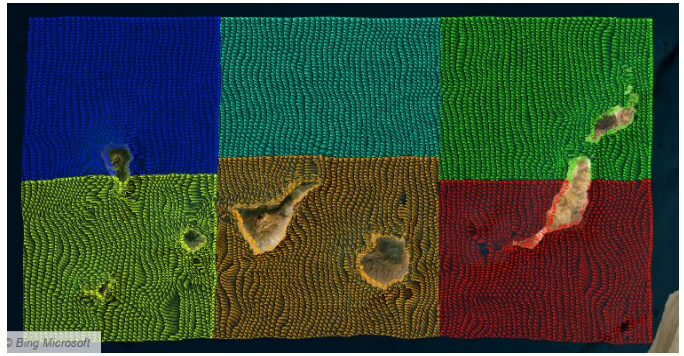
- **Source Identification**
  Divide the domain into multiple release zones to determine which ones contribute to tracer arrivals near Tenerife.
- **Seasonal Simulations**
  Run simulations across different seasons to evaluate the impact of seasonal variability on the plastic transport.
- **Plastic Type & Size Variability**
  Simulate different plastic types and sizes to capture diverse transport behaviors.
- **Sensitivity to Hydrodynamic Resolution**
  Assess the influence of the horizontal resolution of the hydrodynamic model on the results.
- **Accumulation Mapping**
  Combine realistic release conditions and plastic properties to simulate probable pathways and identify high-risk accumulation zones near Tenerife.

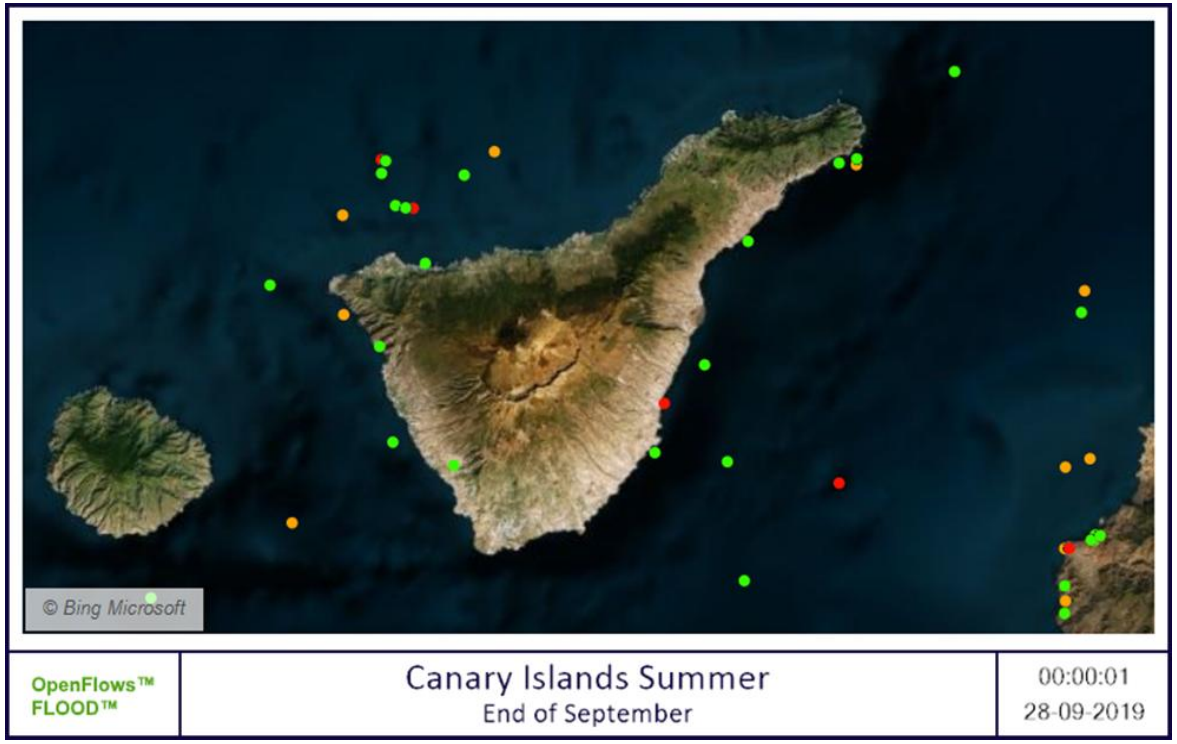
Tenerife Study Case

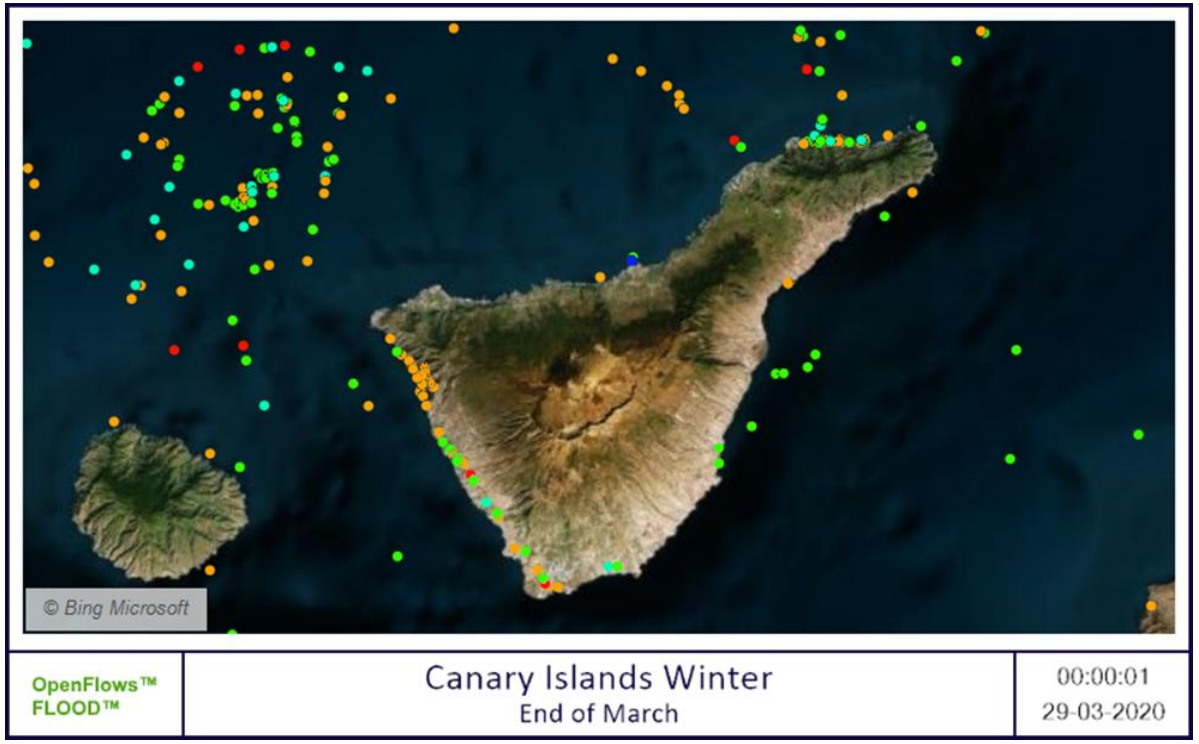
Results

Tenerife Study Case

Results







Tenerife Study Case

Next Steps

Study Land-Retained Tracers (on going)
Determine the origin of tracers retained on land and analyze accumulation patterns.

Compare Plastic Types (on going)
Analysis of transport variability with different plastic categories (e.g. PET, HDPE, PP).

Sensitivity Analysis
Compare results with different hydrodynamic resolution

Model Current Timeframes
Run simulations for present-day periods.

Identification of accumulation areas
Simulation with realistic conditions to predict accumulation hot-spots.

Thank you for your attention!

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