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# HEAT

HARMFUL EFFECTS OF ANTHROPOGENIC HEATWAVES ON LAGOON BIVALVES, FISHERMEN, AND ECOSYSTEMS

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# THE DSSTTA CALL «STUPIRE»

**4 THEMATIC AREAS**

🏞️ **Resources**: from territorial resources to autonomy
🌎 **Territories**: integrated and sustainable management
🌱 **Relations**: the health of ecosystems
🌡️ **Changes**: preparedness, management, and adaptation to unwanted changes

**KEY POINTS OF THE CALL**

**Bold** and unconventional research
🌎 Focus on strategic topics, including:
•**Adaptation** to climate change
•Ecological transition and sustainability
•Society–environment interactions
•Promotion of new approaches and inter-institutional collaborations

**CALL RESULTS**

📩 Over 30 projects submitted
✅ 27 scored above 70/100

💰 5 projects funded

📍 *HEAT* is one of the 5 selected, with a strong transdisciplinary component: physics, climate, ecology, biology, economics, health



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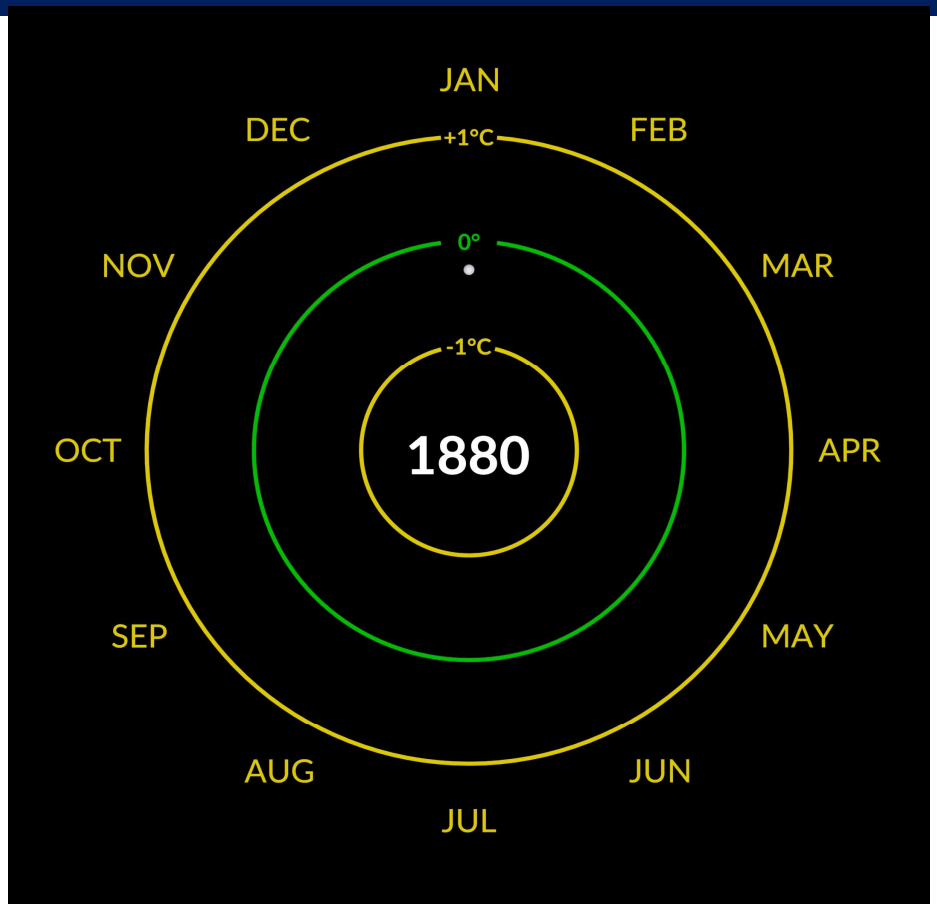
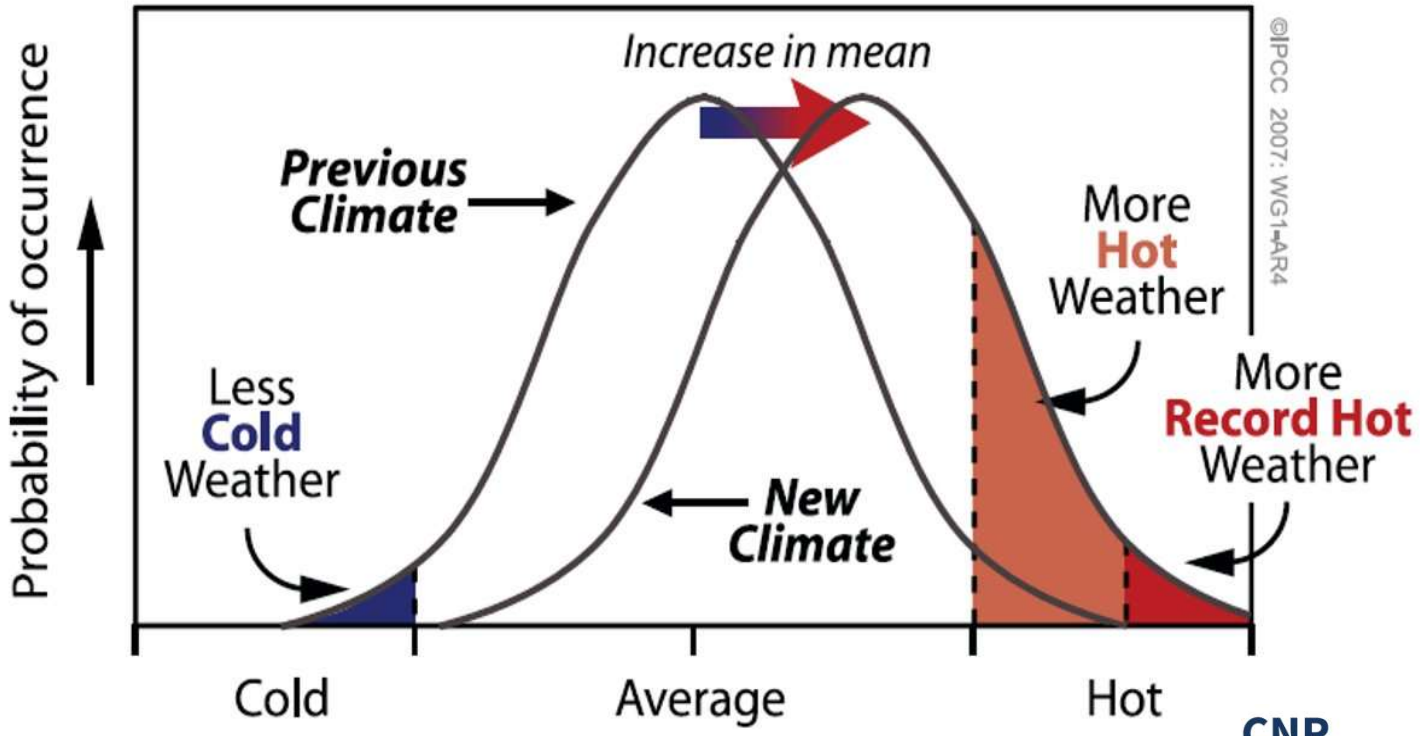
# THE CHANGING CLIMATE



# INCREASE OF EXTREME EVENTS…WHY DO?



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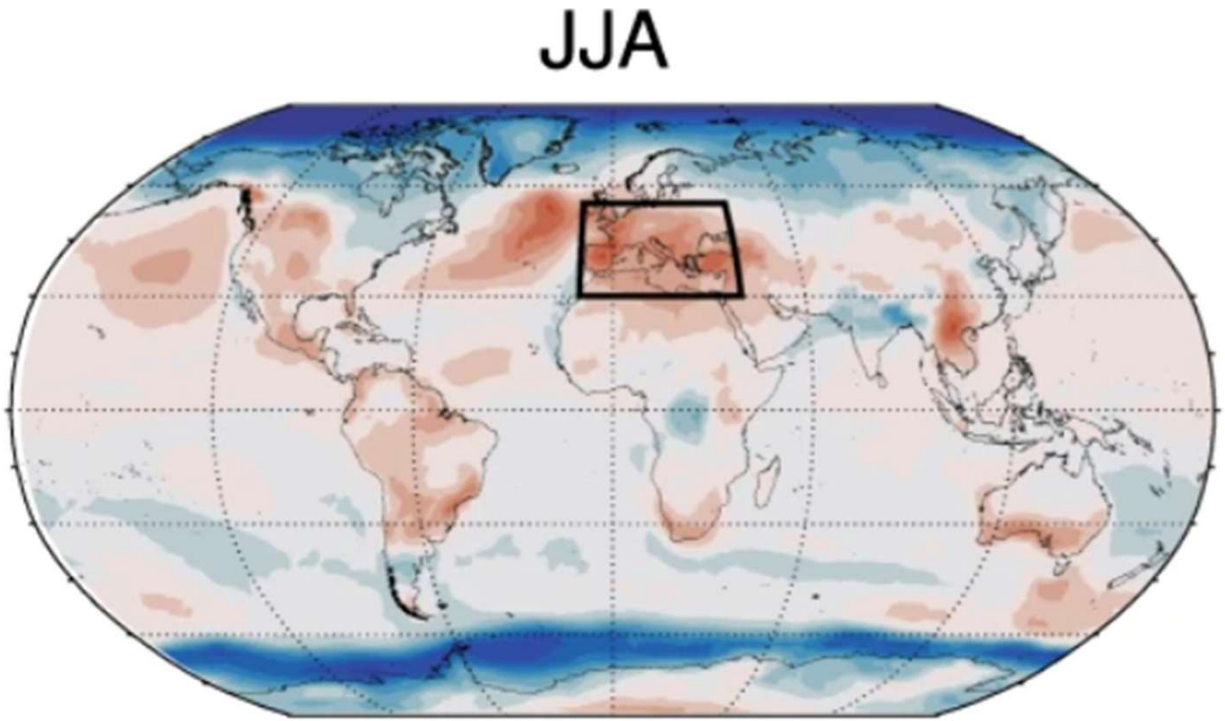
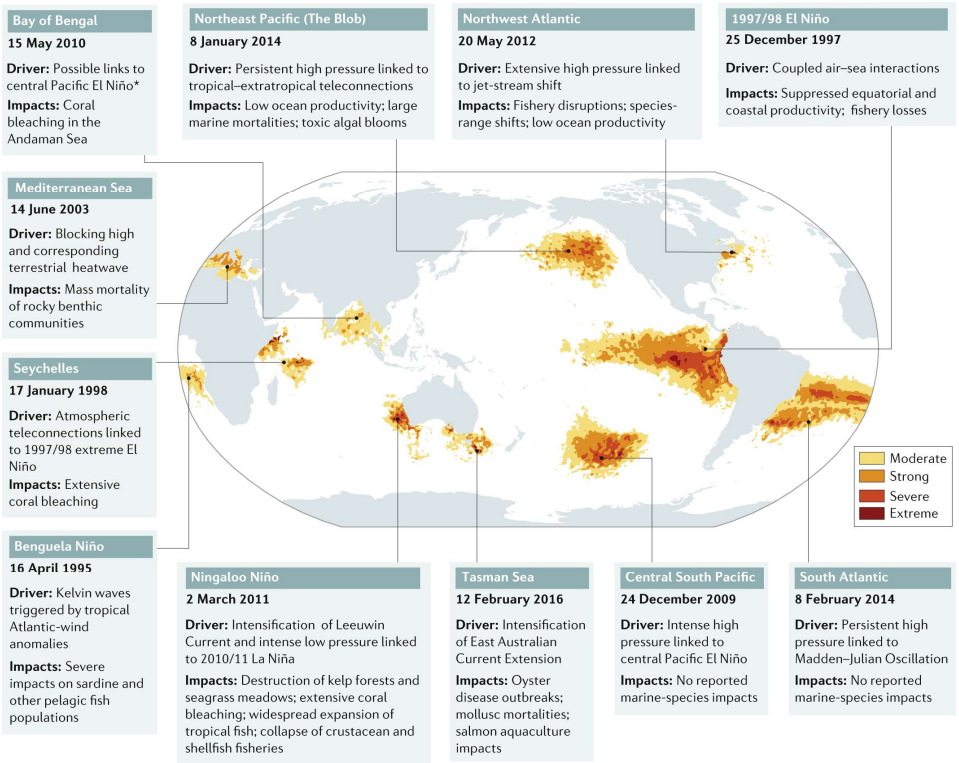
# HEATWAVES …

**Prolonged periods of extreme heat, exceeding climatological thresholds of temperature and duration**

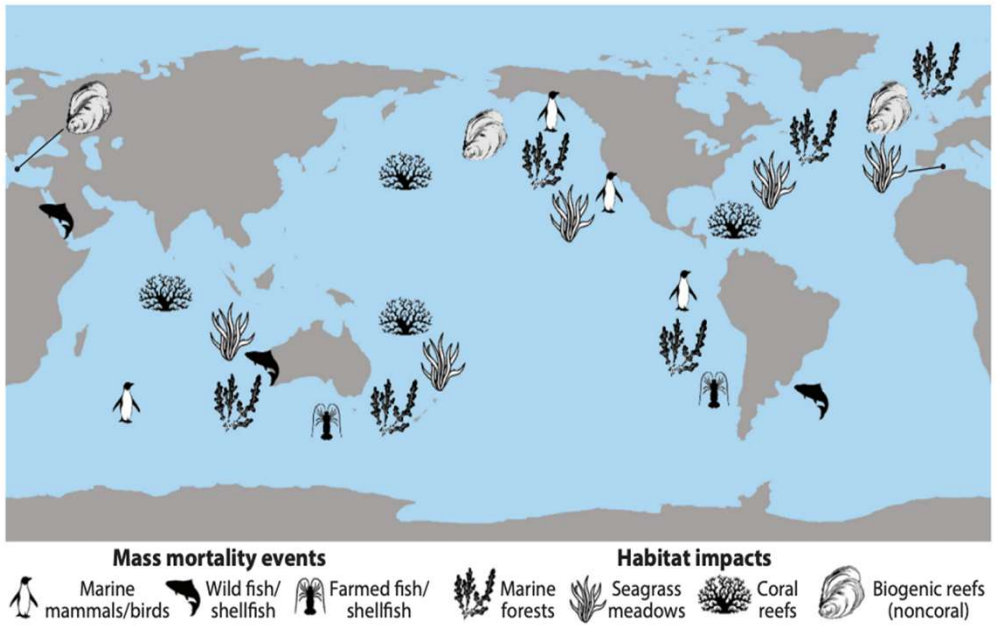



Simolo and Corti, 2022

# …MARINE HEATWAVES (as defined in Hobday et al., 2016)…




Hoolbrook et al., 2020




Smith et al. 2022



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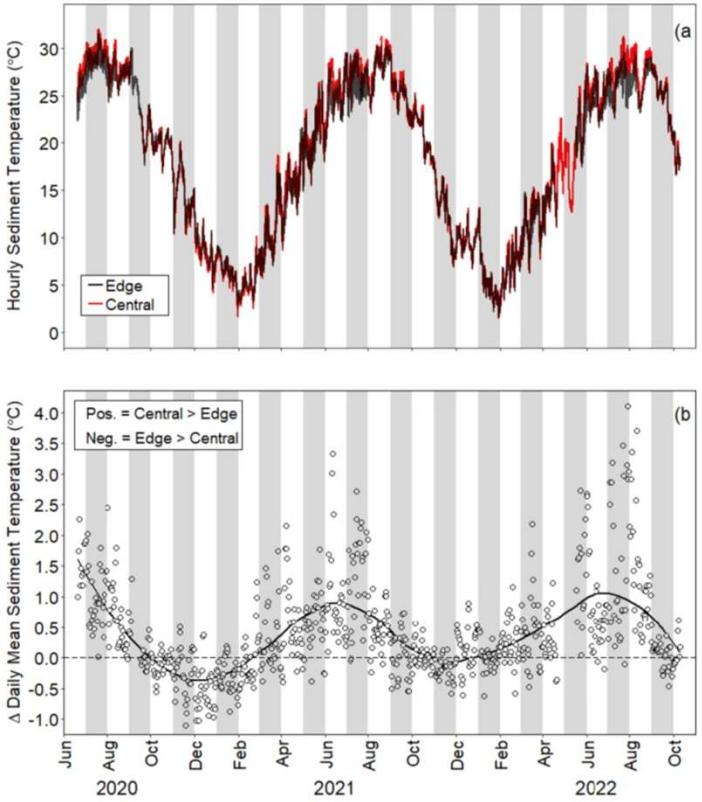
# …AND Sediment HW (local scale)


Tassone and Pace, 2024



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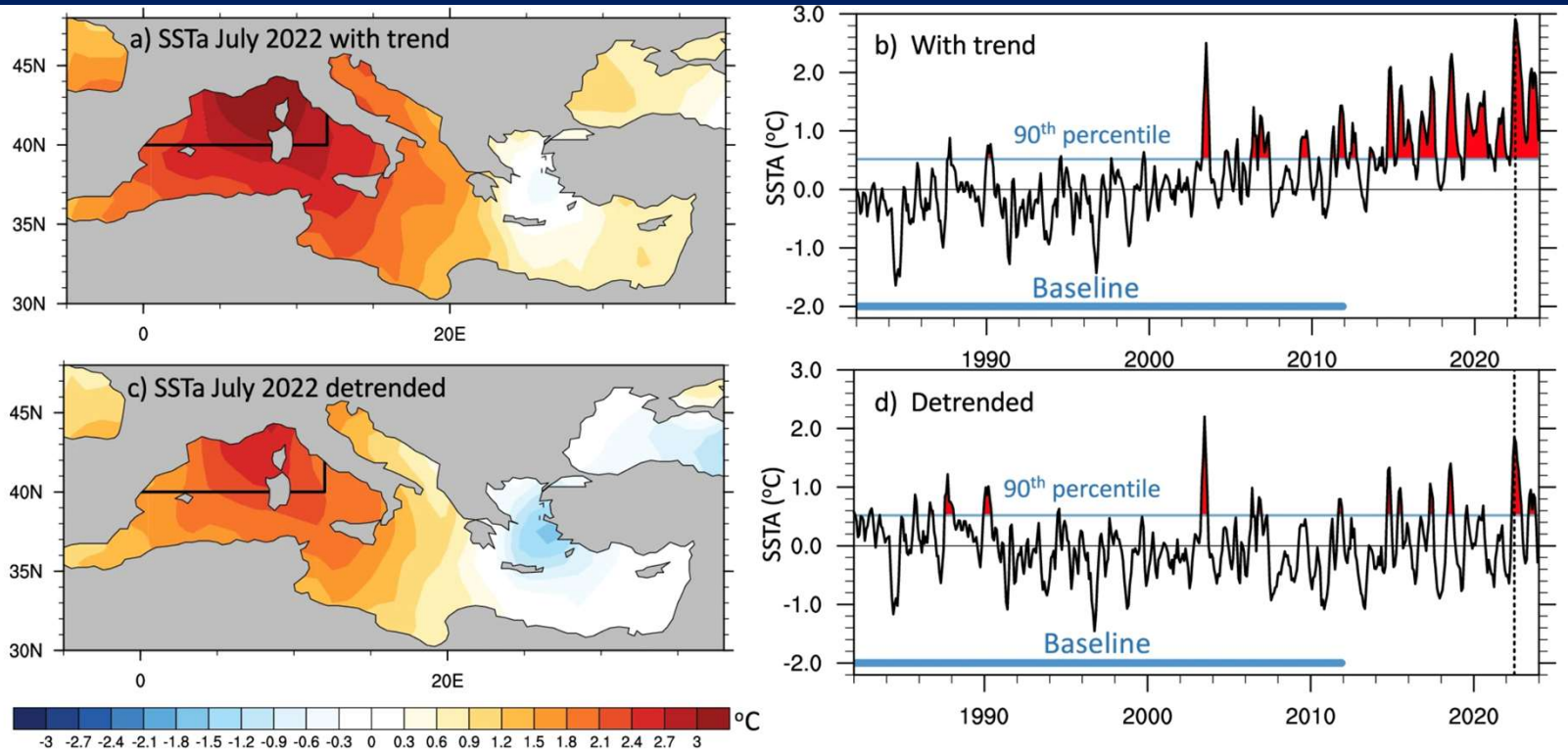
# MHWs IN MEDITERRANEAN SEA




Capotondi et al. 2024



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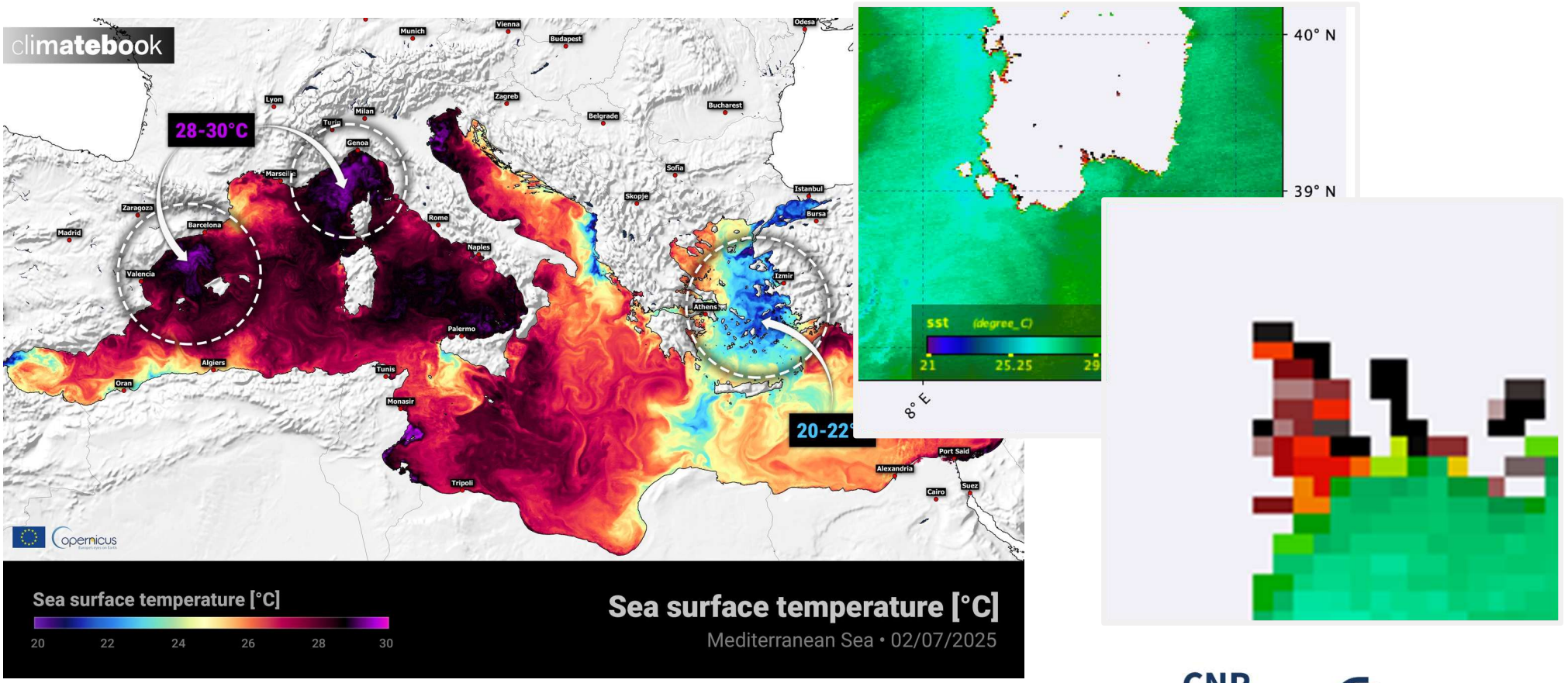
# THE SCIENTIFIC AND TECHNICAL CHALLENGE: local scale and local effects



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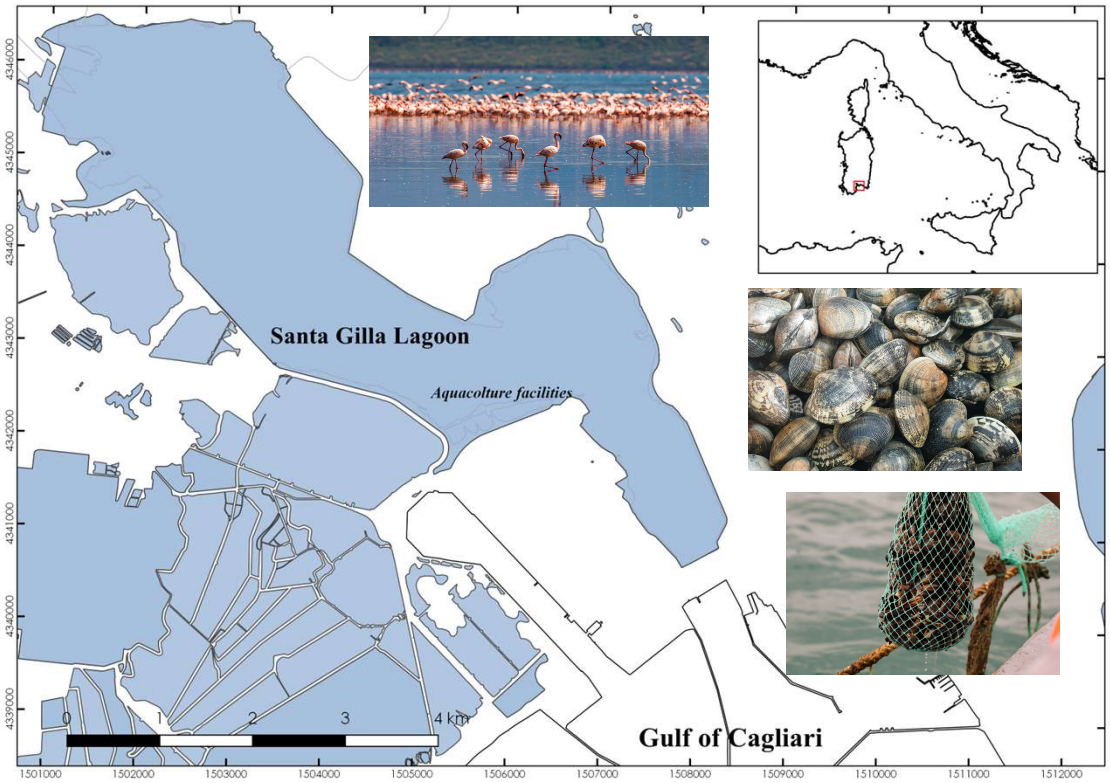
# SANTA GILLA LAGOON

- ✓ 1300 ha
- ✓ Ramsar SITE (D.M. September 03, 1980)
- ✓ “Sito di interesse Comunitario” (Directive 92/43 CEE)
- ✓ Fishing Economy (Shellfishes and Fishes) and some Tourism
- ✓ Salt Production in the nearby “Saline Contivecchi”



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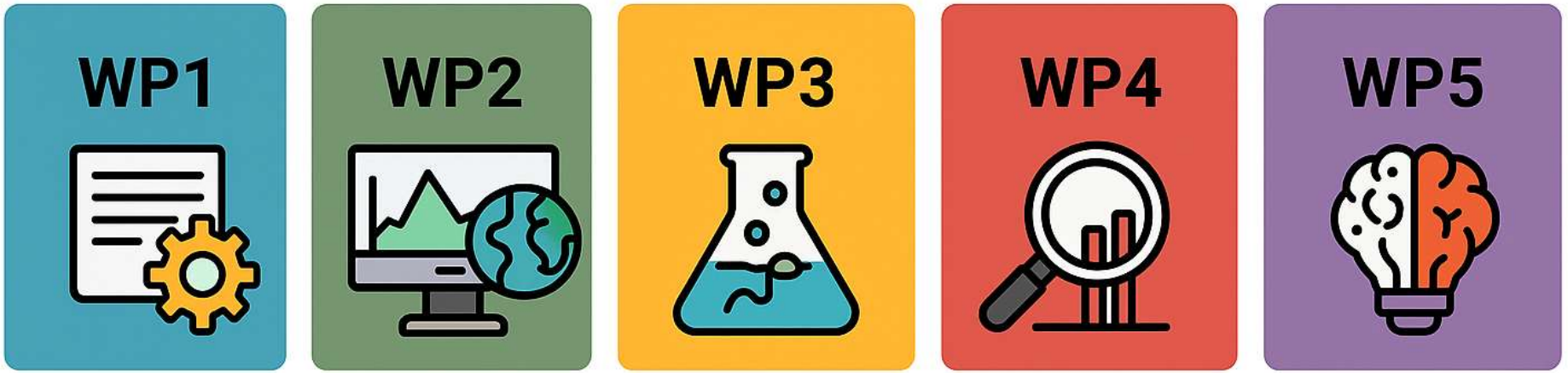
# THE TEAM
# 4 CNR INSTITUTES CNR + 1 UNIVERSITY DEPT

- Antonio Olita (PI), Leopoldo Fazioli, Valerio Lembo, ISAC-CNR
- Antonio Pusceddu (CO-PI), DISVA, UNICA
- Paolo Magni, IAS-CNR
- Elena Pagliarino, Monica Cariola, Greta Falavigna, IRCRES-CNR
- Marco Morabito, IBE-CNR

# THE HEAT PROJECT




| WP1 | WP2 | WP3 | WP4 | WP5 |
|---|---|---|---|---|
| MANAGEMENT | ENVIRONMENTAL AND CLIMATIC MONITORING | MESOCOSM EXPERIMENTS | SOCIO ECONOMIC ANALYSIS | RESULTS INTEGRATION |



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# WP1 - MANAGEMENT AND PREPARATORY ACTIONS

- 🔧 **Activities**

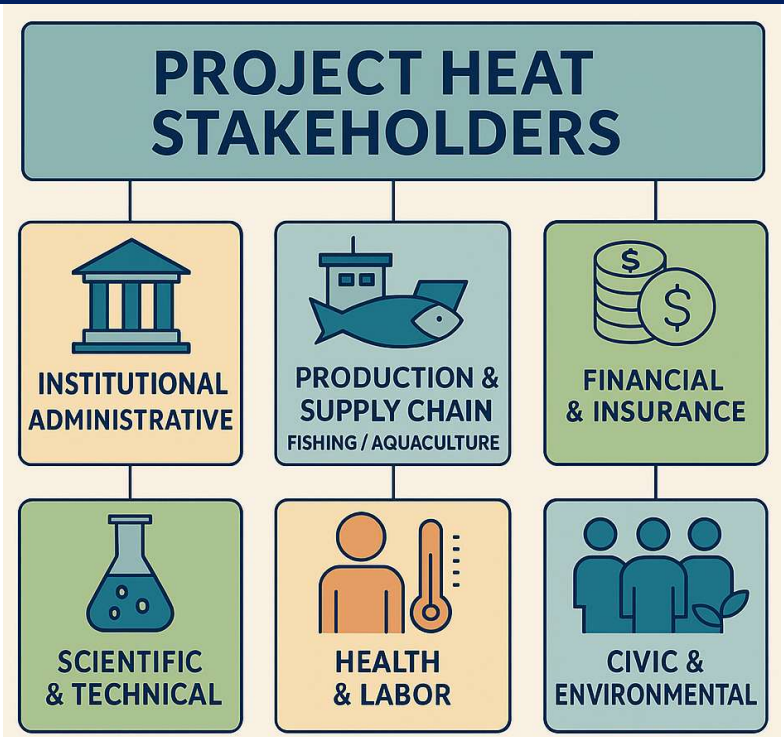
🛠️ **Project kick-off**: planning, permits, and purchase of key equipment (data loggers, mesocosms, weather station, lab instruments, computing server).

👥 **Personnel recruitment** through public call.

🤝 **Stakeholder identification** and initial engagement.

📍 **Sites selection** in the lagoon.

🗓️ **Internal meetings organization** and launch of reporting activities.



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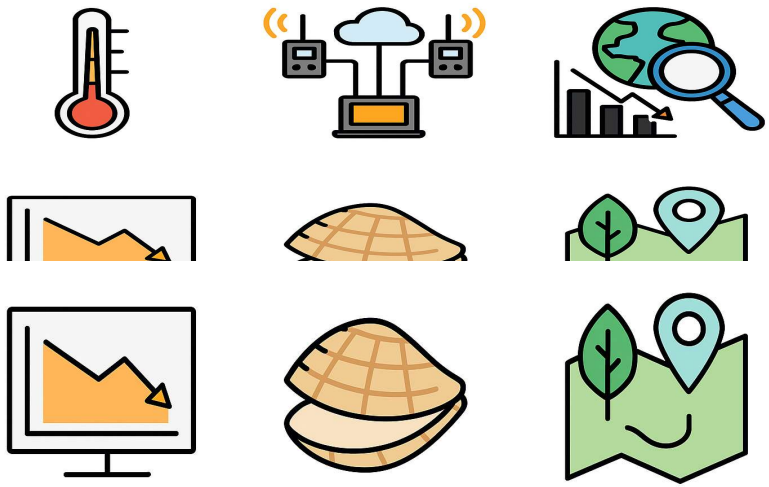
# WP2 - ENVIRONMENTAL AND CLIMATIC CHARACTERIZATION

**Activities**

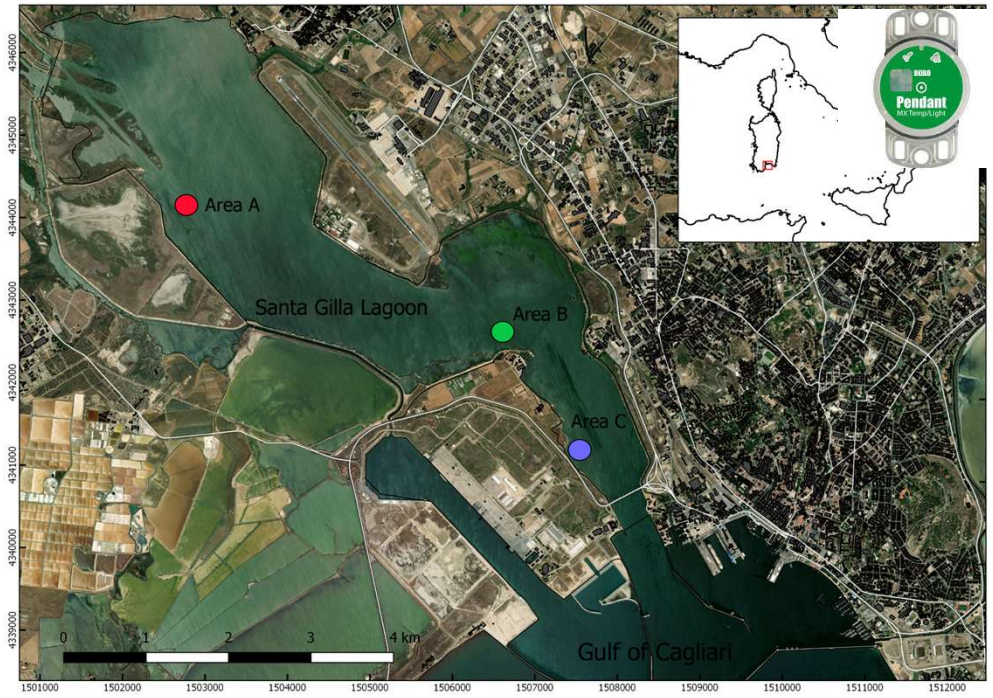
- Analysis of historical and current temperature data (air, water, sediment).
- Installation and calibration of the sensor network.
- Reconstruction of climatologies and MHW/SHW events.
- IPCC downscaling.
- Installation of a weather station
- Modelling and retrieval of atmospheric parameters.
- Environmental monitoring and distribution of *Ruditapes*. Mapping of current and future habitat suitability.

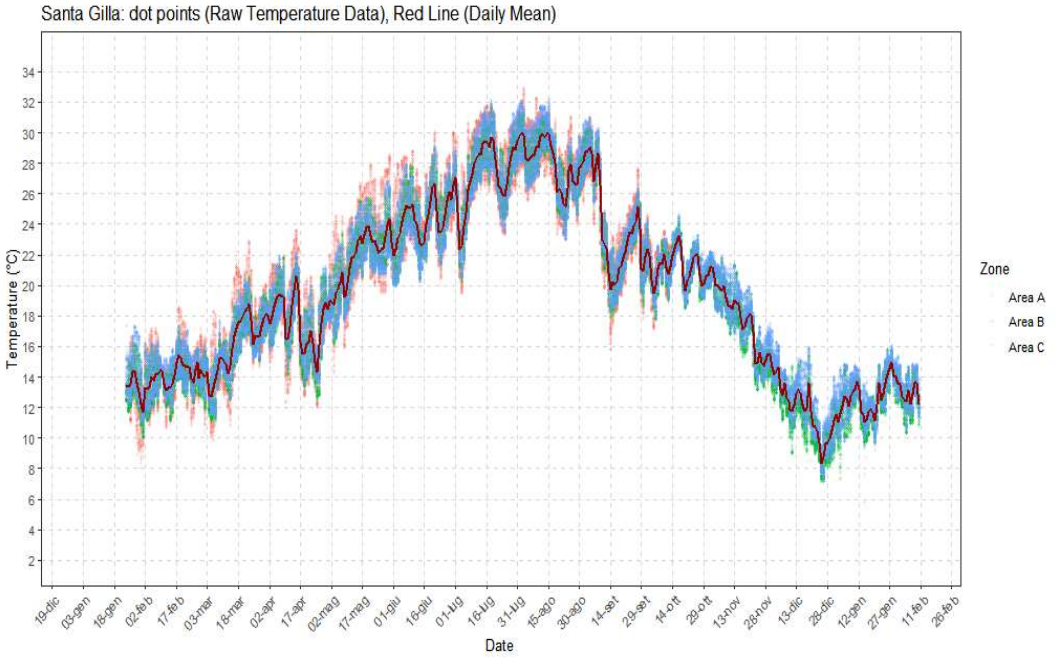


**Methodology**

Integrated use of sensor data, climatologies, and models. Spatial and seasonal approach to lagoon thermal dynamics. Integration with field-based biological activities.

# WP2 - ENVIRONMENTAL AND CLIMATIC CHARACTERIZATION: WHAT DO WE HAVE RIGHT NOW



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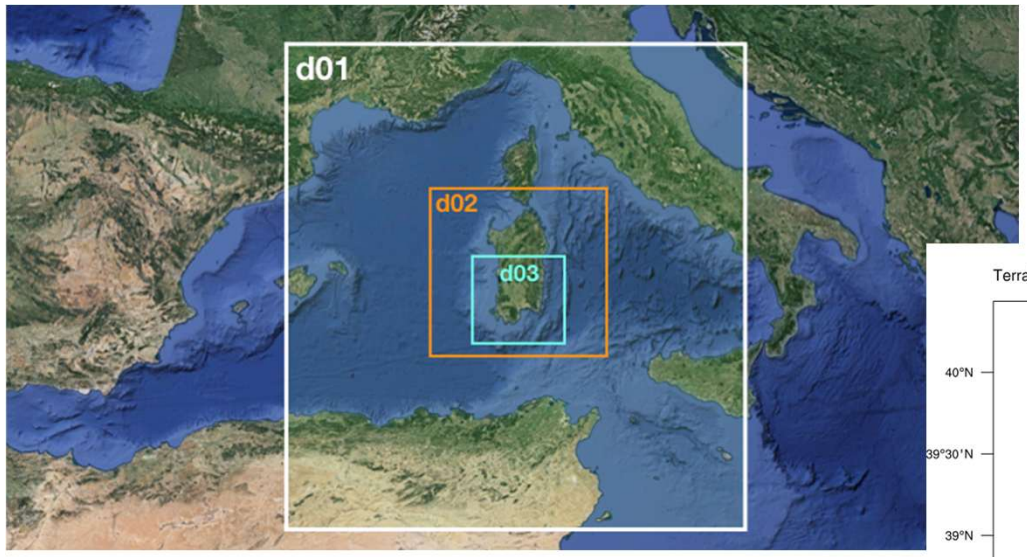
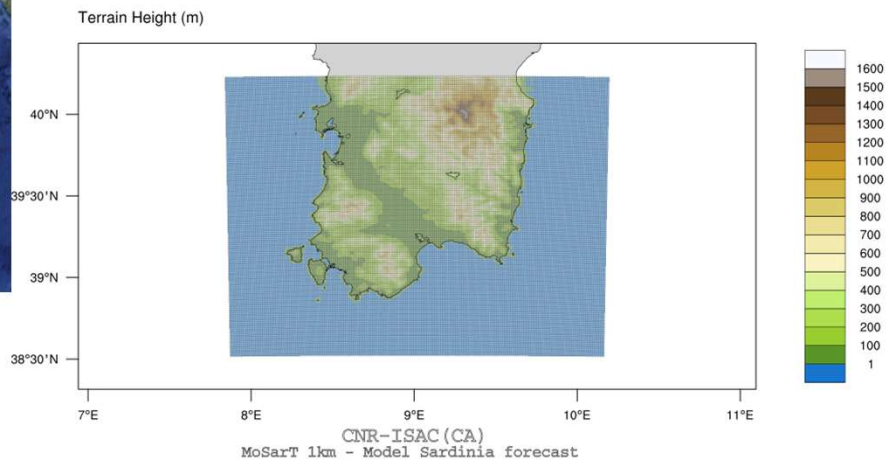
# WP2 - ENVIRONMENTAL AND CLIMATIC CHARACTERIZATION: WHAT DO WE HAVE RIGHT NOW



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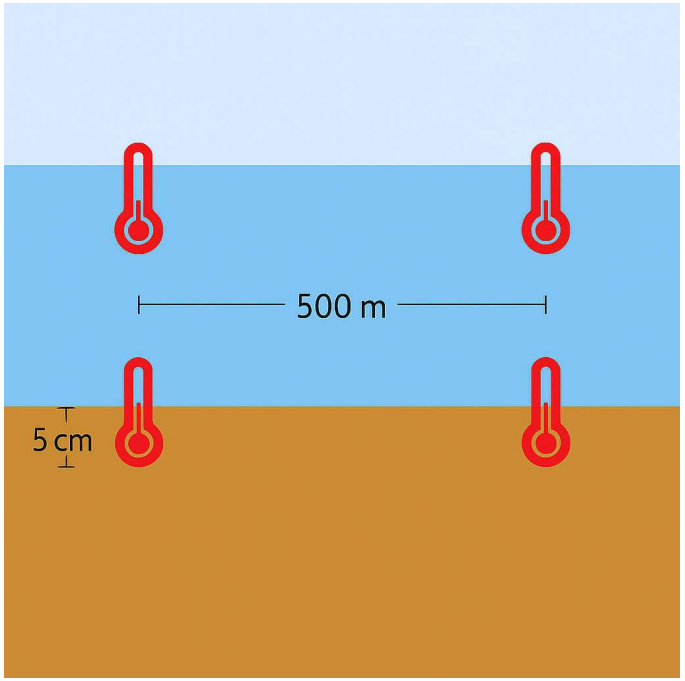
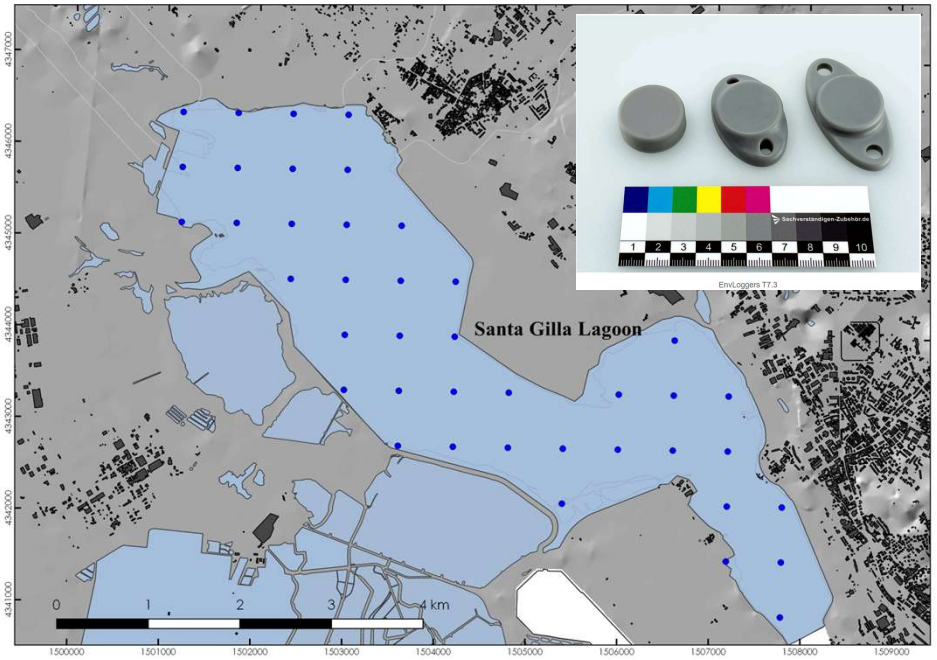
# WP2 - ENVIRONMENTAL AND CLIMATIC CHARACTERIZATION



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# WP3 – MESOCOSM EXPERIMENTS

***Activities***

Setup of experimental facilities. Collection and acclimation of target species. Thermal stress experiments. Analysis of physiological data.

**Native**

***Ruditapes decussatus***

**Allochtonous**

***Ruditapes philippinarum***



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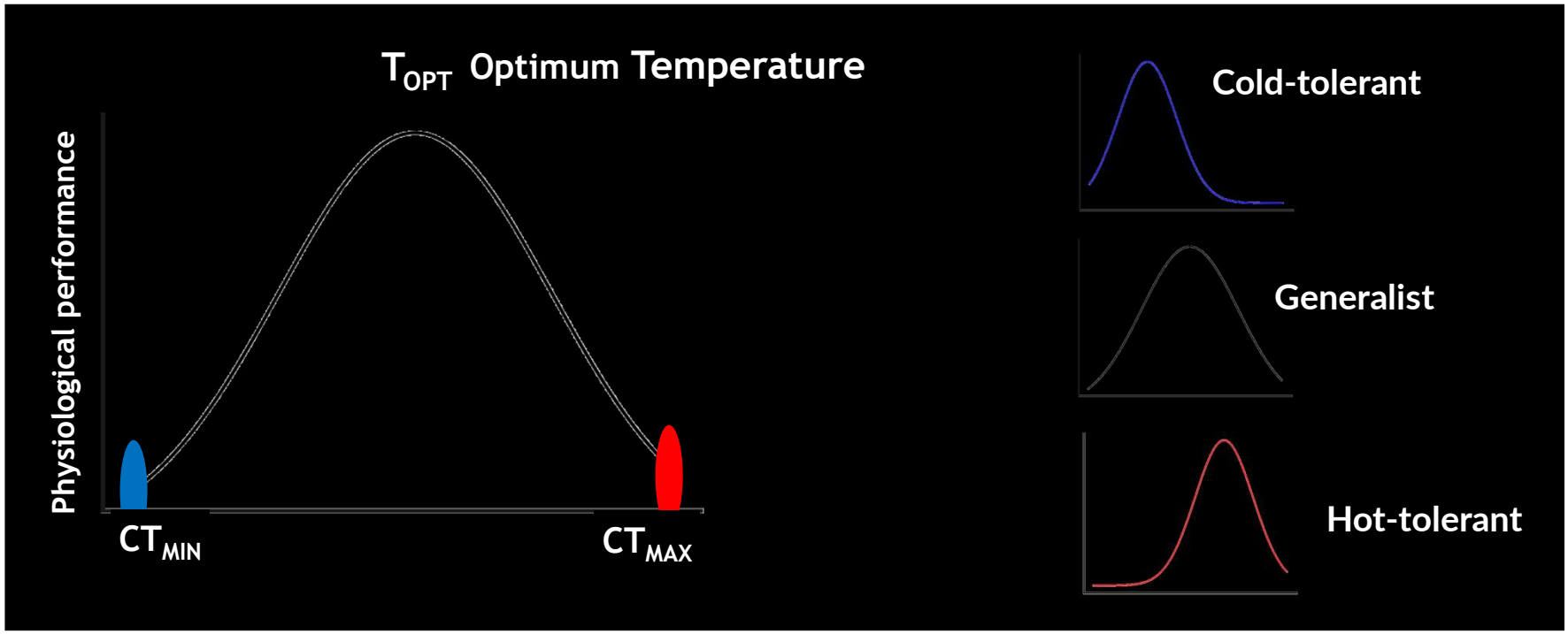
# WP3 – MESOCOSM EXPERIMENTS

**How do Rising Temperatures Influence Organisms Living in Coastal Lagoon?**



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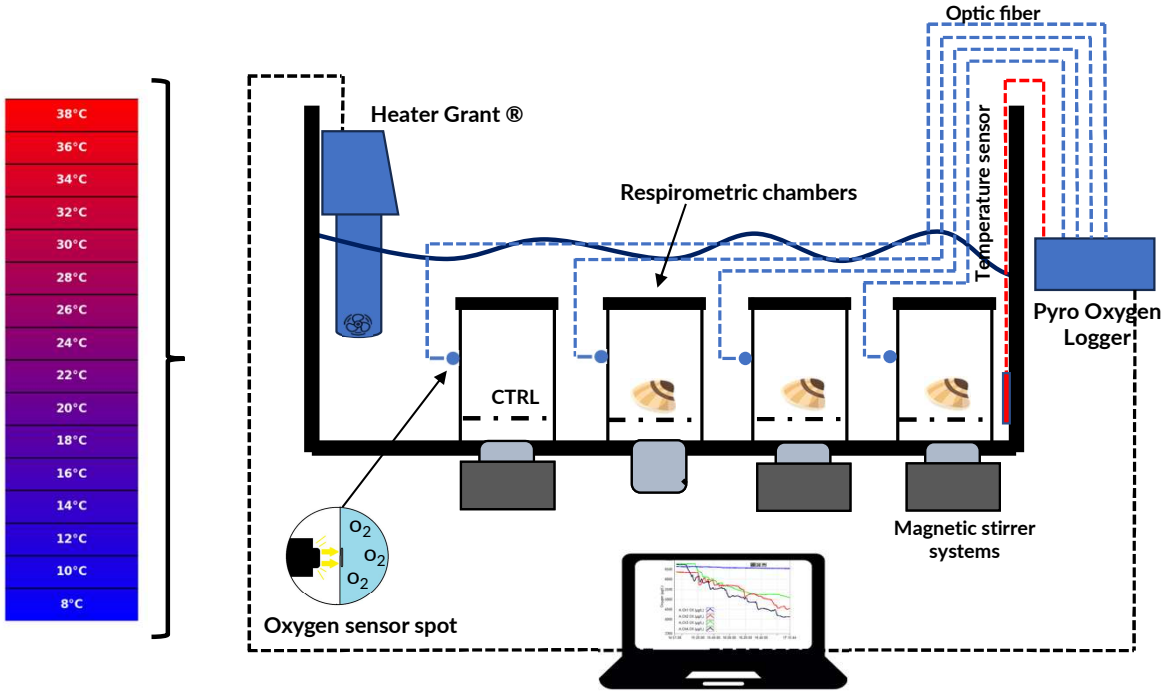
# WP3 – MESOCOSM EXPERIMENTS

**Respiration Rate ($O_2$mg $L^{-1}$ $h^{-1}$ $gDW^{-1}$) as a proxy for metabolism**

Experimental Setup




## Thermal Performance Curve Executive Steps

**Step 1.** Preliminary analysis

**Step 2.** «rTCP» metabolic performance model to temperature

**Step 3.** Best Performance Model among 24

**Step 4.** Transformation into Probability of occurence

**Step 5.** Metabolic Suitability maps



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# WP4 – SOCIO ECONOMIC ANALYSIS

**Activities**

- Analysis of heatwave impacts on local community livelihoods
- Survey of perceptions and viewpoints of key stakeholders
- Study of the local clam industry under thermal stress
  - Effects on production and market dynamics
  - Organizational, procedural, and economic changes
- Assessment of workers' well-being and health
- Identification of adaptation strategies (linked to Worklimate2.0)

**Methodology**

- Qualitative research: interviews, focus groups, workshops
- Engagement with local administrators, decision-makers, businesses, and professional bodies
- Analysis of financial and economic data

WORKLIMATE2.0
CLIMA LAVORO PREVENZIONE



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# WP5 – TRANSDISCIPLINARY ASSESSMENT OF THE IMPACTS

**Activities**

Integration of environmental, biological, and social data.
Assessment of combined impacts.
Final consultation with stakeholders.
Development of outreach materials and recommendations

**Methodology**

Cross-disciplinary analysis.
Participatory approach.
**Translation of results into tools useful for policy, adaptation, and lagoon governance.**

# Thanks for your attention!!!

**A cura di Antonio Olita – antonio.olita@cnr.it**