Stato di avanzamento dell'implementazione del modello SHYFEM e simulazioni

State of progress of the implementation of the SHYFEM model and simulations

CASCADE | PP4 | Alessandro Minigher

Web Meeting | 28th September 2021

European Regional Development Fund

Introduction: the Modeling System

Integrated modeling system

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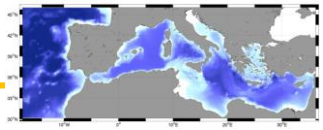
Regional scale

- **MedFS** model (CMEMS)
- Mediterranean Sea → **Adriatic Sea**
- **Low** spatial **resolution** (4 km × 4 km)
- **No data** near the **coast** and in the Marano-Grado **lagoon**
- Fully **operative**



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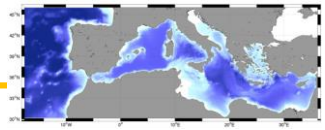

Marine initial & boundary conditions

Pilot scale

- **SHYFEM** model (CNR-ISMAR)
- **Gulf of Trieste** and **Marano-Grado lagoon**
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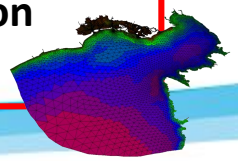
- **Not operative** yet



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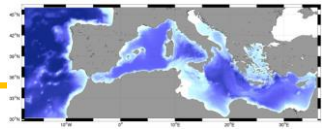

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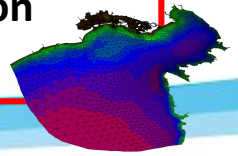
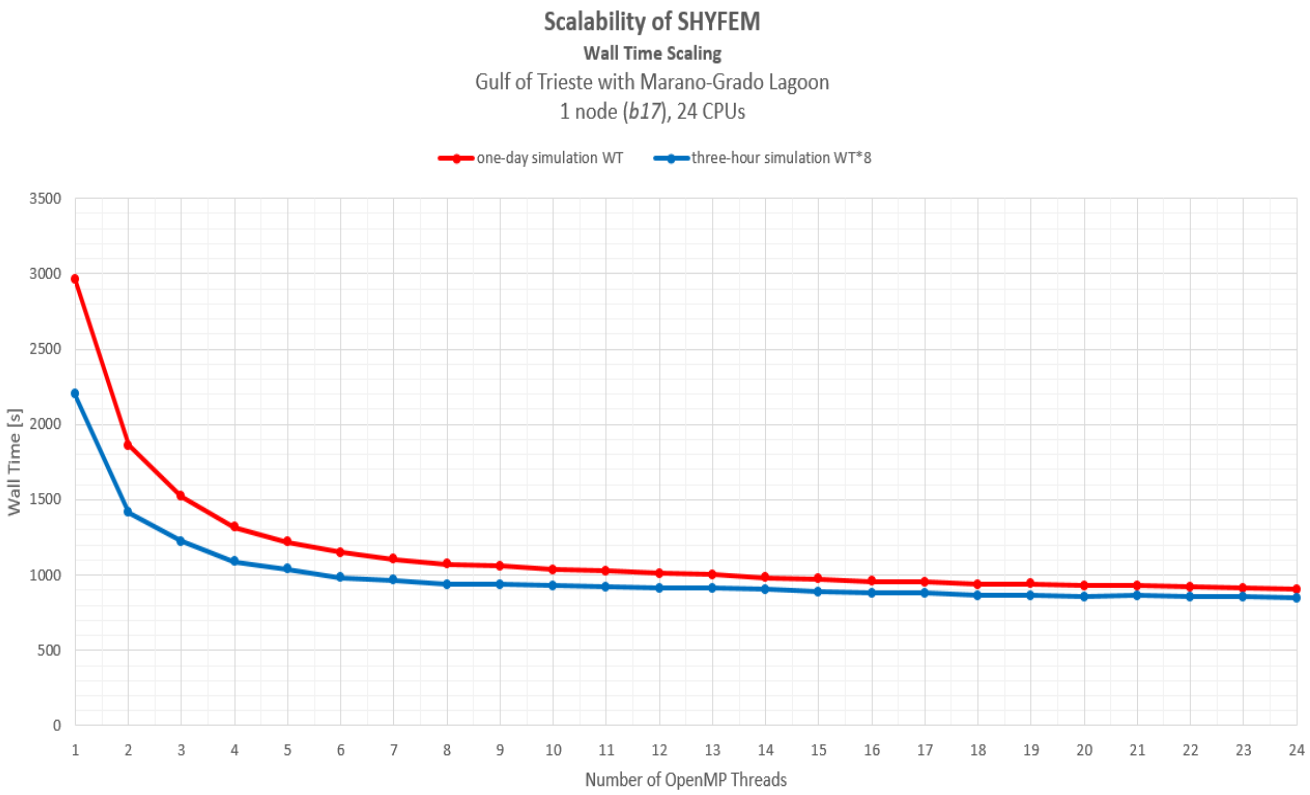
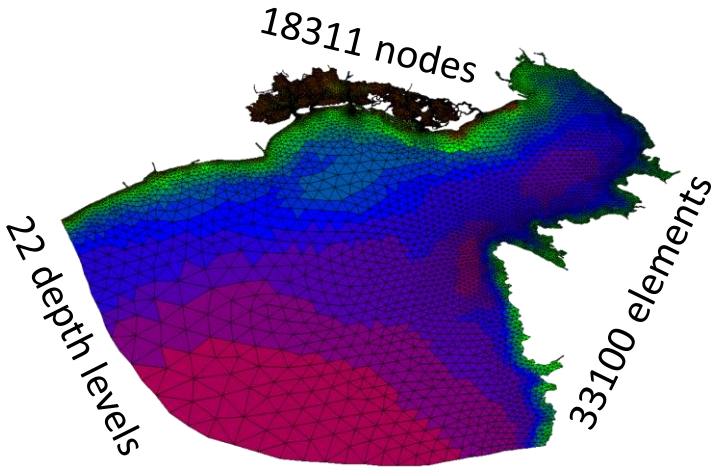


Outputs

Scalability of SHYFEM (v. 7.5.70) – Open MP





To simulate [days]	Wall time* [hours]
5 (forecast)	1.5
365 (analysis)	120**

* With 8 threads OMP

** Spin-up time ≈ 10 hours

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ARPA FVG
AGENZIA REGIONALE PER LA PROTEZIONE DELL'AMBIENTE DEL FRIULI VENEZIA GIULIA

Which Inputs does SHYFEM need?

Marine initial & boundary conditions:

- T, S
- currents
- water level

Source: CNR-ISMAR, CMEMS

Meteorological forcing:

- rain
- wind and air pressure
- heat

Source: CRMA – ARPA FVG (WRF)

River flows at the mouths:

- discharges

Source: Civil Protection FVG, CNR-ISMAR

Outputs

Sensitivity of the Marano-Grado Lagoon to Rivers: Simulation Setups

A

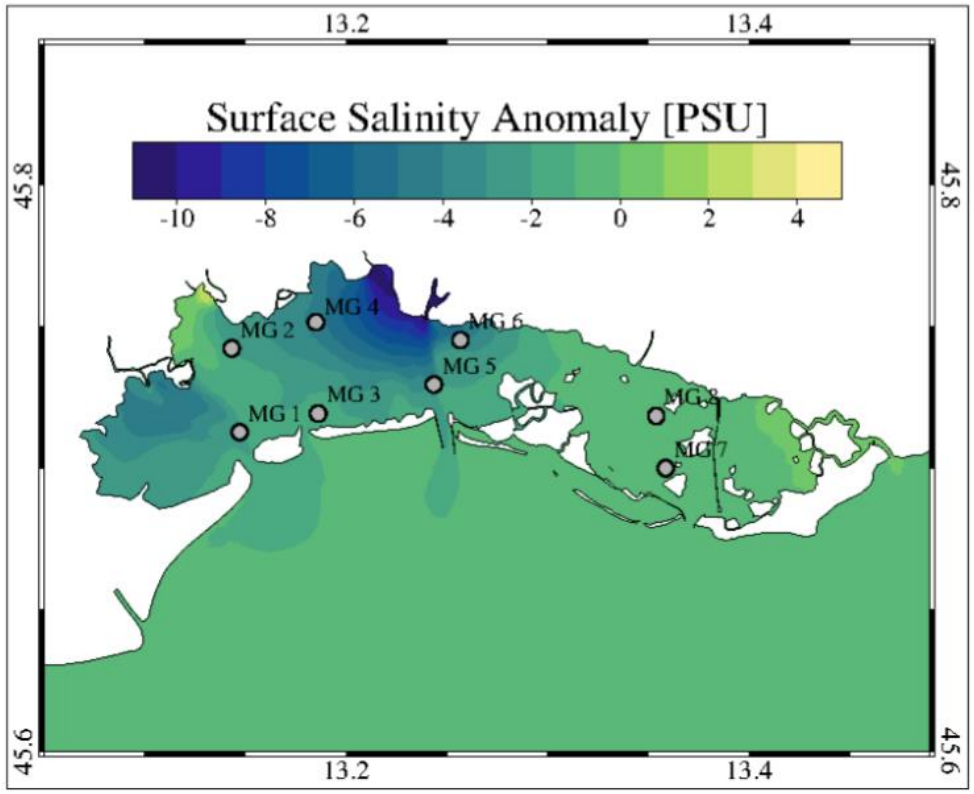
River/Torrent	Time Resolution	$\langle Q \rangle \pm \sigma_{\langle Q \rangle}$ [$m^3 s^{-1}$]	$\langle z \rangle$ [cm]	Data Source
Aussa	two daily	2.01 ± 0.16	-	CNR-ISMAR
Cormor	two daily	8.30 ± 2.07	-	CNR-ISMAR
Corno	two daily	3.59 ± 0.27	-	CNR-ISMAR
Stella	two daily	31.13 ± 1.78	-	CNR-ISMAR
Turgnano	climatological	-	0.5	CNR-ISMAR
Zellina	climatological	-	1.0	CNR-ISMAR

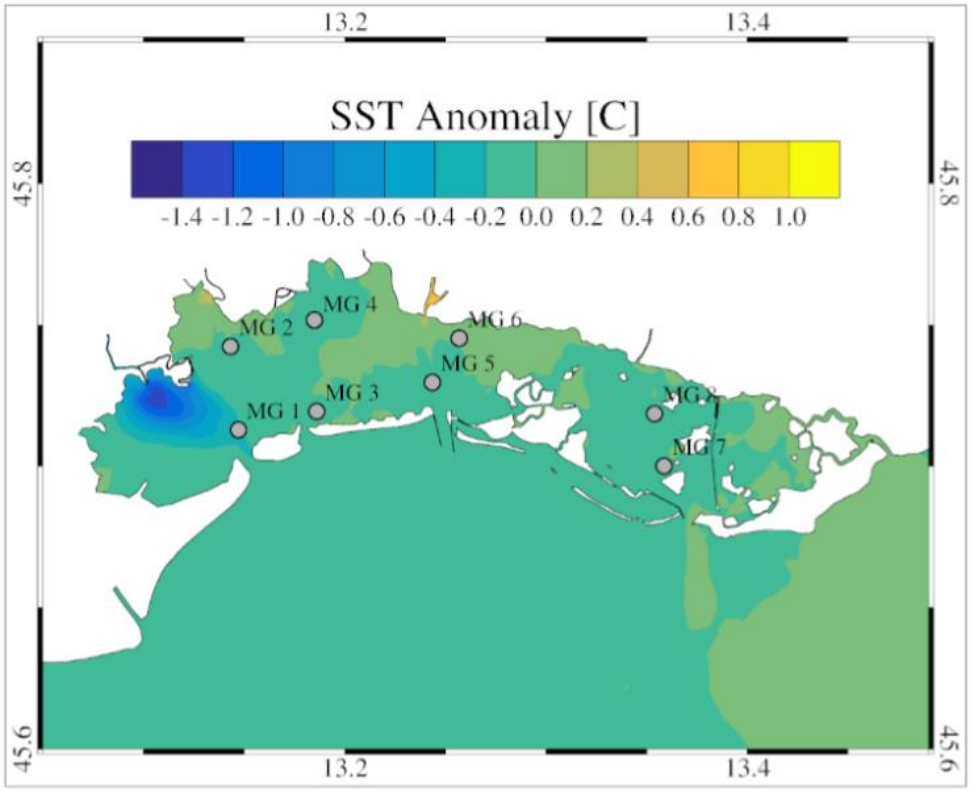
B

River/Torrent	Time Resolution	$\langle Q \rangle \pm \sigma_{\langle Q \rangle}$ [$m^3 s^{-1}$]	$\langle z \rangle$ [cm]	Data Source
Aussa	climatological	15	-	ERSA (1976)
Cormor	climatological	5	-	ERSA (1976)
Corno	climatological	12	-	ERSA (1976)
Stella	climatological	50	-	ENEA (1989)
Turgnano	climatological	1	-	Visentini F. (1962)
Zellina	climatological	2	-	ERSA (1976)

Sensitivity of the Marano-Grado Lagoon to Rivers: S & T anomalies

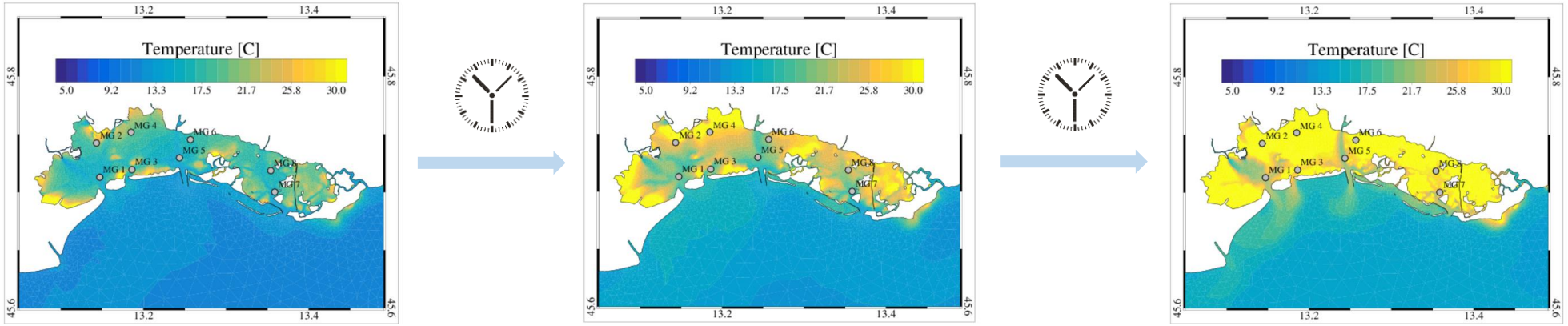
Anomalies = f(B) – f(A)





Time averages over the period 2020-08-01 - 2020-08-31

Current Problems: Temperature Drift



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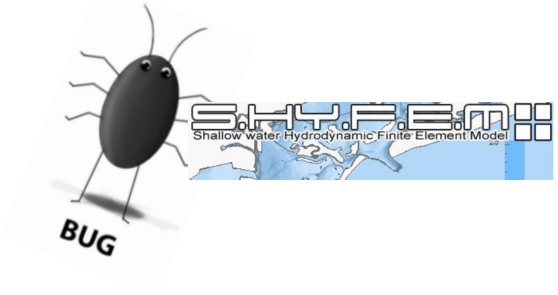

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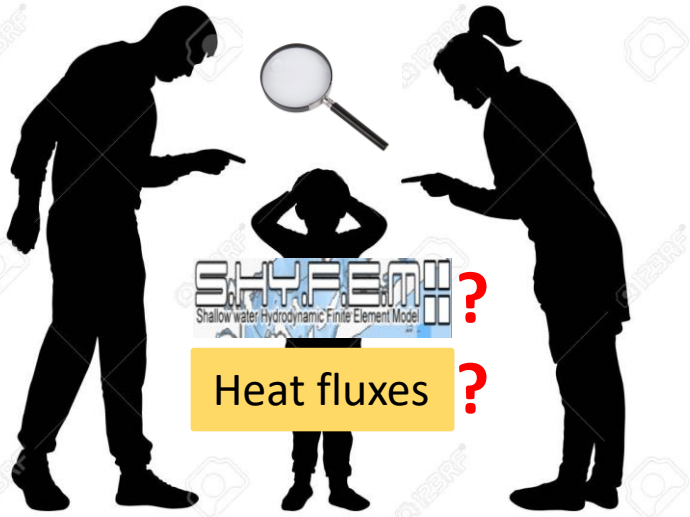

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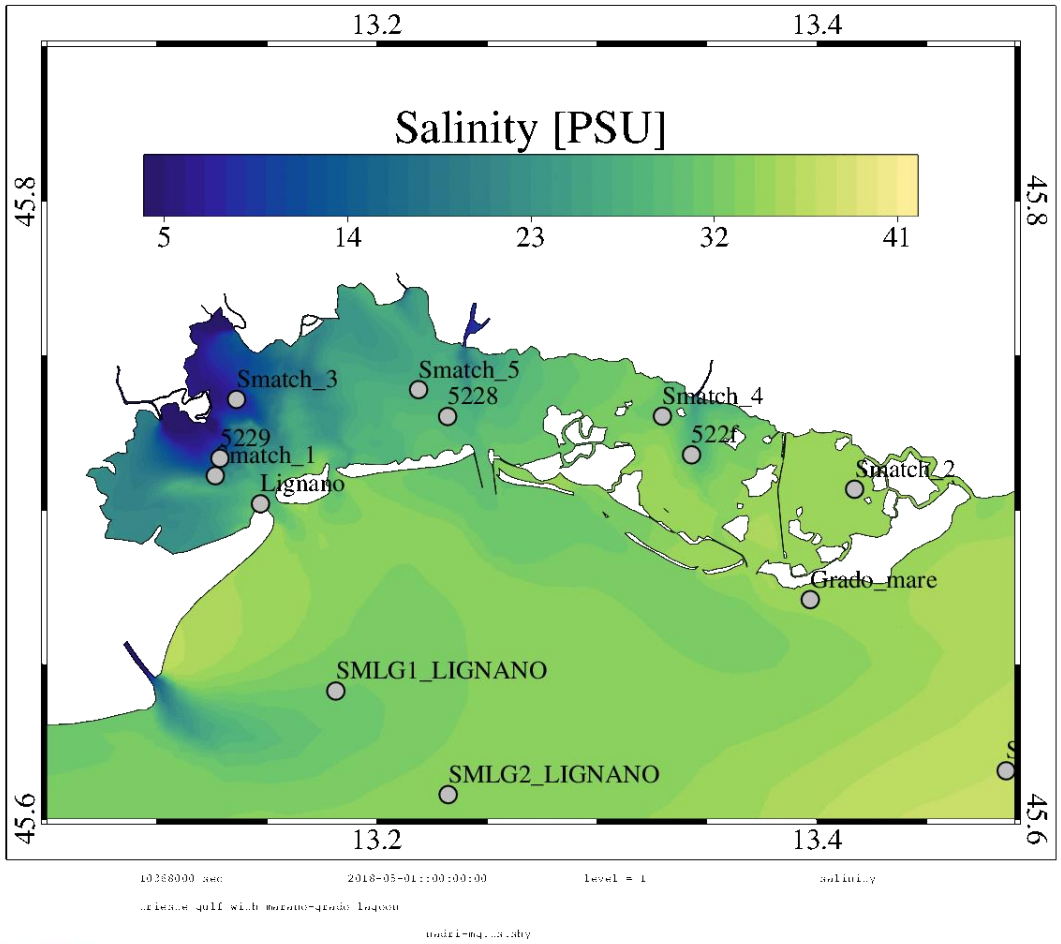
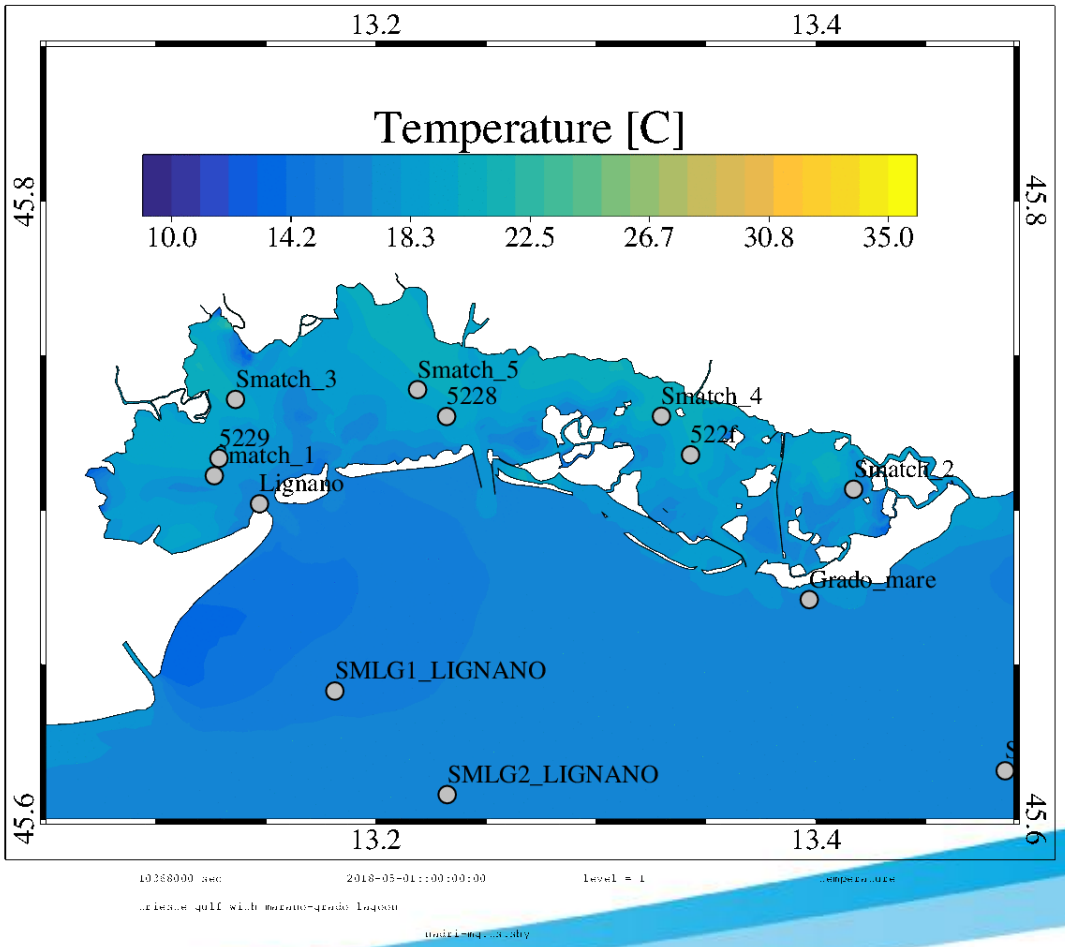
Annual, Hindcast Simulation





Future Developments

- Computation of the **spin-up** time of SHYFEM for the Pilot Area
- **Validation** and **calibration** of SHYFEM through **ARPA FVG** oceanographic **measurement campaigns** in the Gulf of Trieste and Marano-Grado lagoon
- **Implementation** of the **ARPA FVG** marine **forecasting system** for the Pilot Area

Act 4.2 Set up and testing of the integrated modelling system
D.4.2.1 Models simulations and forecasting systems implemented and products available (Gulf of Trieste and Marano-Grado lagoon)

CONTACT INFORMATION

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