

Poročilo o delu sekcije za oceanografijo SZGG

30.01.2025, UL FGG

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- (1) Nacionalni inštitut za biologijo
- (2) Fakulteta za računalništvo in informatiko UL
- (3) Agencija RS za okolje
- (4) Univerza v Novi Gorici

SZGG skupščina, 30. 01. 2025, UL FGG



Copernicus Marine User Engagement

- Ime projekta:

Developing High-Resolution Models for Forecasting Sea Surface Currents and Marine Effluent Dispersion

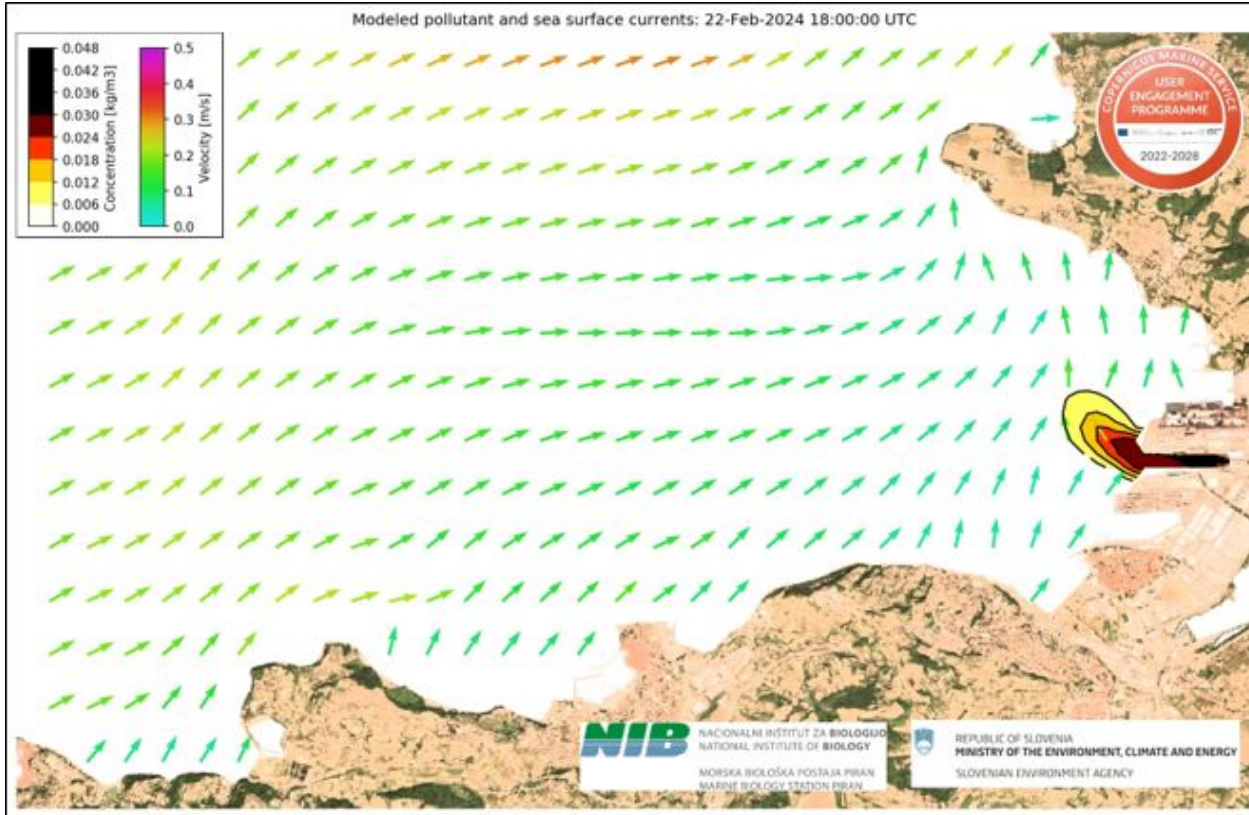
- Cilj projekta:

Razvoj operativnih numeričnih modelov visoke ločljivosti za operativno napoved porazdelitve morskih površinskih tokov in razpršitve odpadne vode iz čistilnih naprav v morje

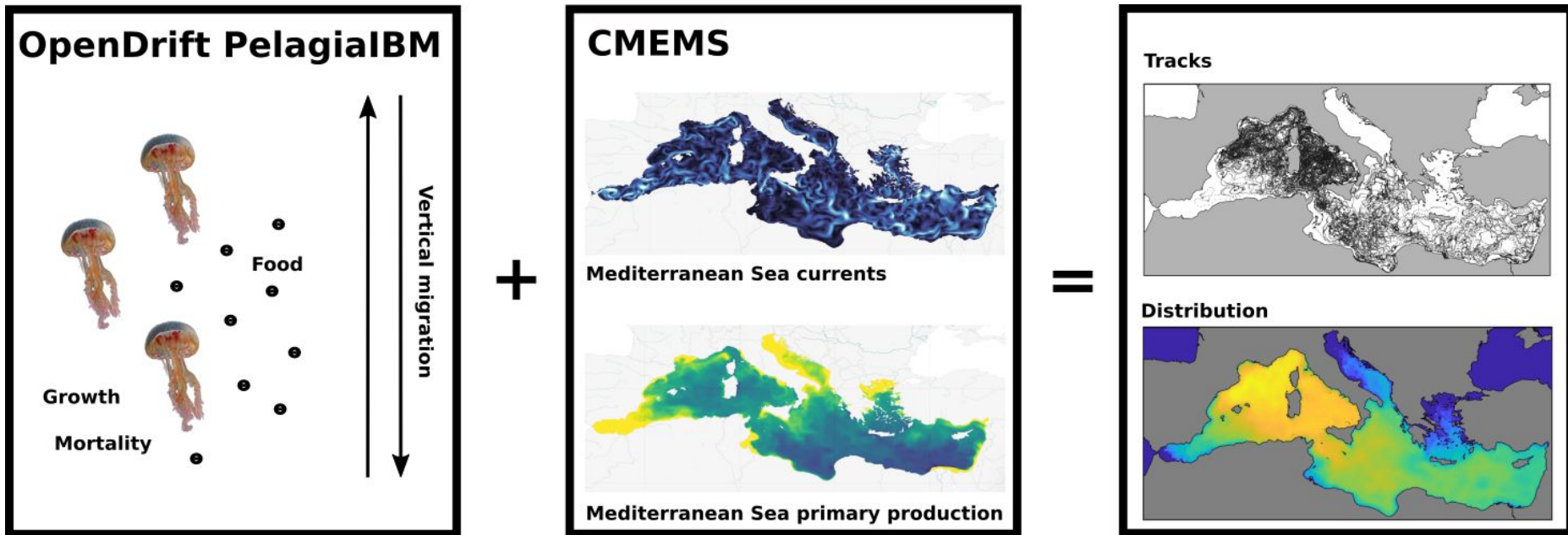
- Trajanje projekta: 05.07.2023 - 05.01.2025. Projekt ravno zaključen.
- Vodja projekta: Boris Petelin, sodelavci: Martin Vodopivec, Matjaž Ličer, Branko Čermelj



Copernicus Marine User Engagement



Individualni model meduz vrste *Pelagia noctiluca* (mesečina)



Novi model prvič prikaže porazdelitev biomase mesečink v Sredozemskem morju.



Razvoj sklopljenega fizikalno-biogeokemijskega modela CROCO-BFM. 18-letna simulacija in primerjava z modelskimi reanalizami ter meritvami.

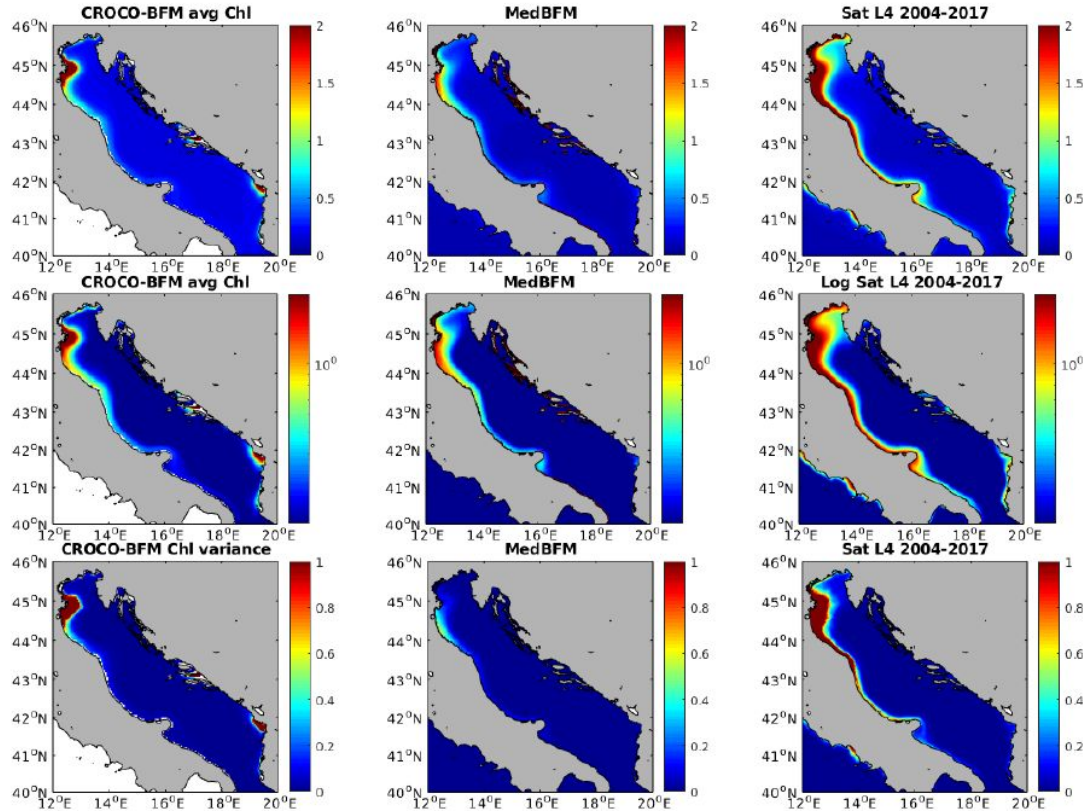
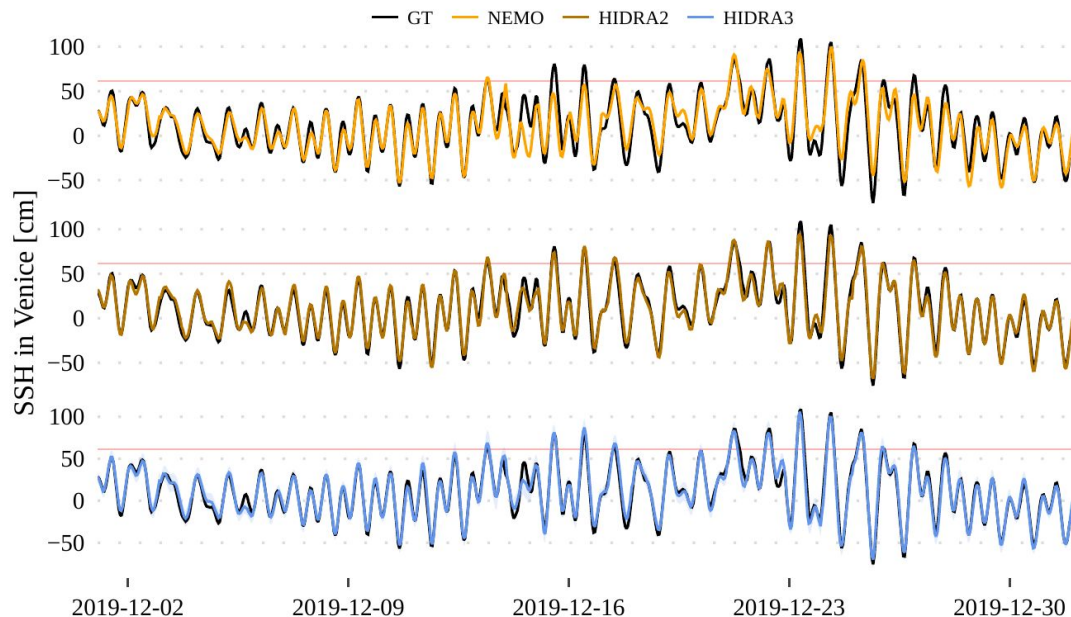
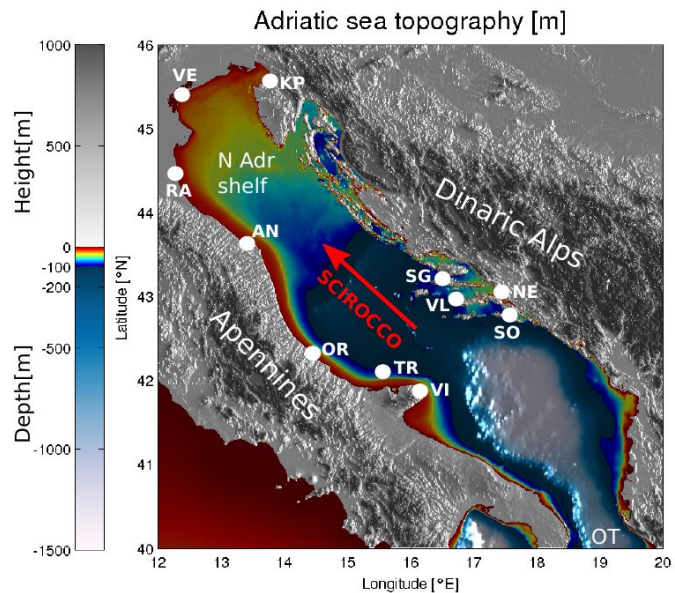


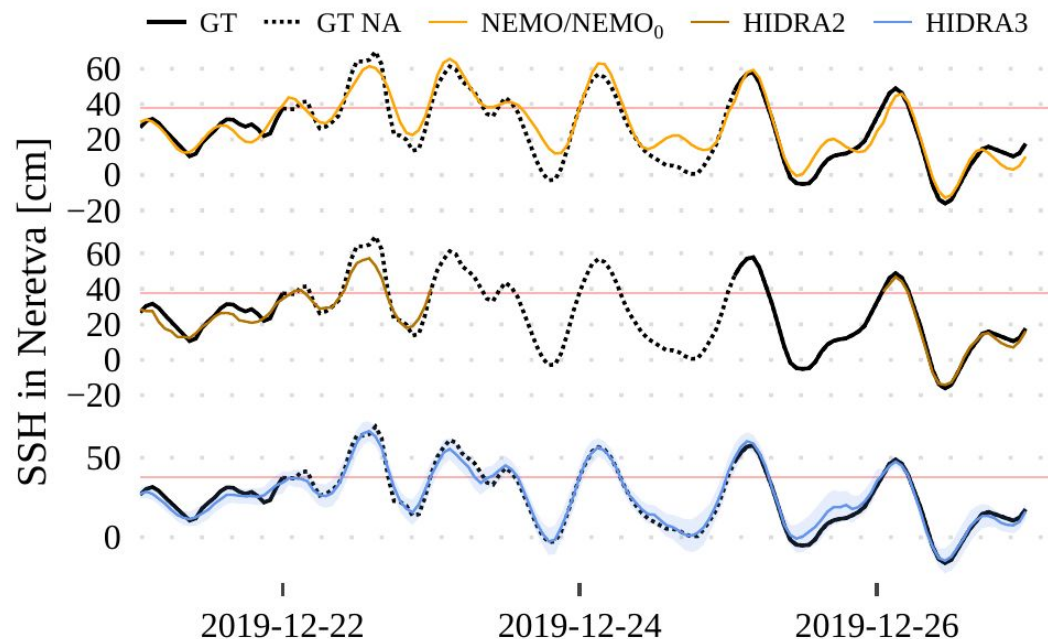
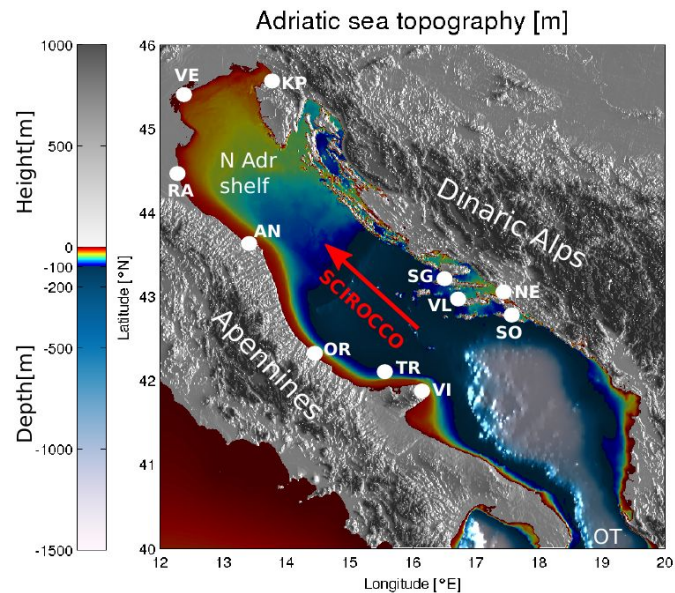
Figure 1: Average surface Chlorophyll concentration. CROCO-BFM (left), MedBFM (center), CMEMS L4 satellite product (right). Linear scale (top), logarithmic color scale (middle), variance (bottom).



HIDRA2, 3 → Adriatic multi-point prediction ECMWF Destination Earth On Demand Extremes



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HIDRA3: deep-learning model for multi-point ensemble sea level forecasting in the presence of tide gauge sensor failures

Marko Rus^{1,2}, Hrvoje Mihanović⁴, Matjaž Ličer^{1,3,*}, and Matej Kristan^{2,*}

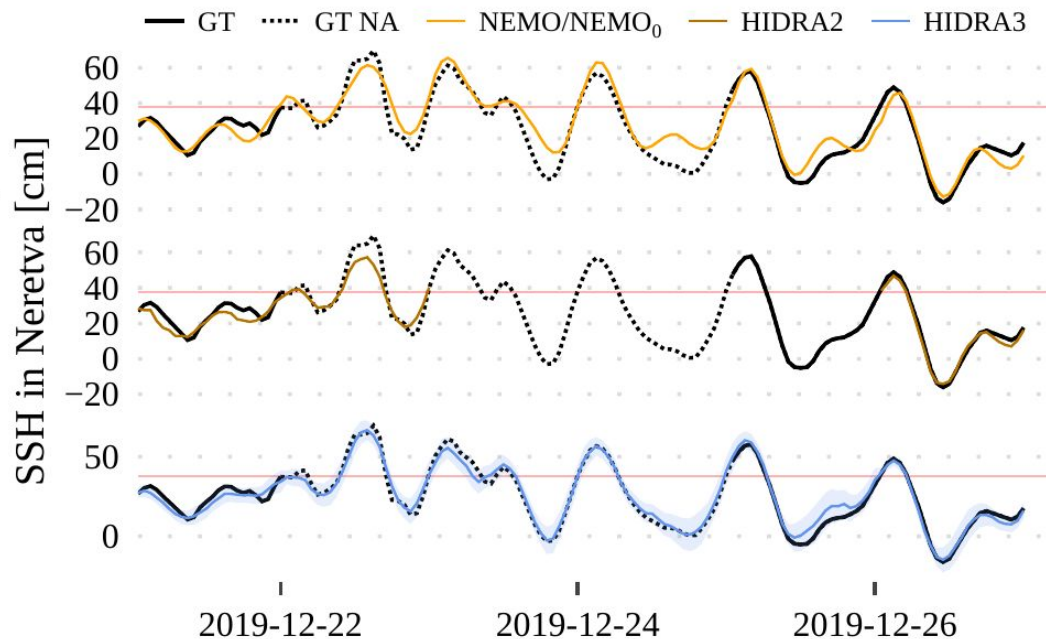
¹Slovenian Environment Agency, Office for Meteorology, Hydrology and Oceanography, Ljubljana, Slovenia

²Faculty of Computer and Information Science, Visual Cognitive Systems Lab, University of Ljubljana, Ljubljana, Slovenia

³National Institute of Biology, Marine Biology Station, Piran, Slovenia

⁴Institute of Oceanography and Fisheries, Split, Croatia

*These authors contributed equally to this research.



Storm surge modeling

Anja Fettich, Matjaz Licer, Marko Rus, Matej Kristan
Ilja Maljutenko, Amirhossein Barzandeh

HIDRA2 deep learning ensemble is operational within ECMWF

On-Demand-Extremes Digital Twin toolbox.



Destination Earth

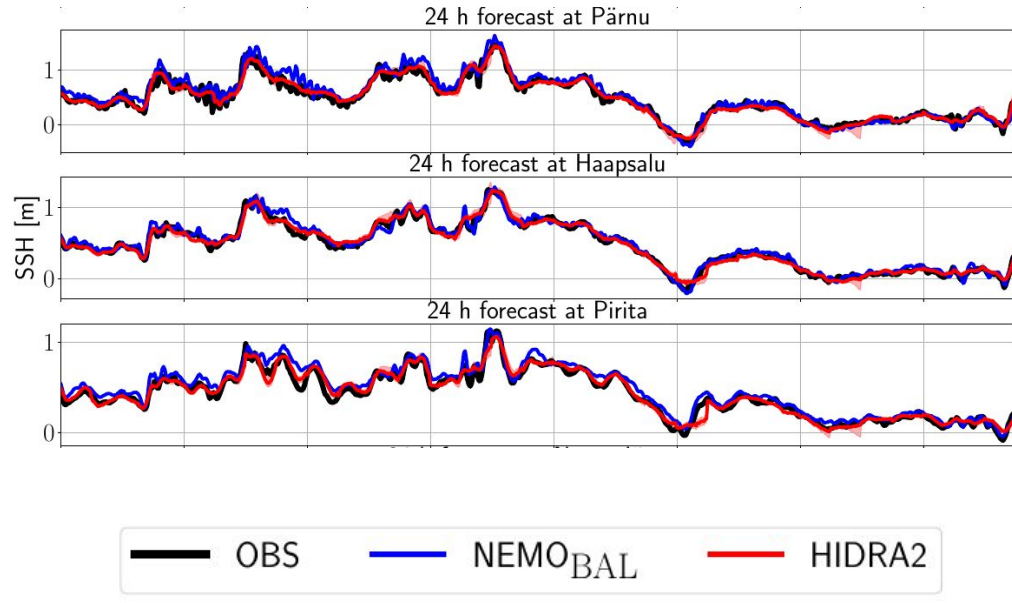
Funded by
the European Union



Implemented by



TAL
TECH



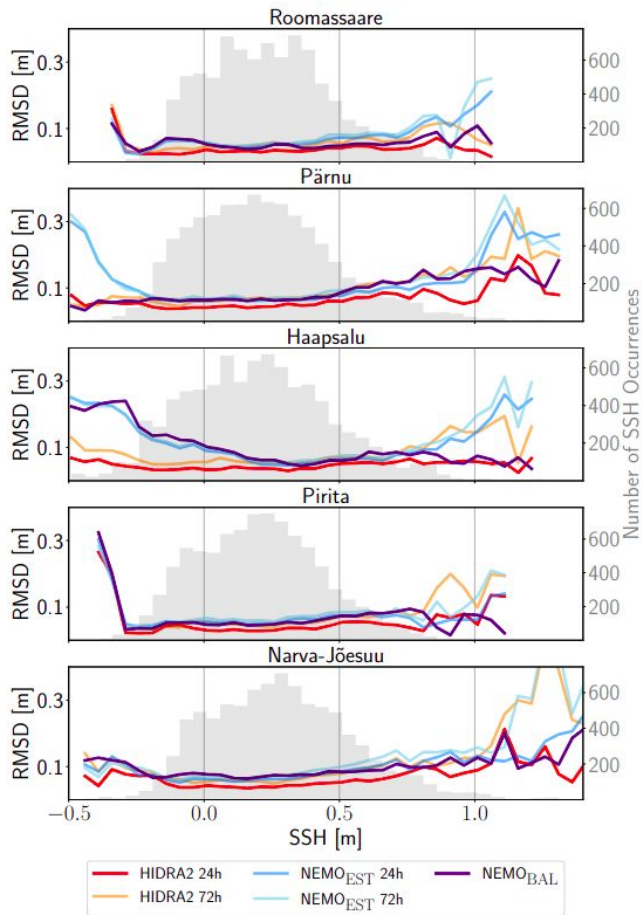
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**TAL
TECH**

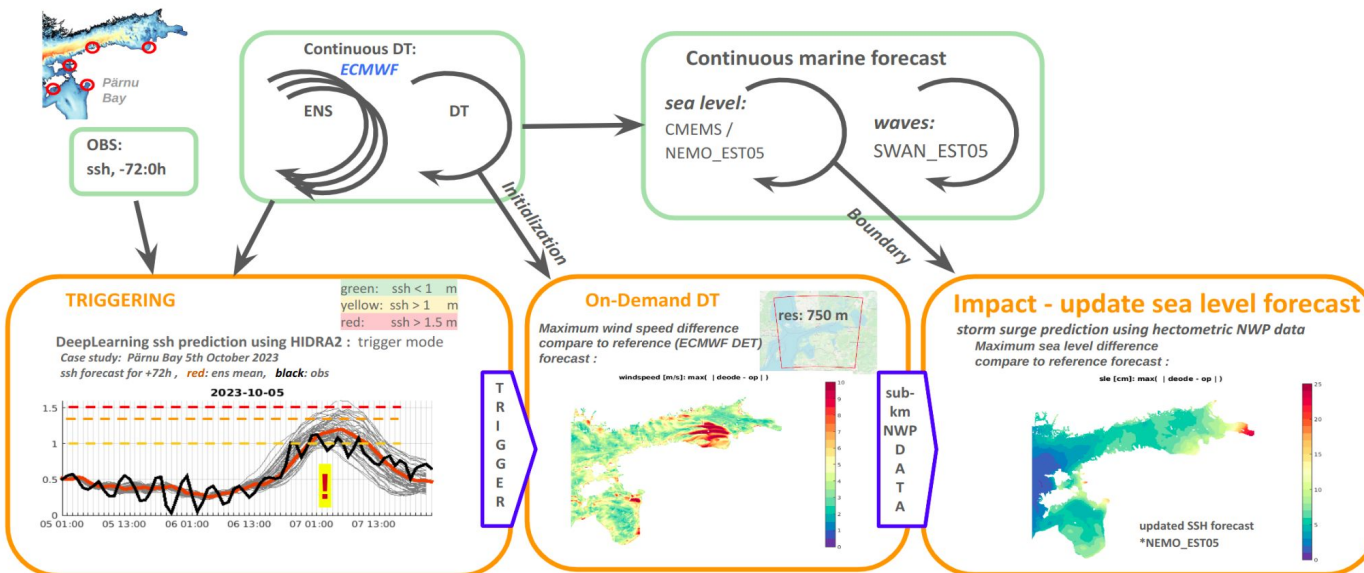




Configurable, flexible and scalable workflows

- Impact model: Storm surge

➤ Two applications: Triggering and sea level height forecast



Baltic Sea pilot area

ARSO METEO
Slovenian Environment Agency

TAL
TECH





SMASH

machine learning for science and humanities | postdoctoral program

Pmf



SMASH → DL meteotsunami modeling

UNG, ARSO, PMF Split

- ML modeling of high-frequency oscillations in Mediterranean ports and bays
- Supervised learning vs Self-supervised learning
- Transfer learning (Bakar vs Vela Luka, Sobra, Stari Grad)



Meteotsunamis: atmospherically induced destructive ocean waves in the tsunami frequency band

S. Monserrat^{1,2}, I. Vilibić³, and A. B. Rabinovich^{4,5}





SMASH

machine learning for science and humanities | postdoctoral program

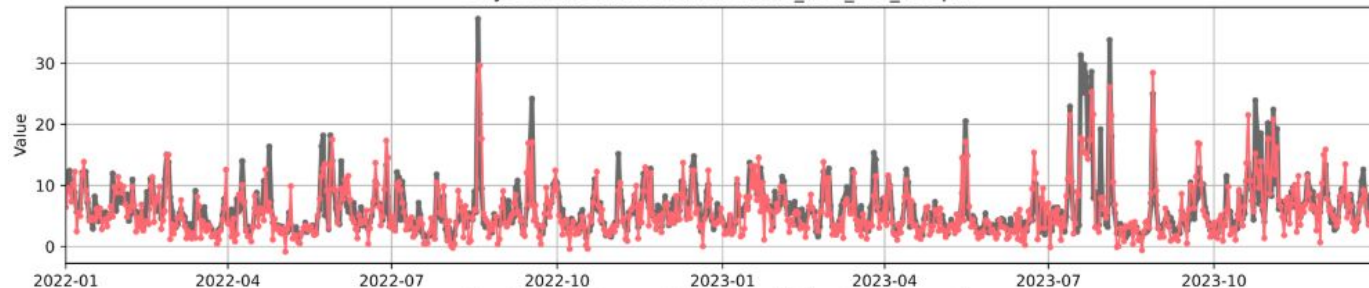
SMASH → DL meteotsunami modeling

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Day 1 Predictions vs. Labels model_best_test_loss.pth



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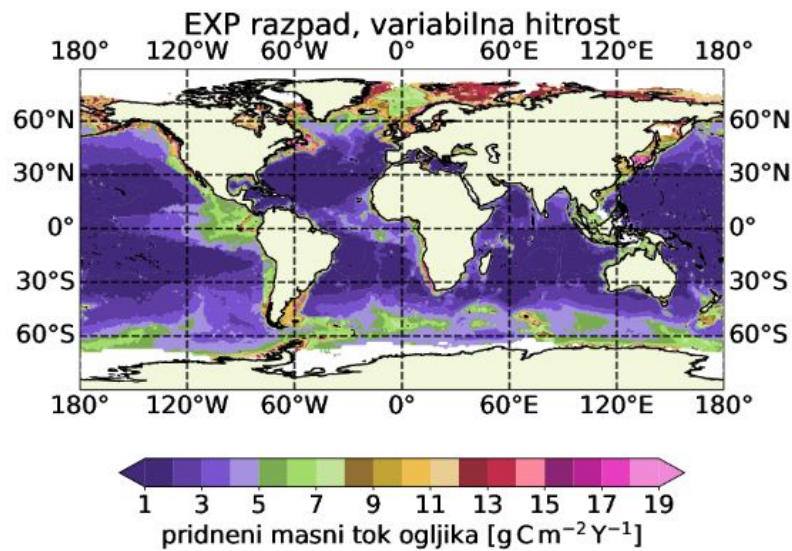


GZ carbon export into deep ocean

Črtomir Ernesto Perharič Bailey, Tinkara Tinta, Martin Vodopivec,
Gerhard Herndl, Matjaž Ličer

$$\frac{d}{dt} \begin{bmatrix} z \\ m \end{bmatrix} = \begin{bmatrix} w_0(m/m_0)^{1/6} \\ -km \end{bmatrix}$$

$$\frac{d}{dt} \begin{bmatrix} z \\ m \end{bmatrix} = \begin{bmatrix} w_0(m/m_0)^{1/6} \\ -k(t)m^{2/3}m_0^{1/3} \end{bmatrix}$$

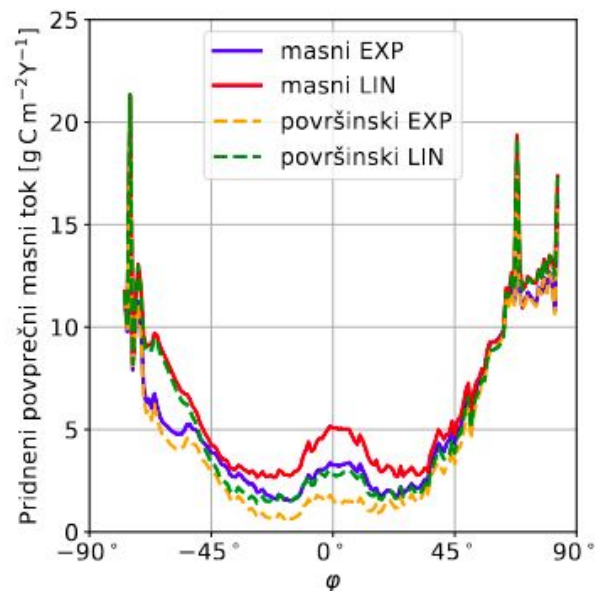


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Jelly Cx out of euphotic zone (-200 m)

Črtomir Ernesto Perharič Bailey, Tinkara Tinta, Martin Vodopivec,
Gerhard Herndl, Matjaž Ličer

