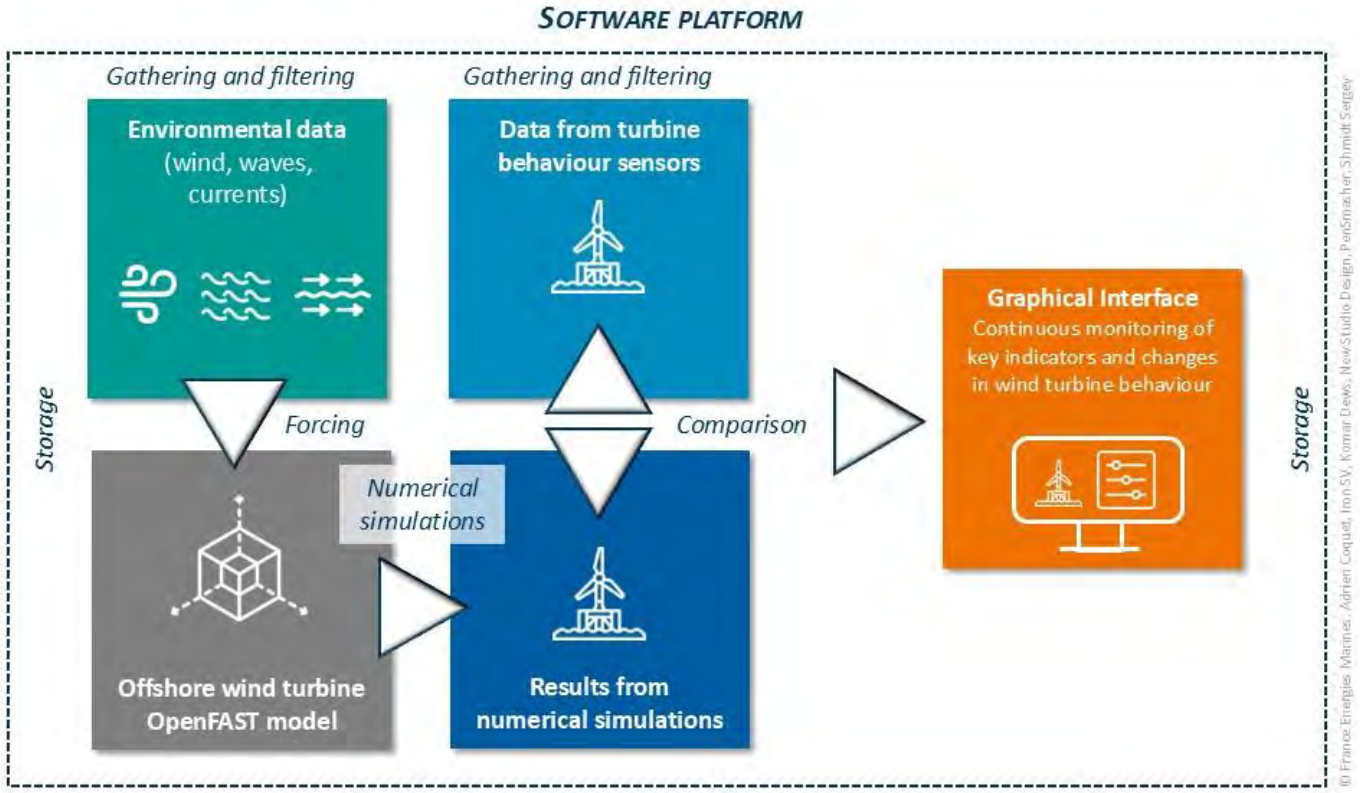
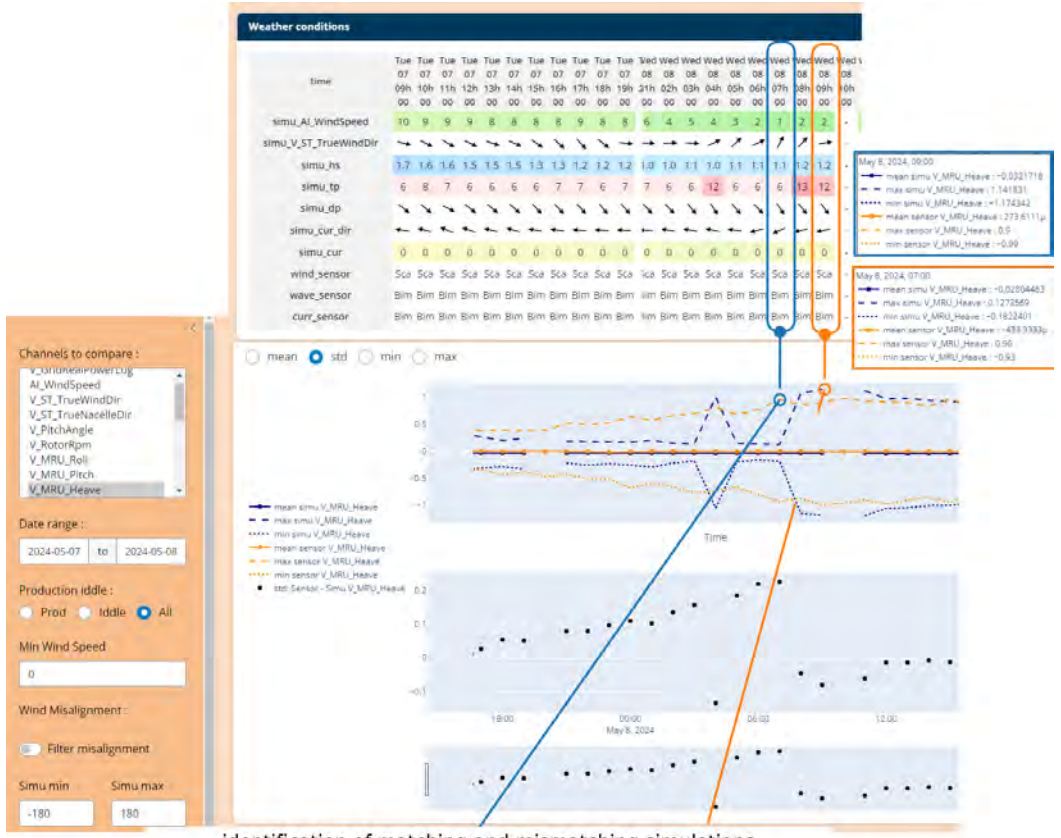
5. Conclusion & wrap up

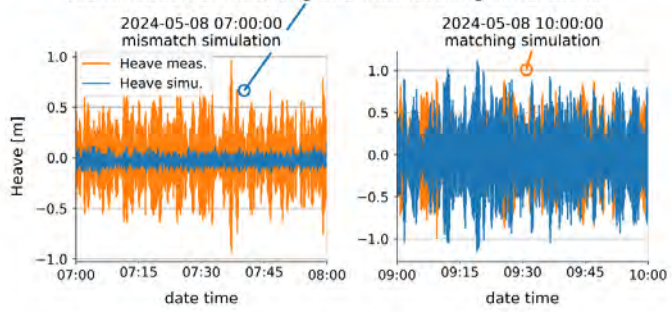
Romain Ribault, FRANCE ENERGIES MARINES

DIONYSOS software platform





identification of matching and mismatching simulations

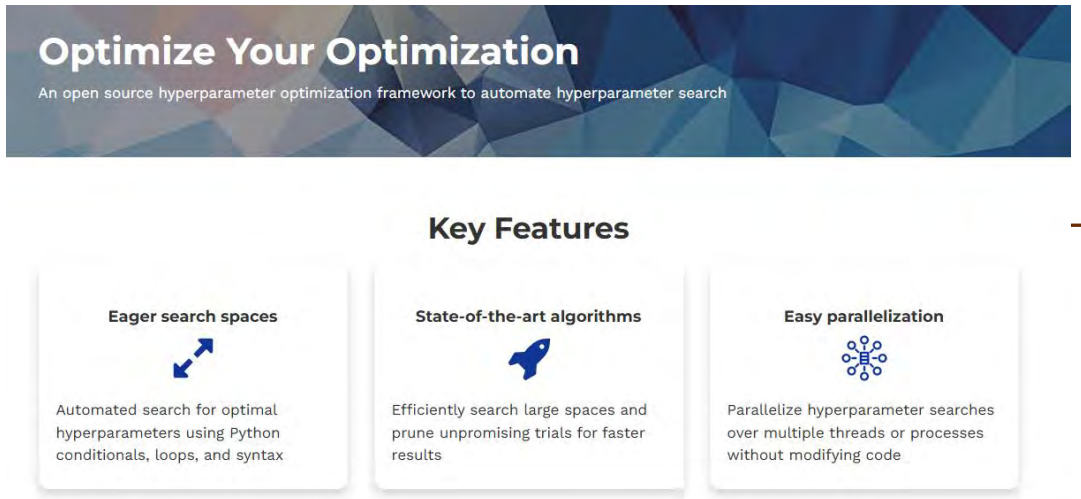


Simuoptuna : interface any simulator with optimization framework

https://gitlab.france-energies-marines.org/Romain/simuoptuna

🖇️ An interface between an optimization framework and any simulation software.

→ Calibrate models!



Optuna opensource framework

👌 Keeping the implementation simple with a sharable and maintainable code.

📝 Logging the inputs, outputs, and models used during the optimization process and identify the best results.

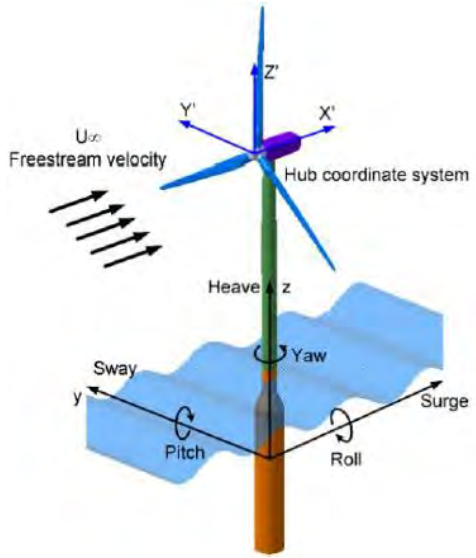
🏆 Adopting state-of-the-art algorithms for sampling and optimization.

⏩ Running the optimization process in parallel to save time.

📈 Visualizing the optimization process and results.

Dionysos outcomes : Hywind demo model / validated against at sea measurements.

- Zefyros OpenFast: Hywind Openfast model / validated against at sea measurements.
- Fully coupled :
  - Rosco controller tuned for floating wind
  - Mooring : lumped-mass (surge frequency calibrated)
  - Tower : beam element theory
  - Blades : beam element theory
  - Floater & hydrodynamic : rigid body + HDB



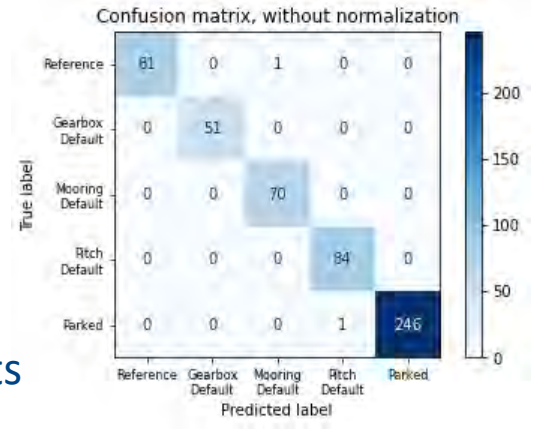
- Sercel contribution : Ansys model (eigenfrequencies & inertia)
- Innosea contribution : HDB calculation + calculation note
- BV contribution : Full QTF database calculation

Dionysos outcomes - Deep learning models

Supervised classification

- Four anomalies
- Synthetic test data
- Logistic regression model

→ Detect and classify defaults

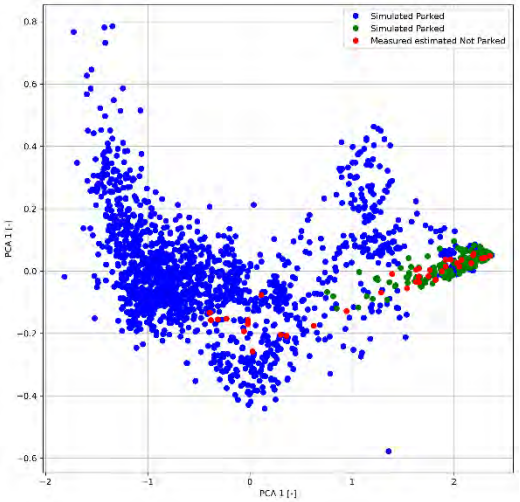


Unsupervised classification

- Autoencoder trained on synthetic data
- Validation on measurements

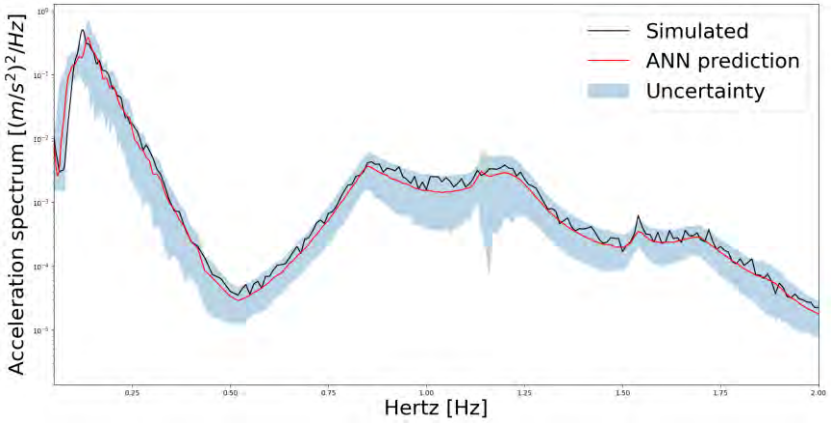
→ Detect parked situation on one Neuron system acceleration

Latent space



Regression

- Uncertainty propagation
- Synthetic test data
- Convolutional neural network



Other ressources

Open Source python package for the community:

-Simuoptuna : Coupling Optuna, an optimisation framework, with any simulator.
-Torchydra : template & tutorials for organising deep learning model repository within FEM.
-Zefyros OpenFast: Hywind Openfast model / validated against at sea measurements.
-TwinSpace : GUI to display comparisons of simulation model results vs. Scada Demosath measurements.

Sensors :

Horizontal Vaisala Lidar (For Nacelle) not in use!