



Coastal & Offshore Modelling Symposium

COMS2026



Ocean Modelling at the Marine Institute Overview of Models and Services

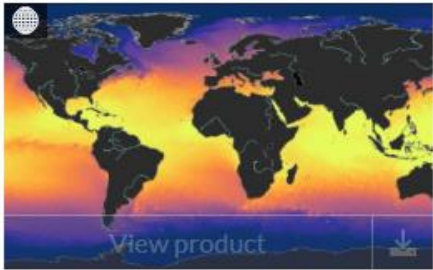
Diego Pereiro
Marine Institute



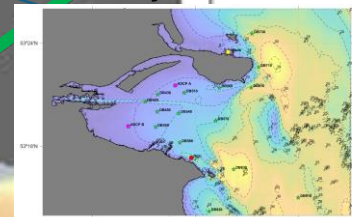
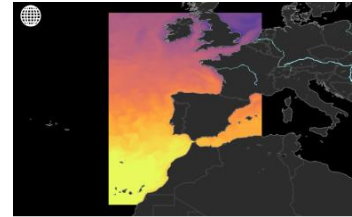
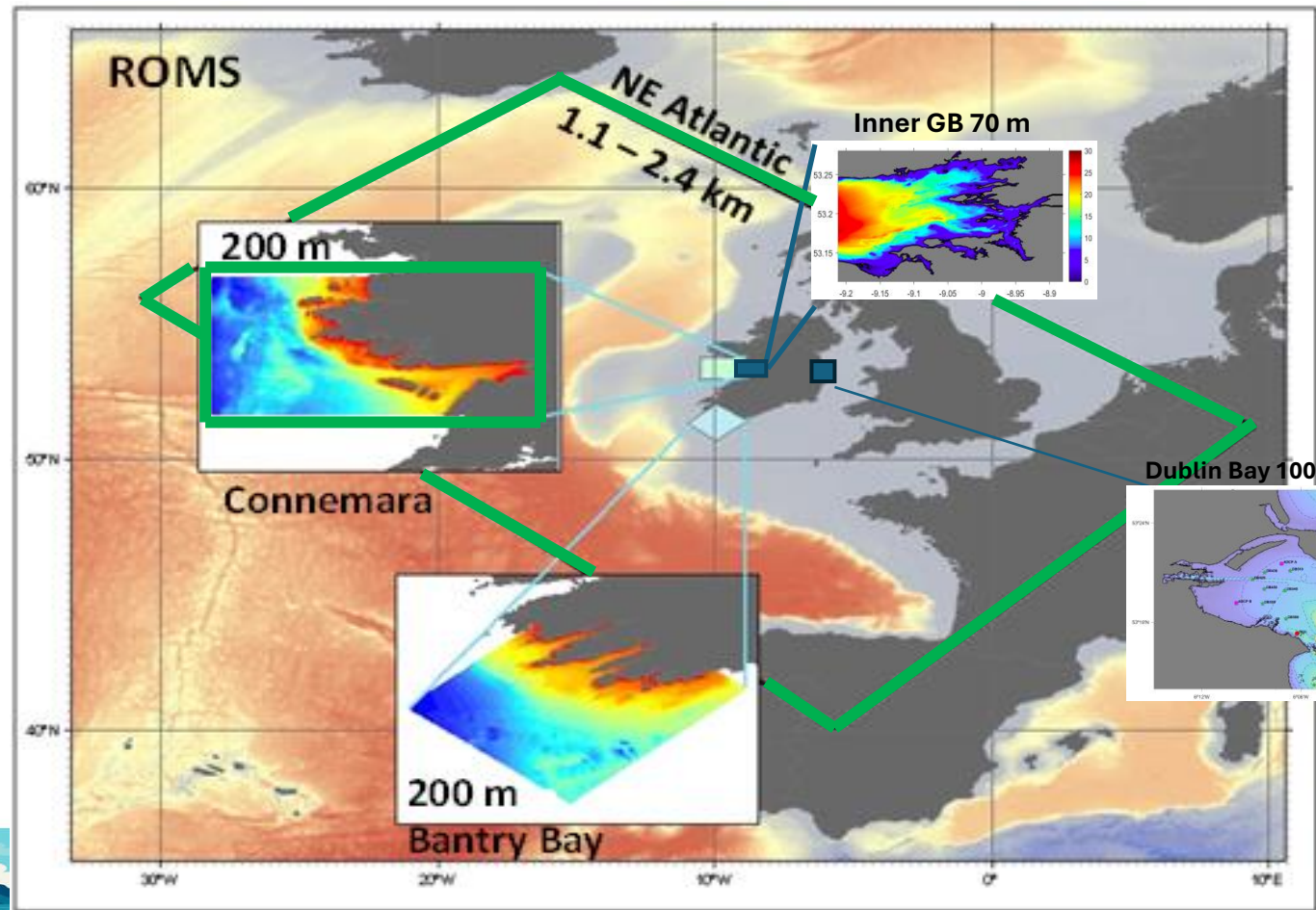
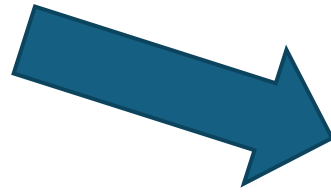
26 Feb, 2026
Cork, Ireland

Hydrodynamics

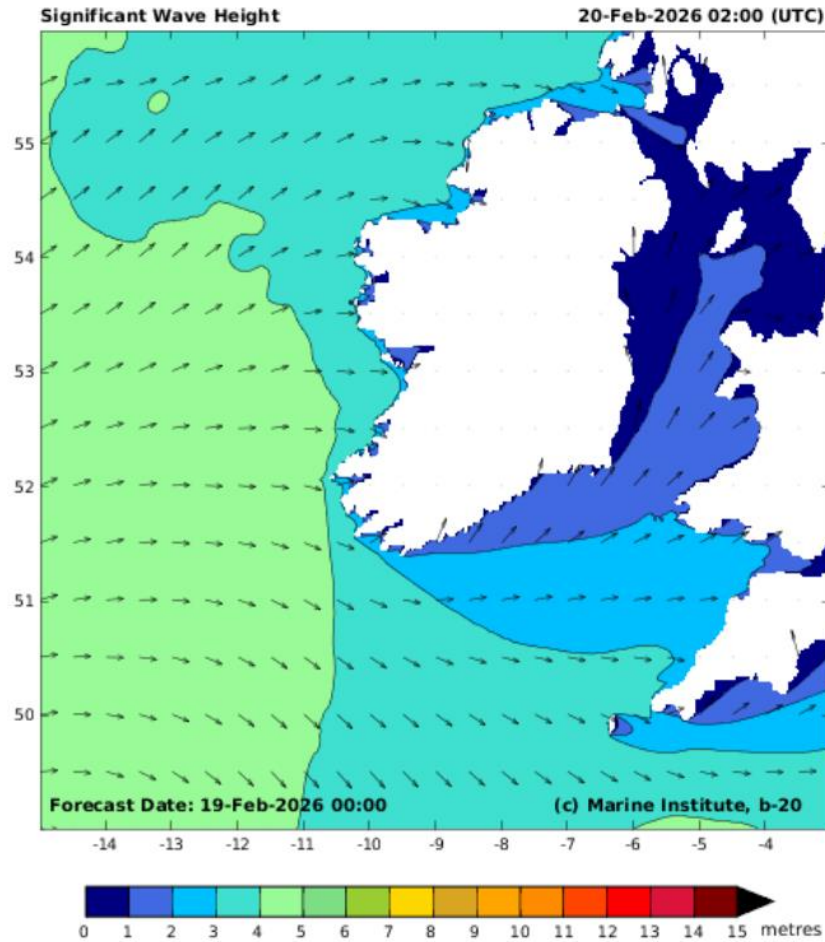
IBI Analysis and Forecast



Global Ocean Physics Analysis and Forecast ☆



Waves



Irish Shelf 0.025 deg
Connemara 200 m

Description	The East_Atlantic model is an implementation of SWAN for a domain covering Irish coastal and oceanic waters.
Type	Hindcast and Forecast Wave parameters
Code	SWAN 40.91A
Grid size	800x940
Resolution	0.025 degrees
Initialisation	Each daily simulation is a 13-day simulation initialised from rest
Wind Forcing	1-Hourly ECMWF operational forcing
Open Boundary Conditions	CMEMS global wave model, GLOBAL_ANALYSIS_FORECAST_WAV_001_027-TDS
Data assimilation	No
Simulation length	13 days: 7-day ramp-up/hindcast; 6-day forecast
Model Run Frequency	Daily
Model Output	3-hourly for spatial fields; 30-minute time series at discrete locations. Format is Matlab binary (*.mat files)

Search & Rescue (web app)

ADRIFT

Marine Institute predicted sea surface tracking.

LATITUDE. Please, enter the approximate latitude where the body entered the water. Alternatively, drag the marker on the map on the right.

LONGITUDE. Please, enter the approximate longitude where the body entered the water. Alternatively, drag the marker on the map on the right.

RADIUS. Use the slider below to select a radius of dispersion around the centre. This is used to account for uncertainties on the location where the body entered the water.

250 metres

ENTRY TIME. Please, enter the time when the body entered the water. If the entry time is known with high accuracy, select the "Exact time" option. Otherwise, select the "Time interval" option. **Notice that all the times to be selected in the calendar forms below are in Dublin time. Mind the offset with your local time, if any.**

Time interval Exact time

START. Please, enter the earliest time when the body may have entered the water.

Available: from 2024-09-01T23:00:00Z to 2024-09-21T23:00:00Z (UTC)

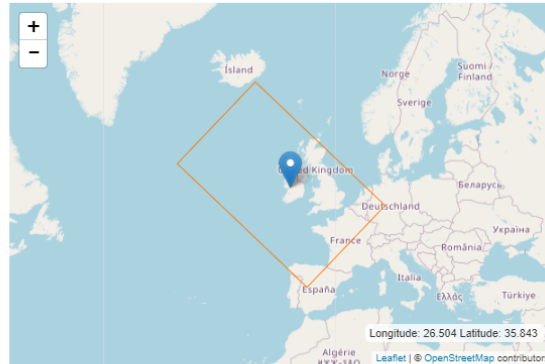
END. Please, enter the latest time when the body may have entered the water.

Available: from 2024-09-01T23:00:00Z to 2024-09-21T23:00:00Z (UTC)

END OF SIMULATION. Please, enter the end time of the simulation.

Available: from 2024-09-01T23:00:00Z to 2024-09-21T23:00:00Z (UTC)

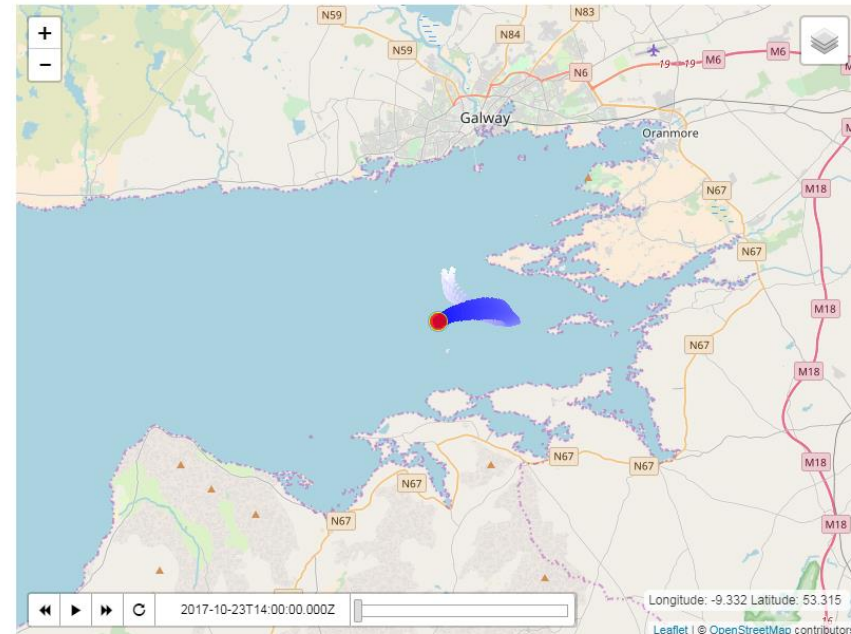
OBJECT TYPE. Select the object type from the drop-down list below.



ADRIFT

Marine Institute predicted sea surface tracking.

Project 2017-10-23 14:00 (click to rename)



Project Details

Created	2017-10-23T16:21:32Z
Start	2017-10-23T14:00:00+00:00Z
End	2017-10-24T02:00:00+00:00Z
Location	53.1949271207, -9.0795135498
Radius	250
Particles	1000
Model	connemara_his

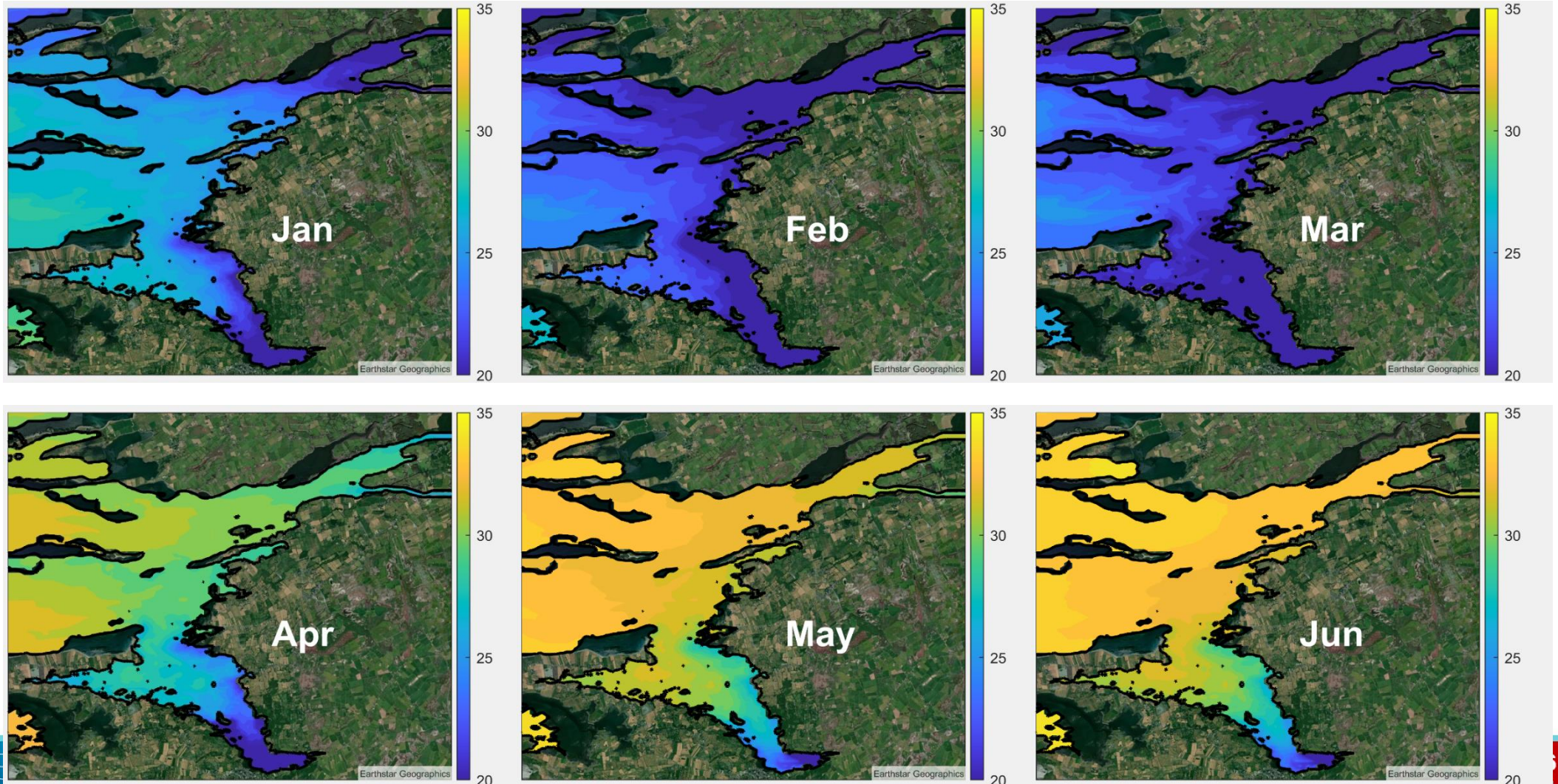
Current Display

UTC Time	2017-10-23T14:00:00.000Z
Local Time	Mon Oct 23 2017 15:00:00 GMT+0100 (GMT Daylight Time)

Downloads

Generated NetCDF File

Salinity Distribution: Native Oyster mariculture and restoration



ncui

Location
Galway

View
Bay

Module
Climate View

tomasz.dabrowski@marine.ie

Climate view

Parameter configuration

Parameter
Salinity

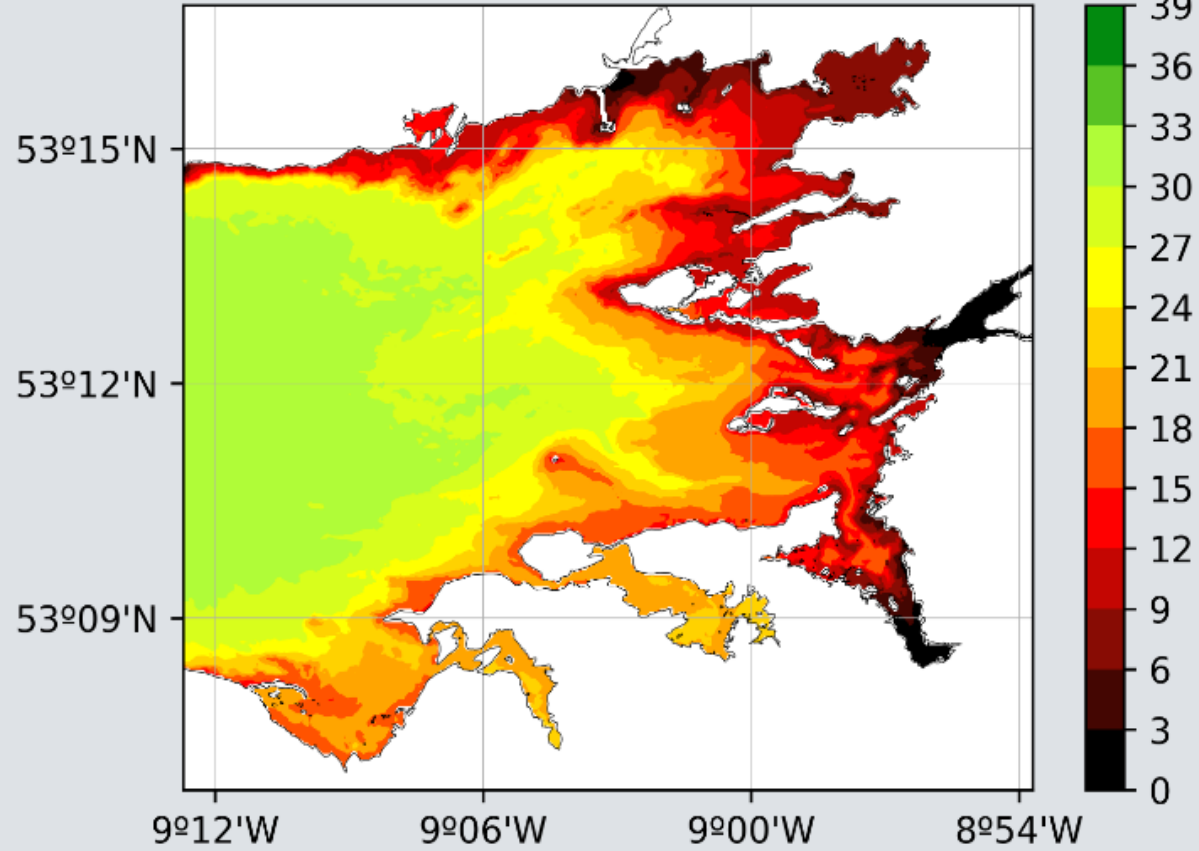
- Temperature
- Salinity**
- Bottom Shear Stress
- Wave Kinetic Energy
- Minimum

Date

Frequency
Multi-year




Multi-year
All years

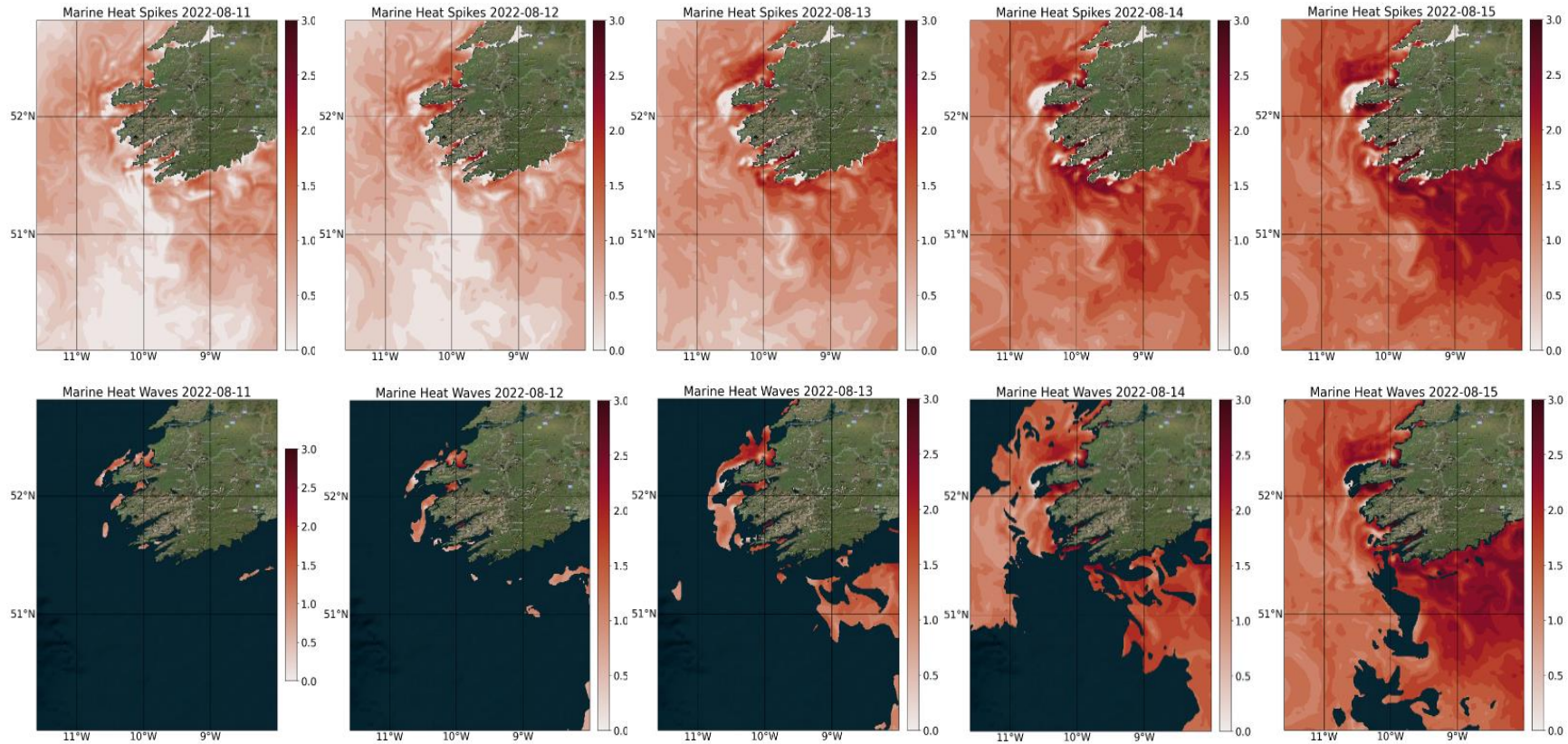
Show





Renville 53°14'33.7"N 08°57'59.6"W

 <p>FALLING TIDE</p>	<p>Thu 19 23:10</p> <p>0.6 m</p>	<p>LOW at 00:16</p> <p>0.0 m</p>	<p>HIGH at 06:29</p> <p>4.9 m</p>
 <p>Temperature</p>	<p>Thu 19 23:10</p> <p>6.8 °C</p>	<p>Min. 3 days</p> <p>Fri 20 01:00</p> <p>6.7 °C</p>	<p>Max. 3 days</p> <p>Sun 22 00:00</p> <p>8.0 °C</p>
 <p>Salinity</p>	<p>Thu 19 23:10</p> <p>28 ppt</p>	<p>Sat 21 07:00</p> <p>25 ppt</p>	<p>Thu 19 23:00</p> <p>28 ppt</p>



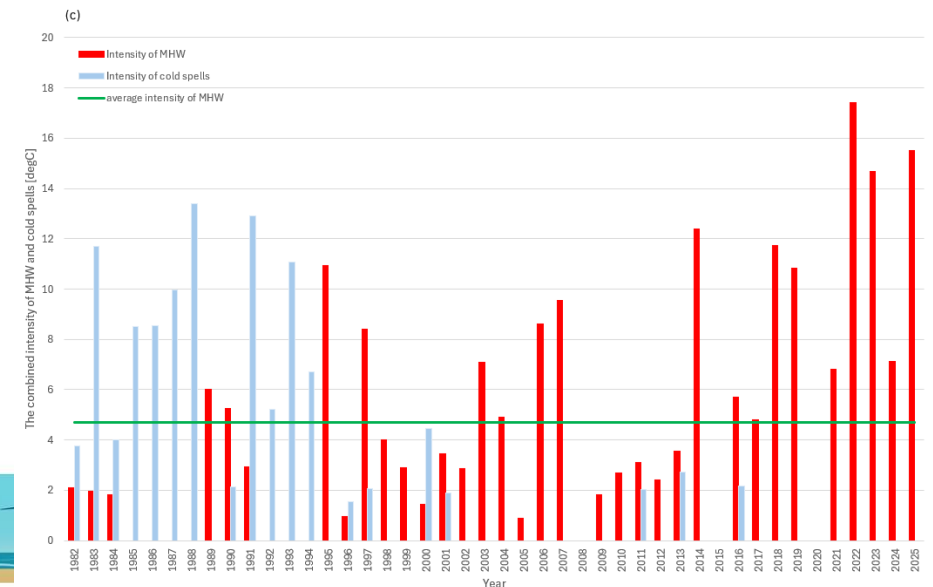
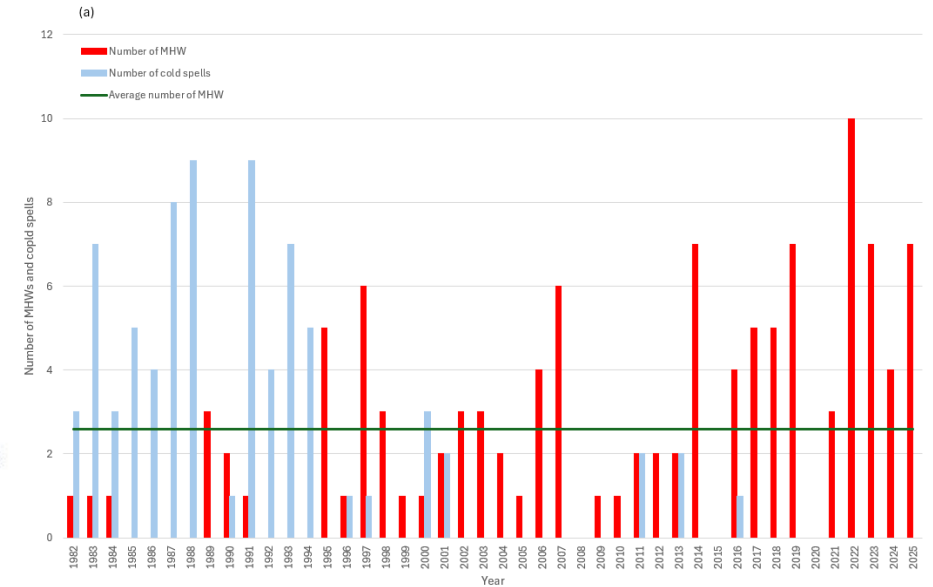
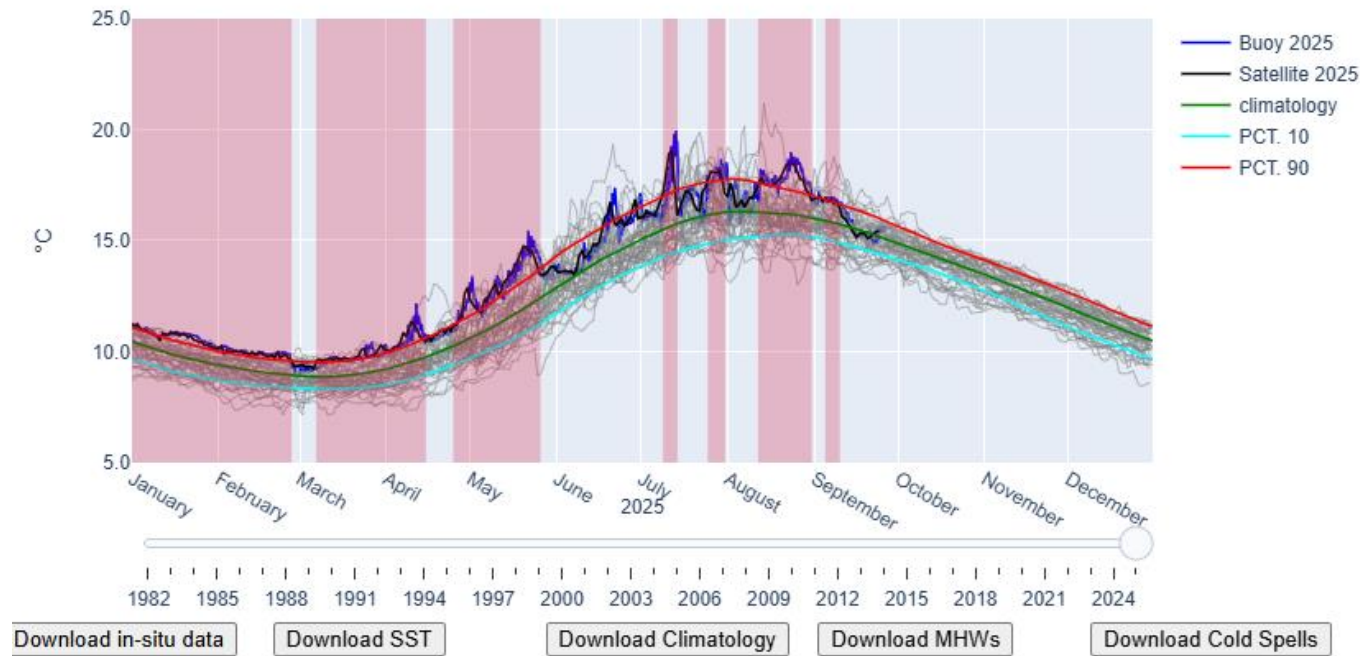
The frequency, duration and intensity of Marine Heat Events, such as Marine Heat Waves (MHWs) are of great concern for a wide range of stakeholders, including aquaculture farmers.

Current conditions and forecasts on MHWs are provided as a 2D visualization maps, highlighting the affected areas.

Marine Heatwaves & cold spells

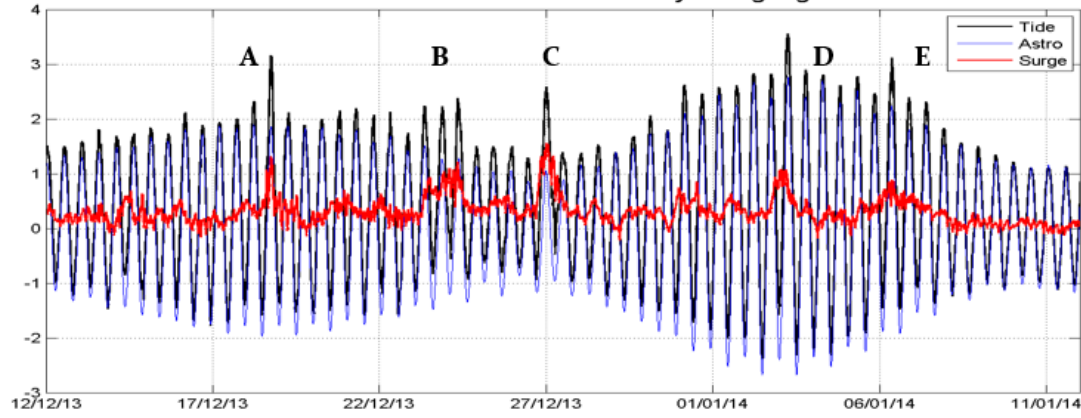
<https://www.marine.ie/site-area/data-services/remote-sensing/surface-temperature-historical>

OSTIA SST 51.675°N 6.725°W (M5)



Storm surges Winter 2013/14

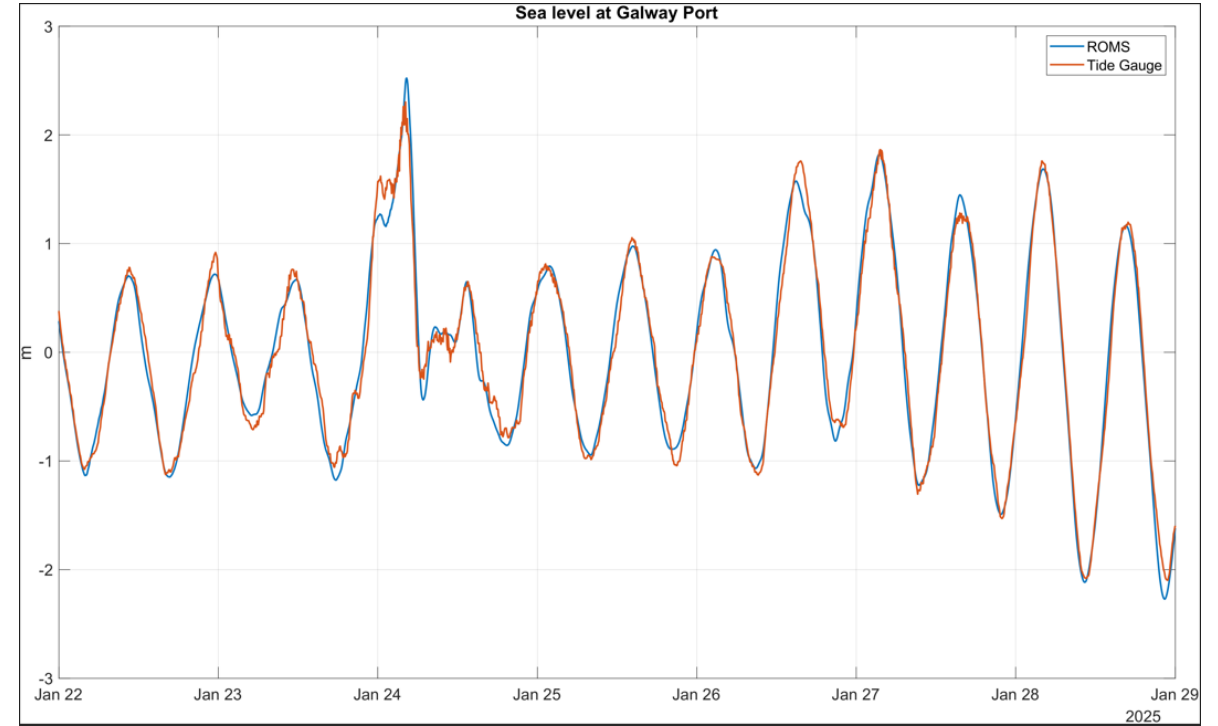
Recorded Water levels at Galway Port gauge



ROMS v GAUGE Zeroed Surge Galway Port



Sea level at Galway Port



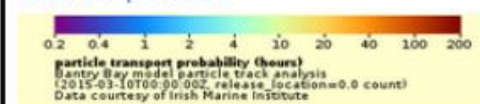
Harmful Algal Bloom warning

Ireland modelled data: Estimated Water Pathway

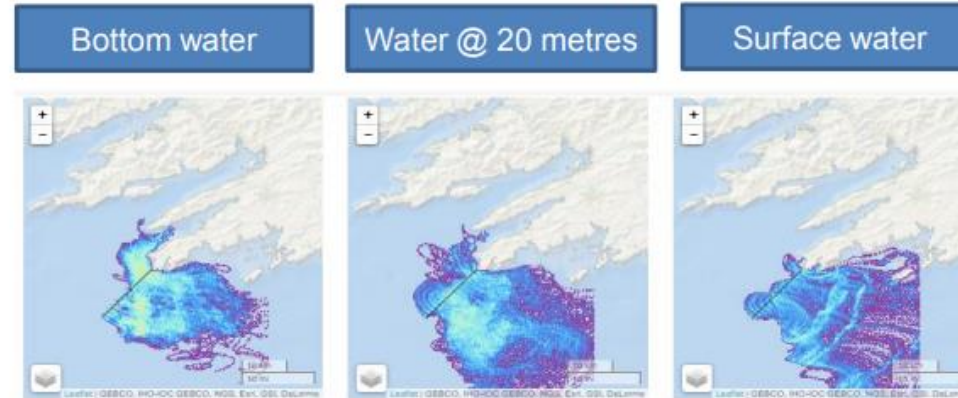
SOUTHWEST: Bantry Bay

The maps show the **most likely transport pathways for the next 3 days of phytoplankton** found along the **presented transects** (black lines off Mizen Head and the Mouth of Bantry Bay) and **water depths** (bottom, 20 metres and surface)

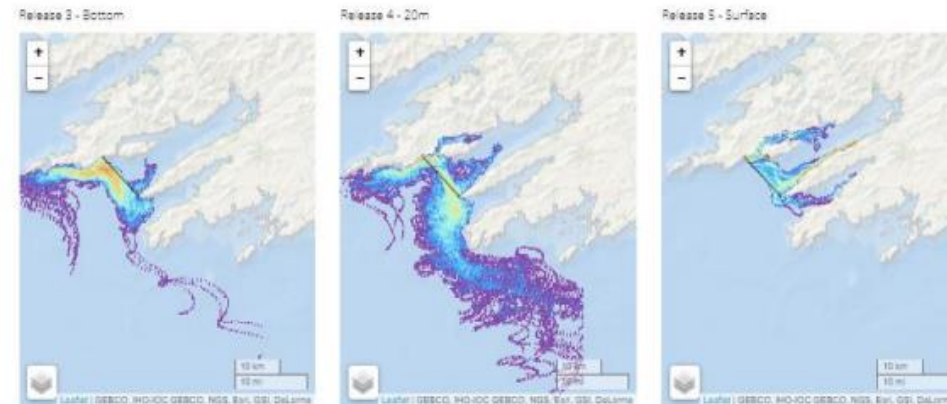
Reddish colours represent areas where phytoplankton remain longest
Cooler colours represent areas where phytoplankton remain for shorter periods



Forecast for the next 3 days

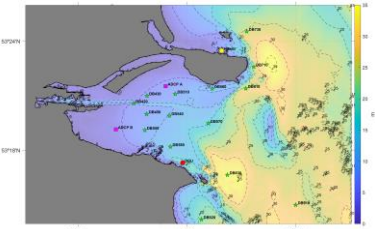
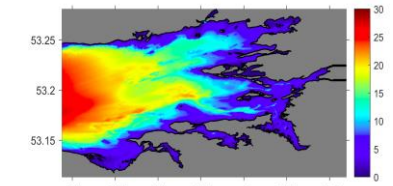
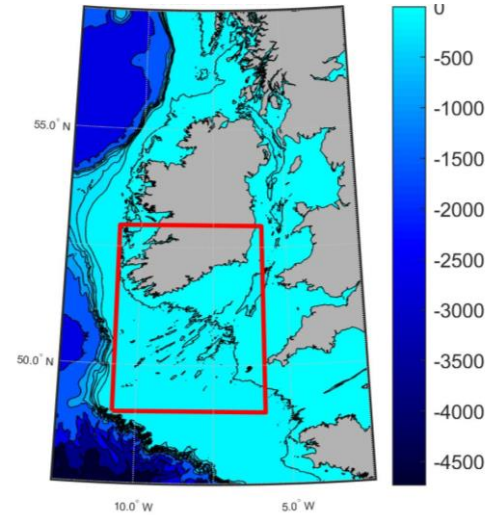
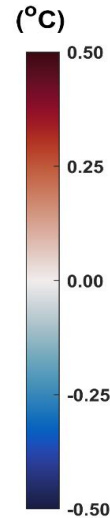
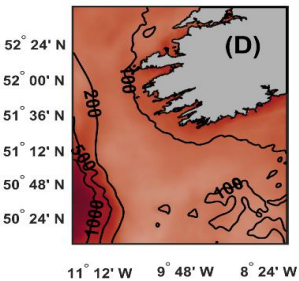
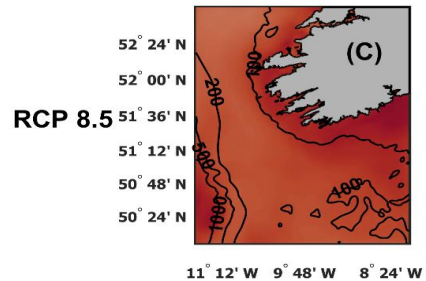
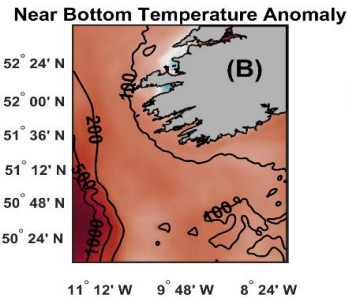
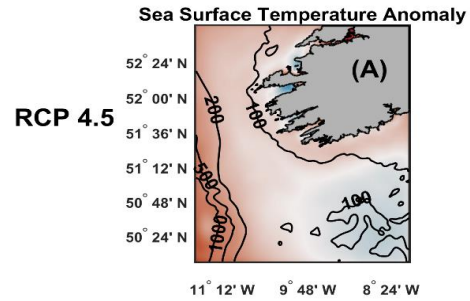


Strong well mixed south westerly transportation dominance in all depths .



Weaken downwelling transport conditions expected allowing decreased offshore waters into all inner bay areas.

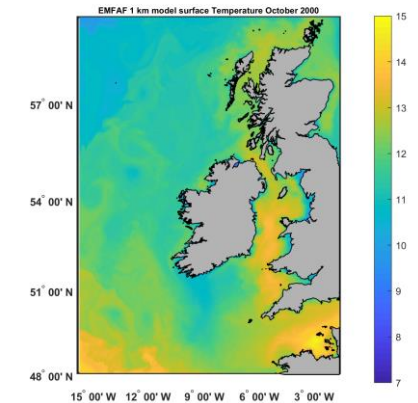
Climate modelling Physics & biogeochemistry



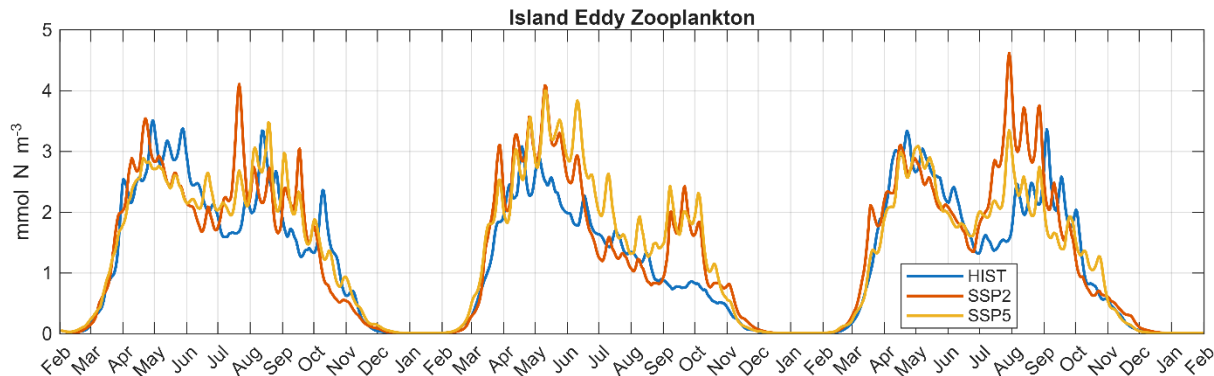
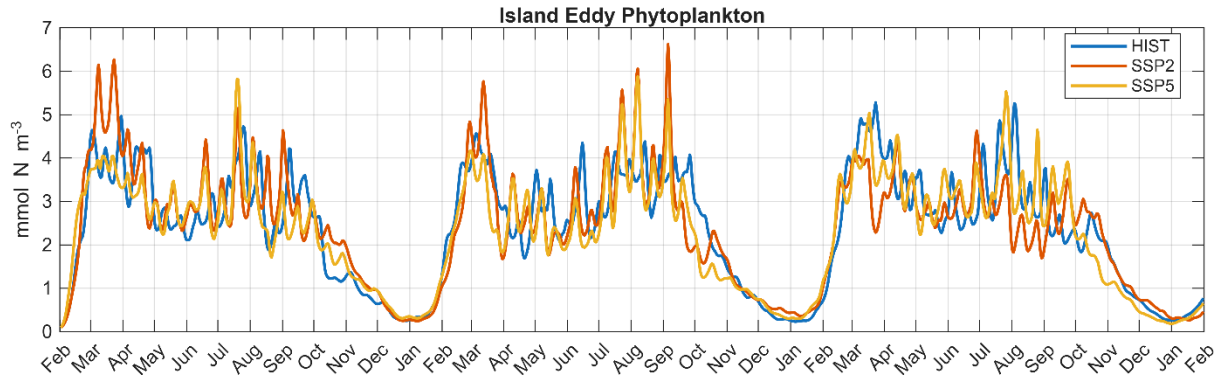
Sea level, temperature, salinity, currents, fronts, stratification

Nutrients, phytoplankton, eutrophication, oxygen, carbonate system

Range of scenarios considered



Climate modelling Physics & biogeochemistry



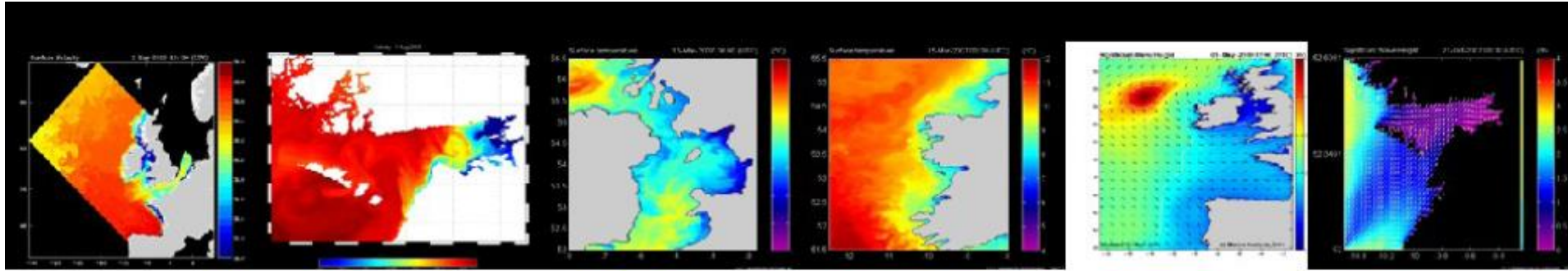
EPA-funded WFD-Futures project

BGC modelling of Galway Bay & Dublin Bay

Climate scenarios: Historical, SSP2, SSP5

Bays with low flushing rate like Galway Bay: higher NO_3 do not cause higher phytoplankton because of grazing: higher zooplankton and lower oxygen

Bays with high flushing rate like Dublin Bay: no noticeable impact except for areas closest to WWTP discharge



Type of models:

- Hydrodynamics (*ROMS, CROCO*)
- Waves (*SWAN*)
- Biogeochemistry (Fennel, PISCES)
- Shellfish (*DEB*)
- Oil spill (*OILTRANS*)
- Particle tracking (*Ichtyop, OpenDrift*)

Downstream services:

- Aquaculture (carrying capacity, HABs, fish larvae transport, disease spread, siting, MHW)
- Weather window
- Fisheries (egg and larvae transport, climatology maps, long term trends, MHW)
- Marine pollution (oil, litter, plastics)
- Storm surges (on request)
- Search and rescue and forensic investigations
- Leisure (sailing)
- Policy support (e.g. MSFD, WFD, OSPAR)
- Wave energy