ANEMOC-3

Modélisation des tempêtes dans l'Ocean Atlantique Nord-Est dans la base d'états de mer ANEMOC-3 et comparaison aux mesures de bouées CANDHIS

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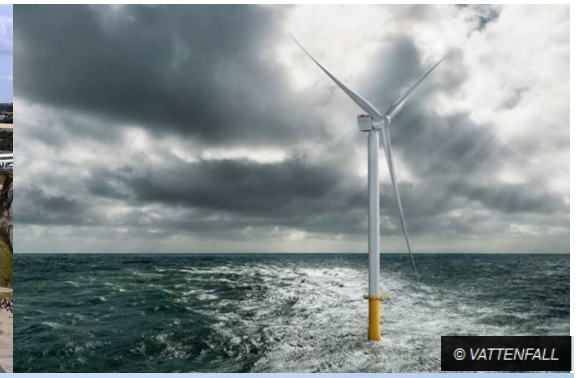
Base de données numérique de vagues: un vrai besoin

La connaissance des états de mer de climat moyen et extrêmes est essentielle:

- conception des structures de protection côtières et des éoliennes en mer offshore
- processus morphodynamiques
- identification de la ressource d'énergie par les vagues
- (…)



➔*Les mesures in situ* (e.g. wave buoys) et satellite sont essentiels mais non suffisantes pour répondre à tous nos besoins

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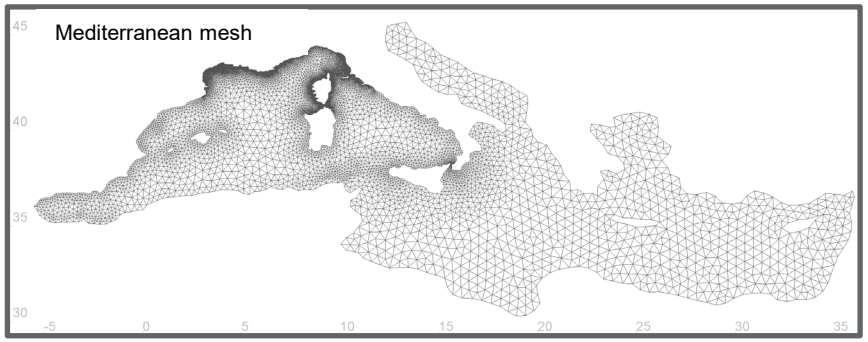
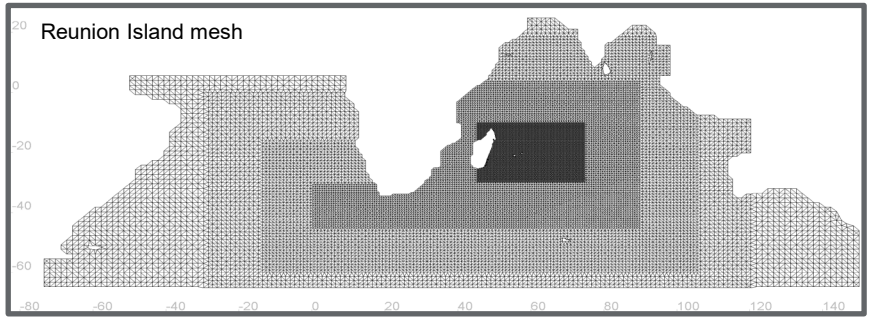
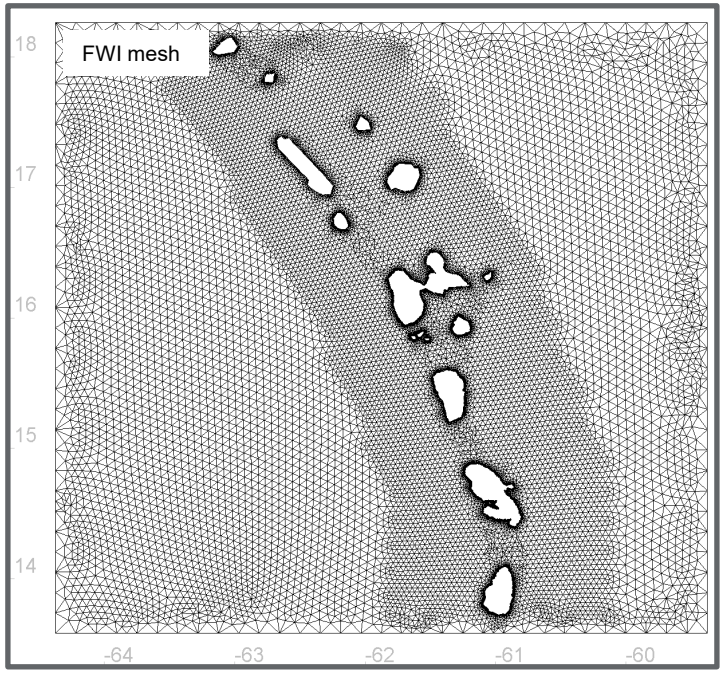
Base d’états de mer numérique ANEMOC-3

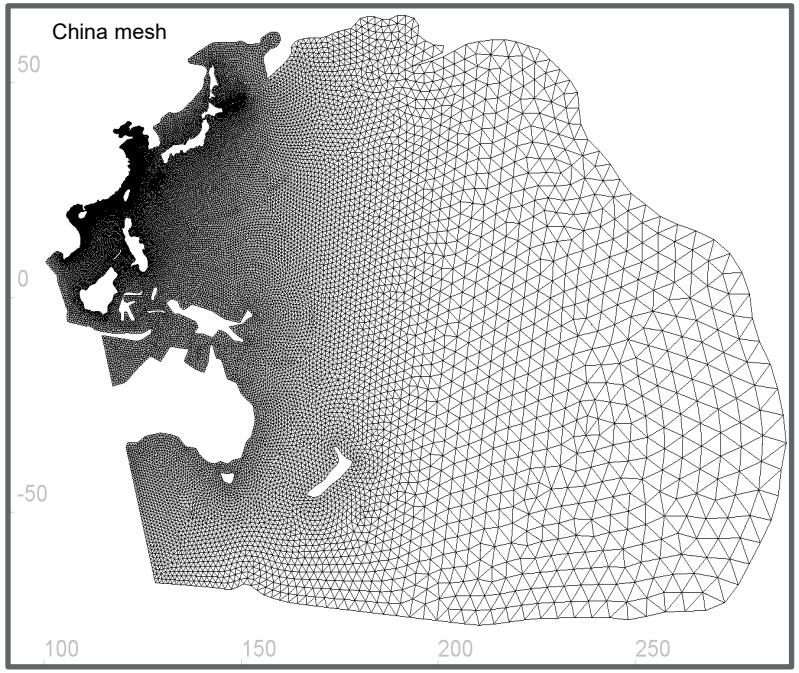
Base de données ANEMOC: historique

- **ANEMOC-1, -2 Mer Méditerranée**
- **ANEMOC-1, -2 Ile de la Réunion**
- **ANEMOC Caraïbes**
- **ANEMOC Chine**
- **ANEMOC-1, -2, -3 Océan Atlantique**

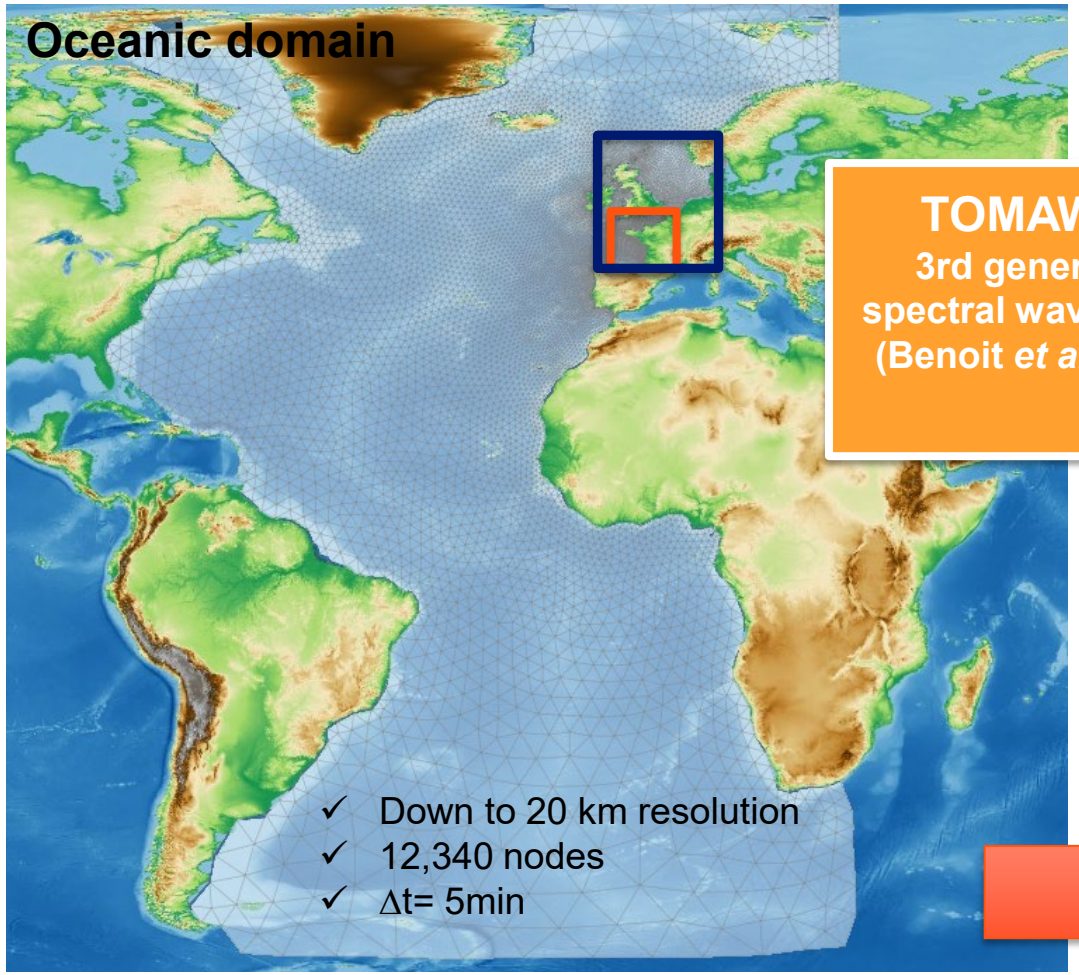






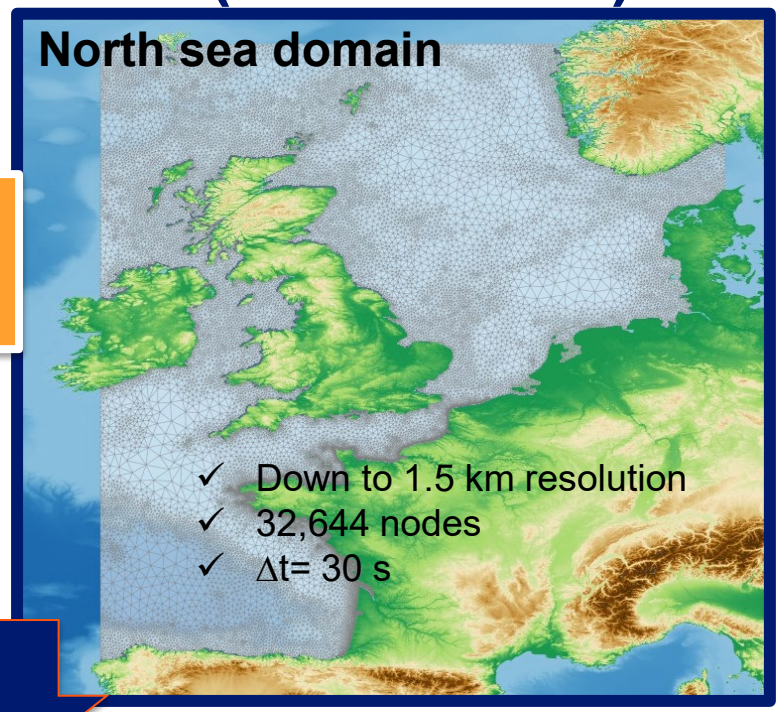


ANEMOC-3: Oceanic, North Sea and Coastal domains (1979 -2024)



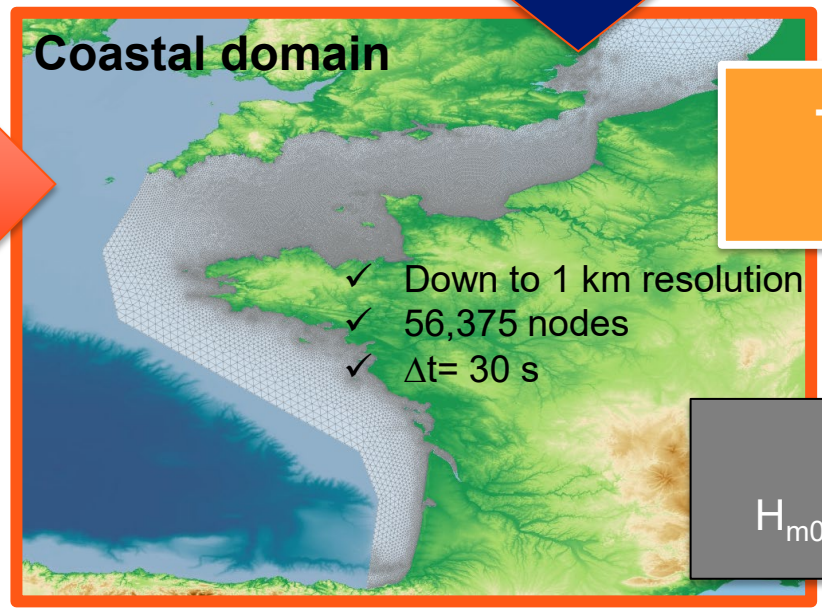
TOMAWAC
3rd generation spectral wave model (Benoit *et al.*, 1996)

TELEMAC-2D



Water levels and currents each 15 min

Wave spectra each hour



TELEMAC2D ➔ TOMAWAC

All domains:

Bathymetry: GEBCO + LEGOS (near the coast)

CFSR & CFSv2 re-analysis wind and pressure

30 min output:
H_{m0}; T_p; T_{m01}; T_{m02}; Dir_m; σ

EDF

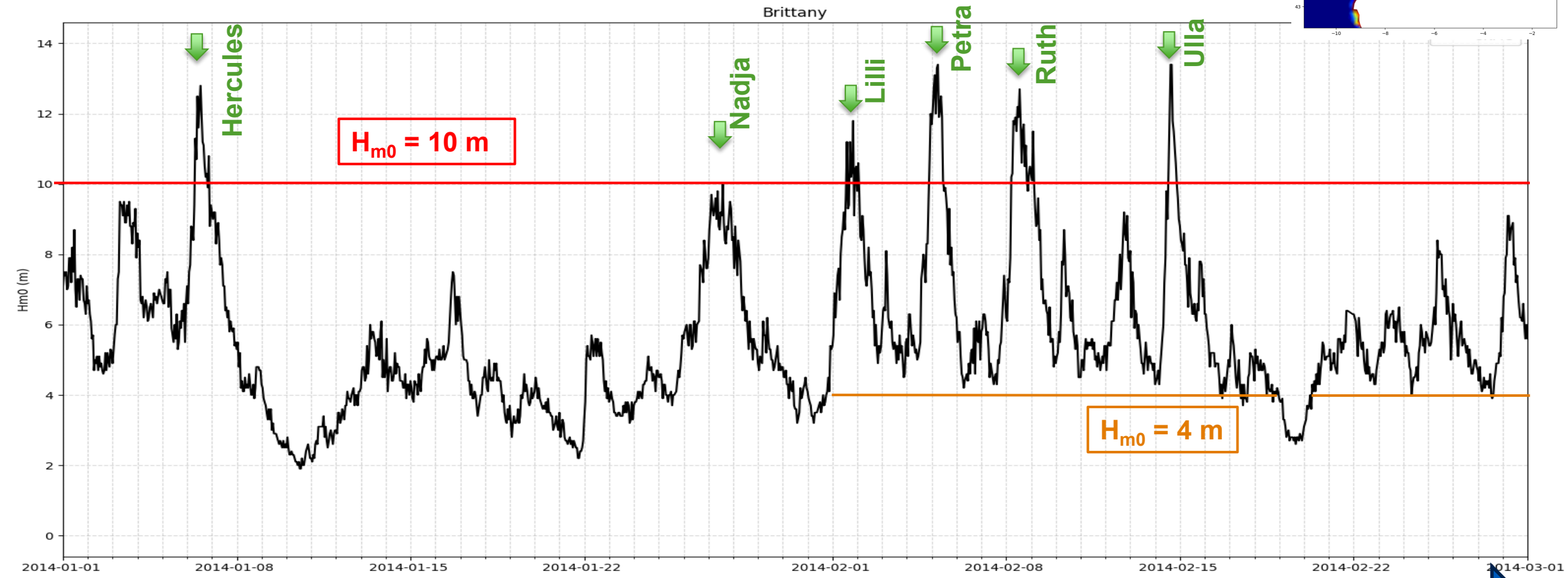
3

L’hiver 2013-2014

Les tempêtes 2013-2014

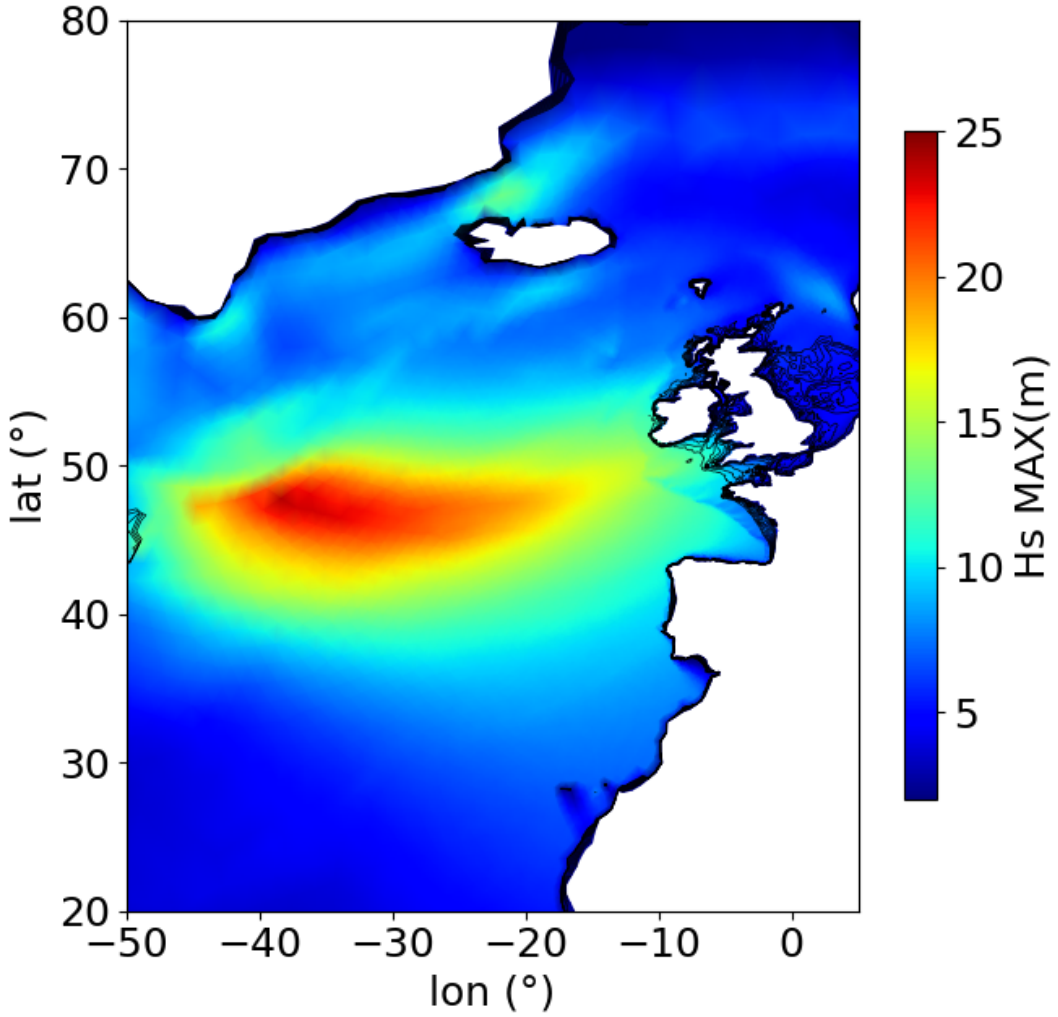
(Blaise et al. (2015); Masselink et al. (2016); Ruju et al. (2020))

Bouée Brittany (62163)

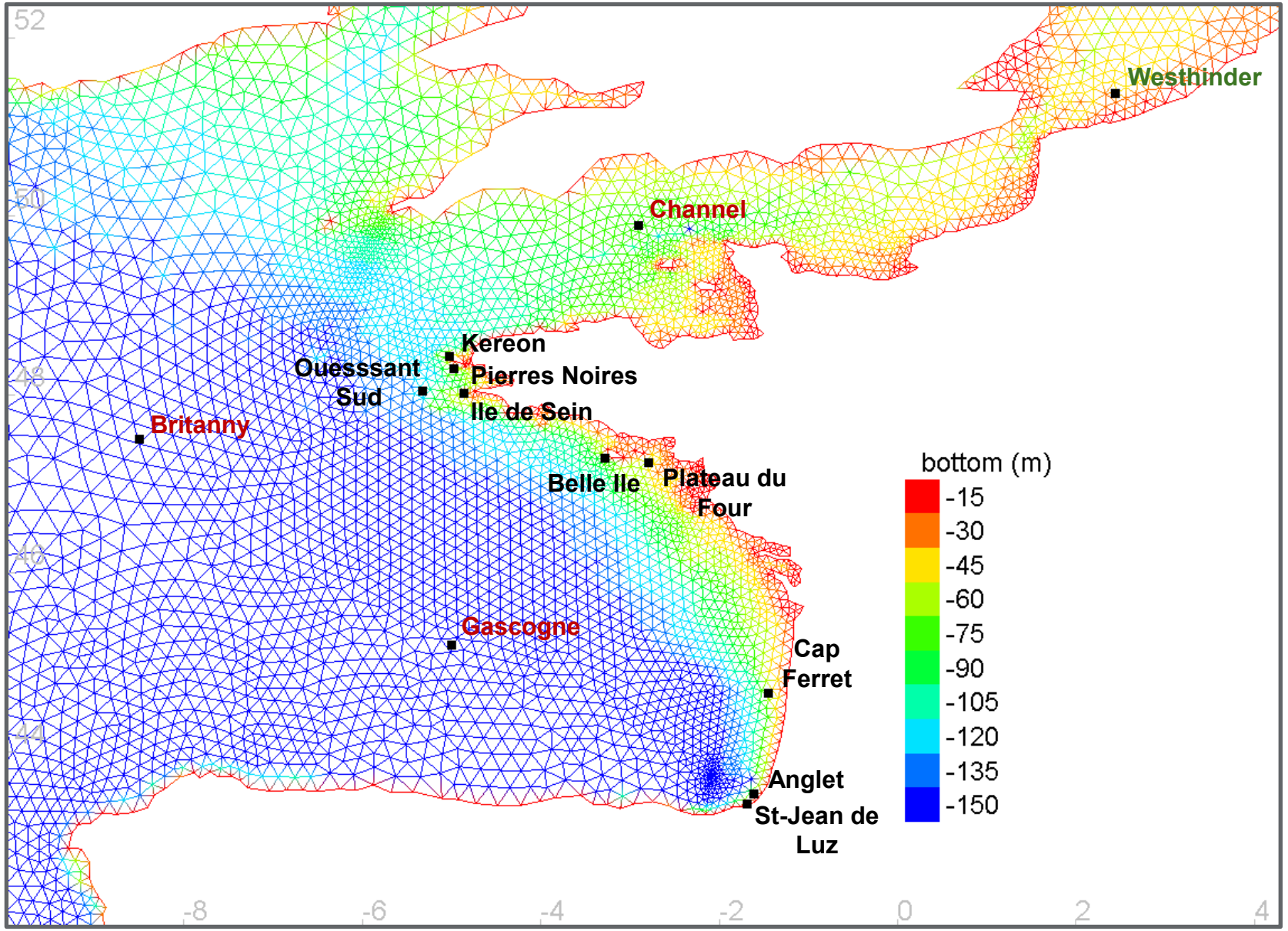


Janvier et février 2014

Hiver 2013-2014 :
Max Hm0 ANEMOC-3 sur 3 jours pendant la tempête Hercules



Mesures *in situ*



Sources de données différentes

Bouées UKMO

https://www.metoffice.gov.uk/weather/specialist-forecasts/coast-and-sea/observations

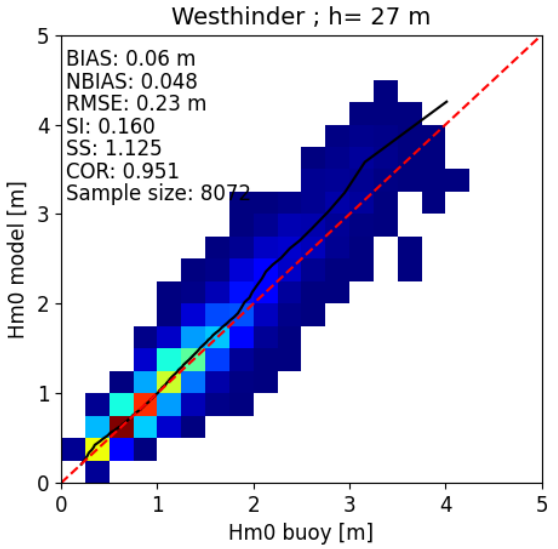
Bouées CANDHIS

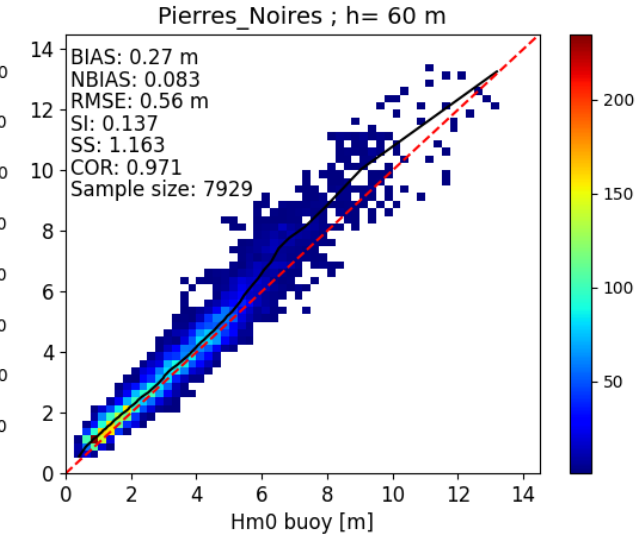
https://candhis.cerema.fr/

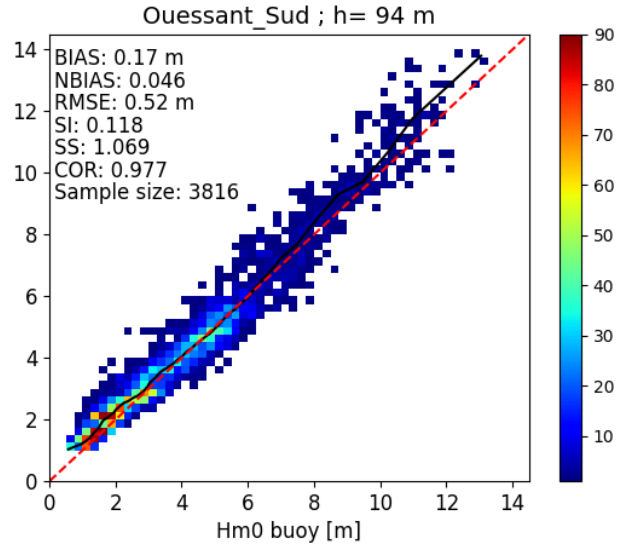
Bouées Belges

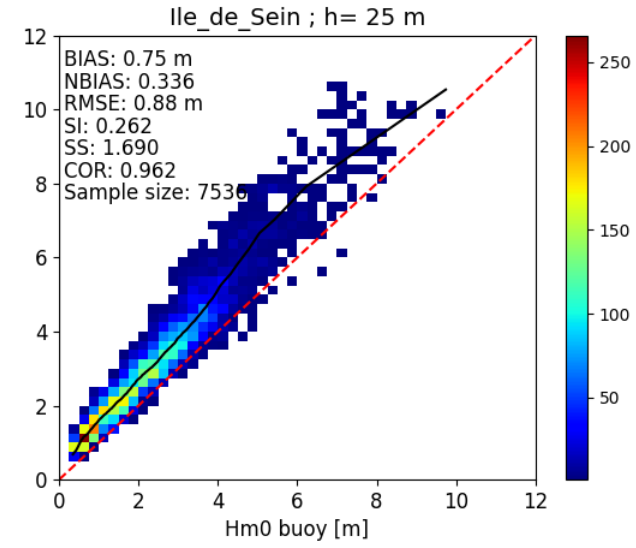
https://meetnetvlaamsebanken.be

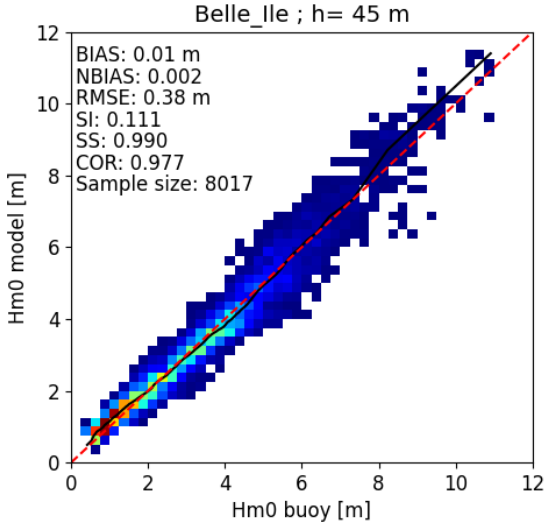
Comparaisons hiver 2013-2014

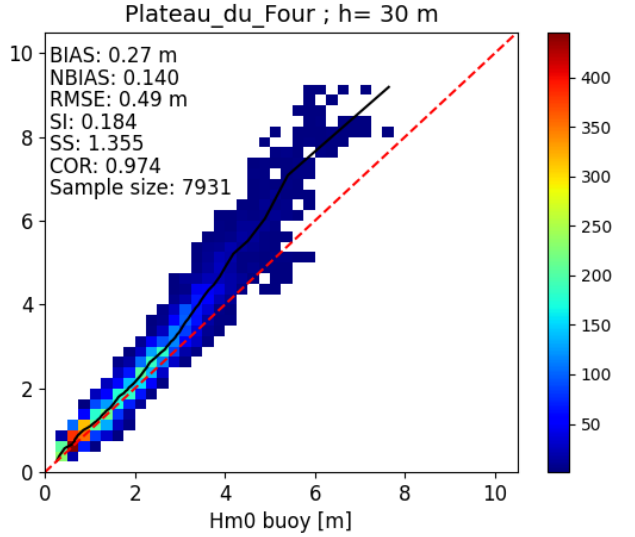


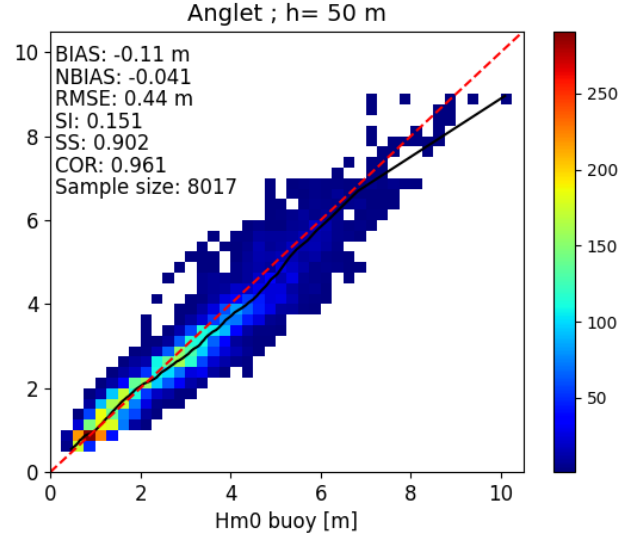


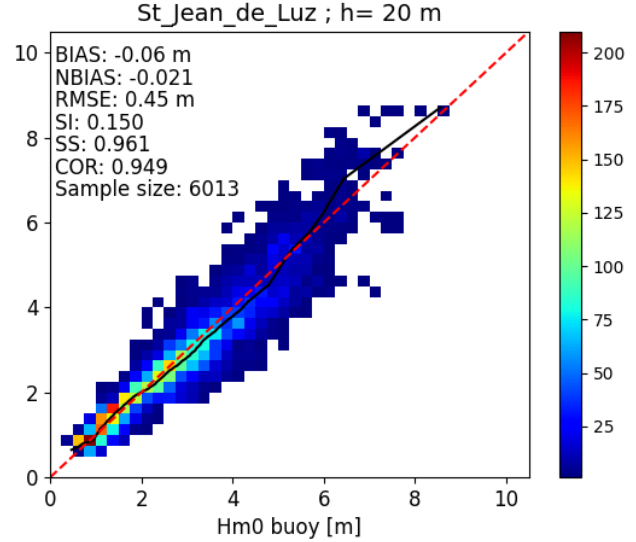










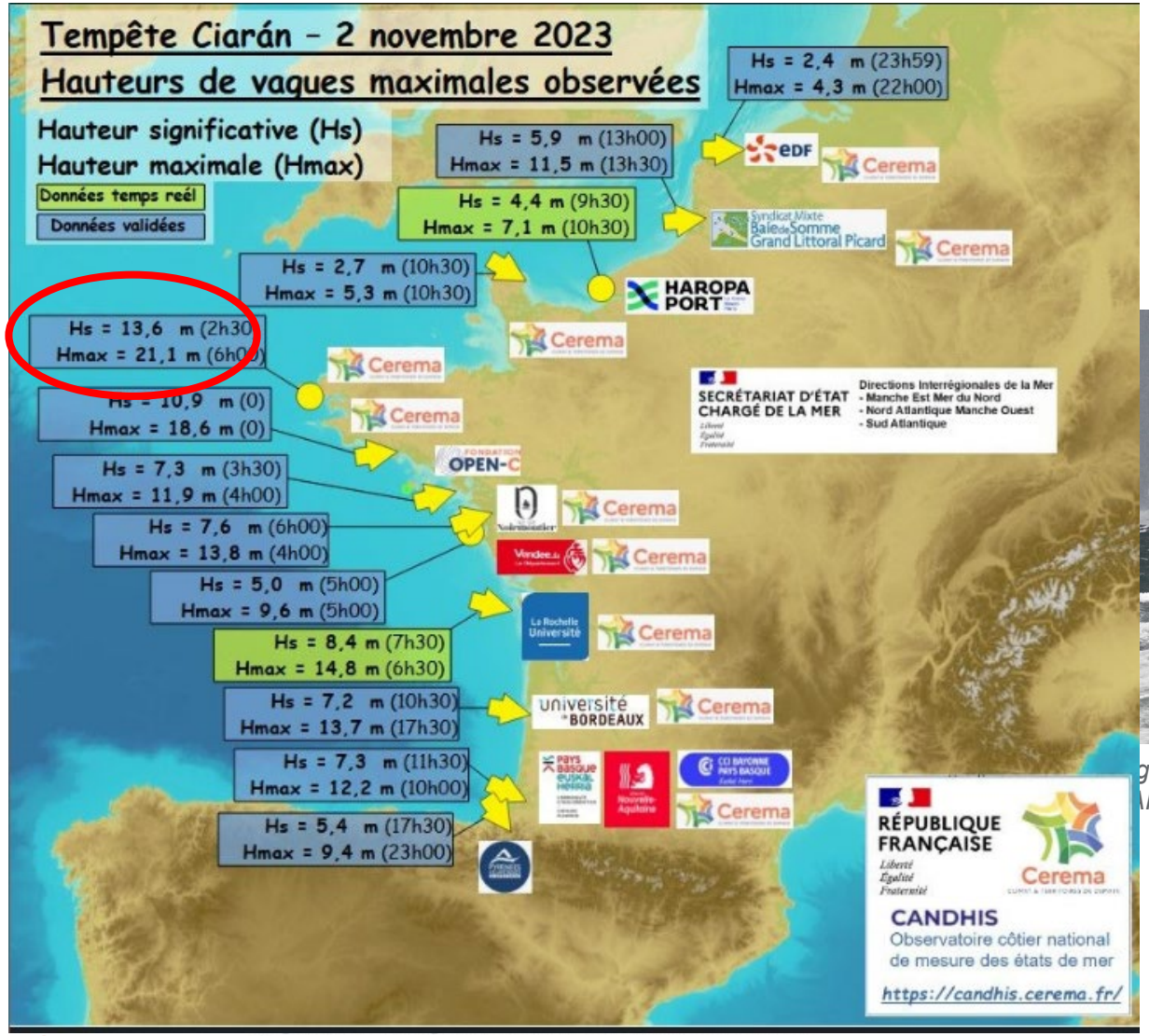


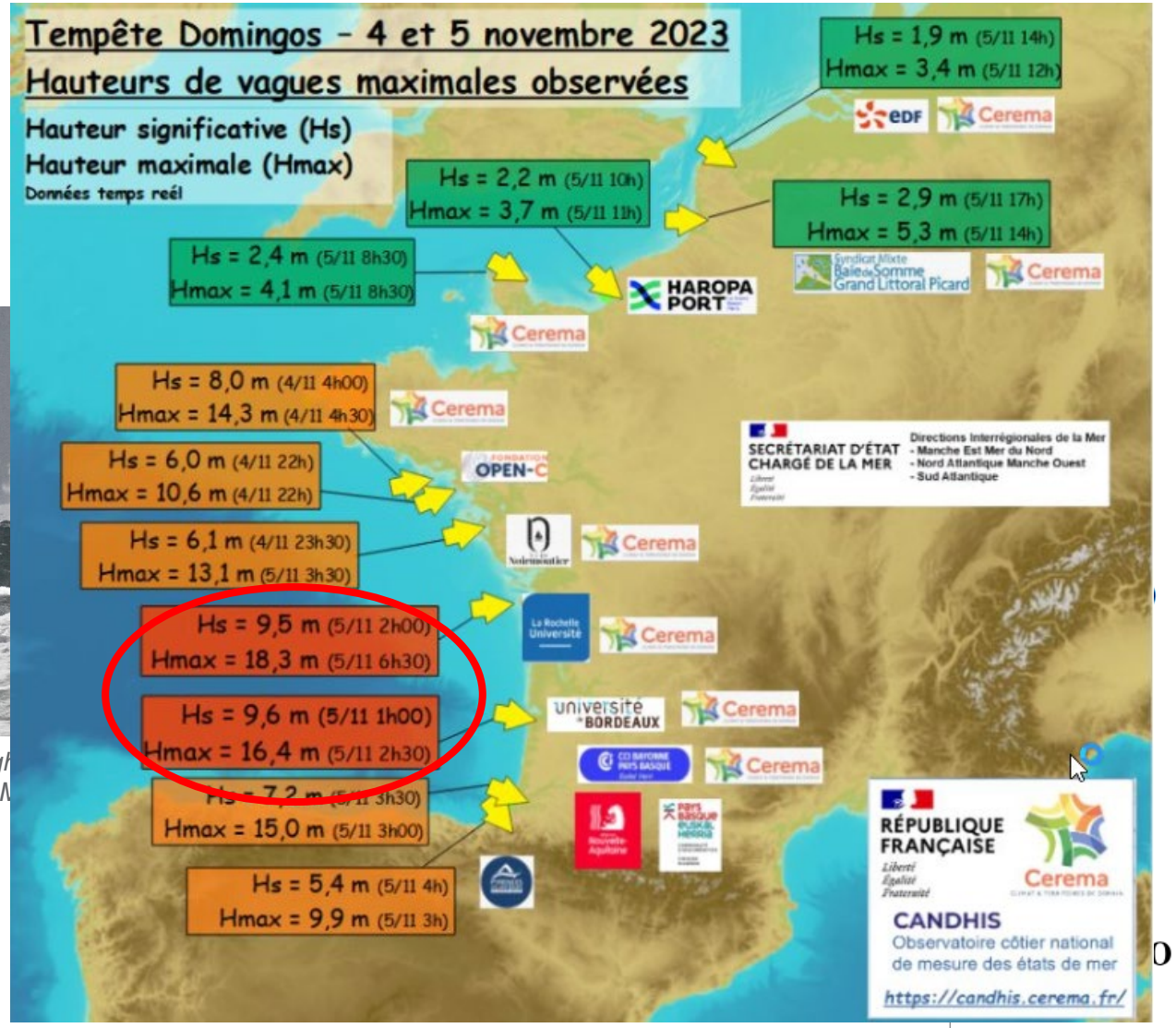
4

Les tempêtes Ciaran and Domingos (November 2023)

Tempêtes Ciaran and Domingos 2023

CEREMA, réseau CANDHIS

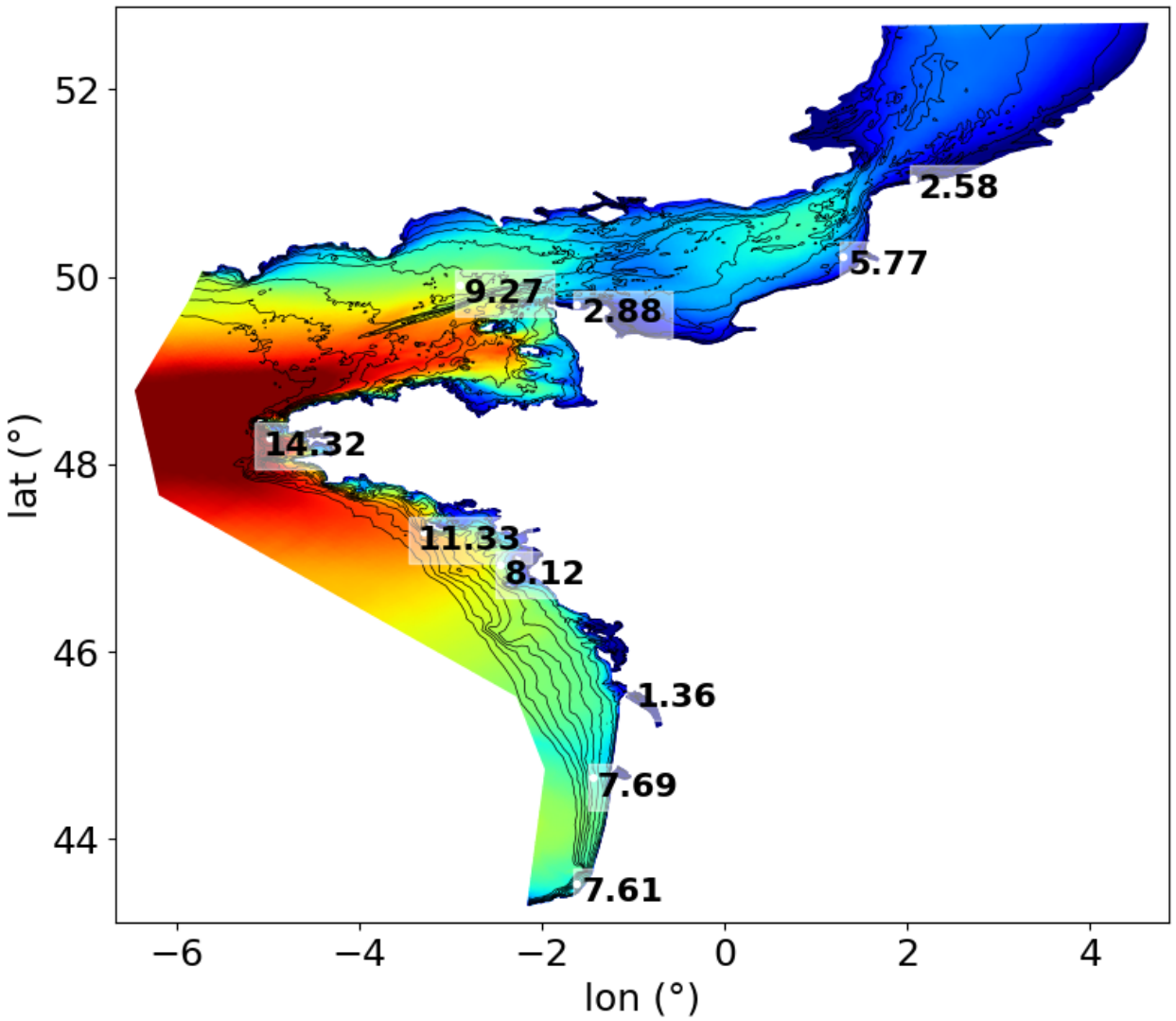




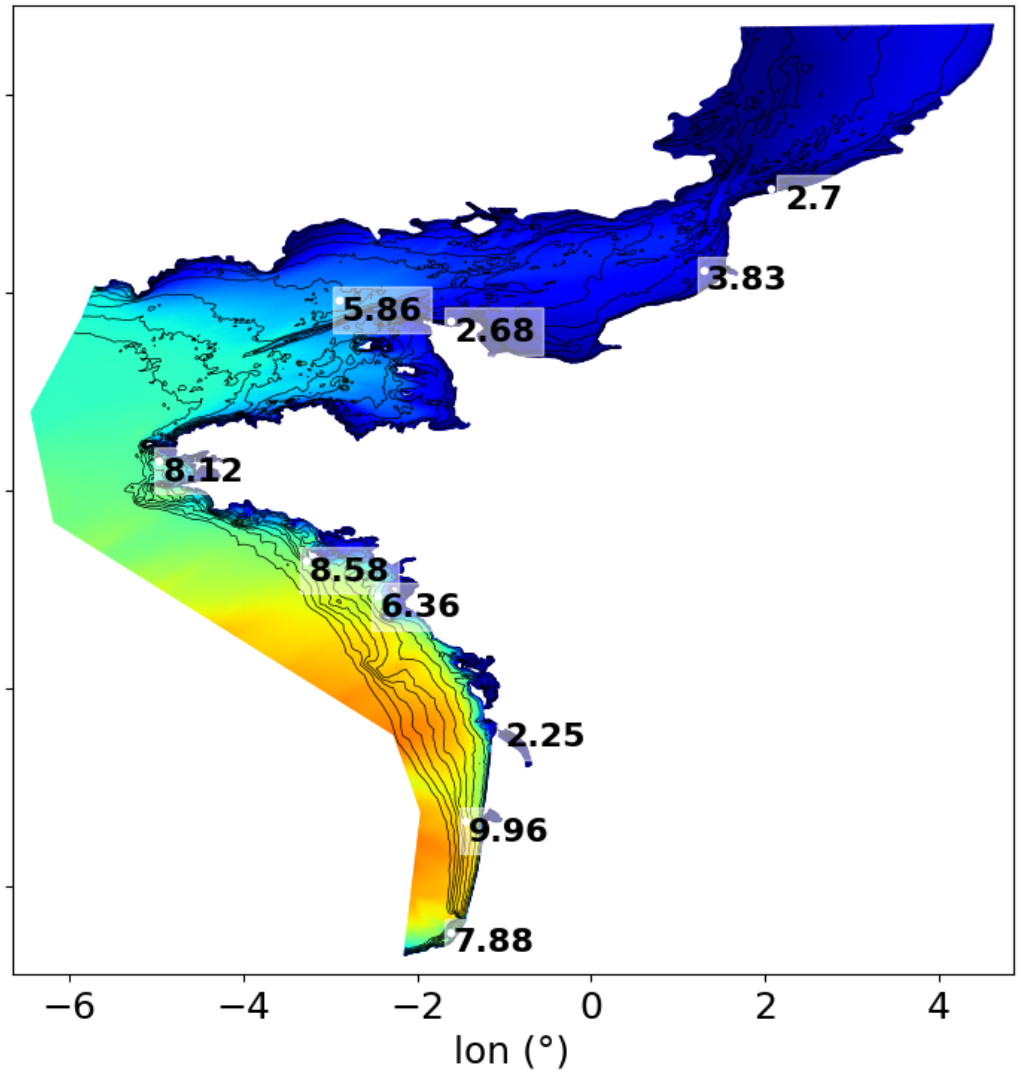
Tempêtes Ciaran and Domingos 2023 :

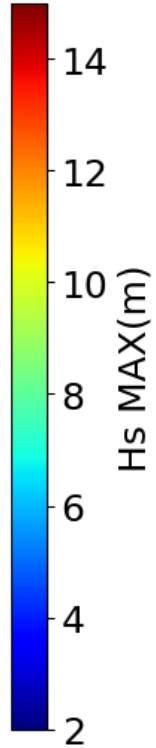
Max Hm0 ANEMOC-3 vs CANDHIS buoys

Ciaran storm

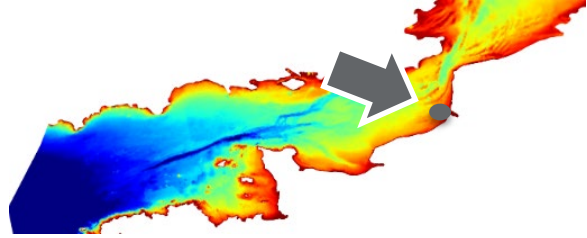


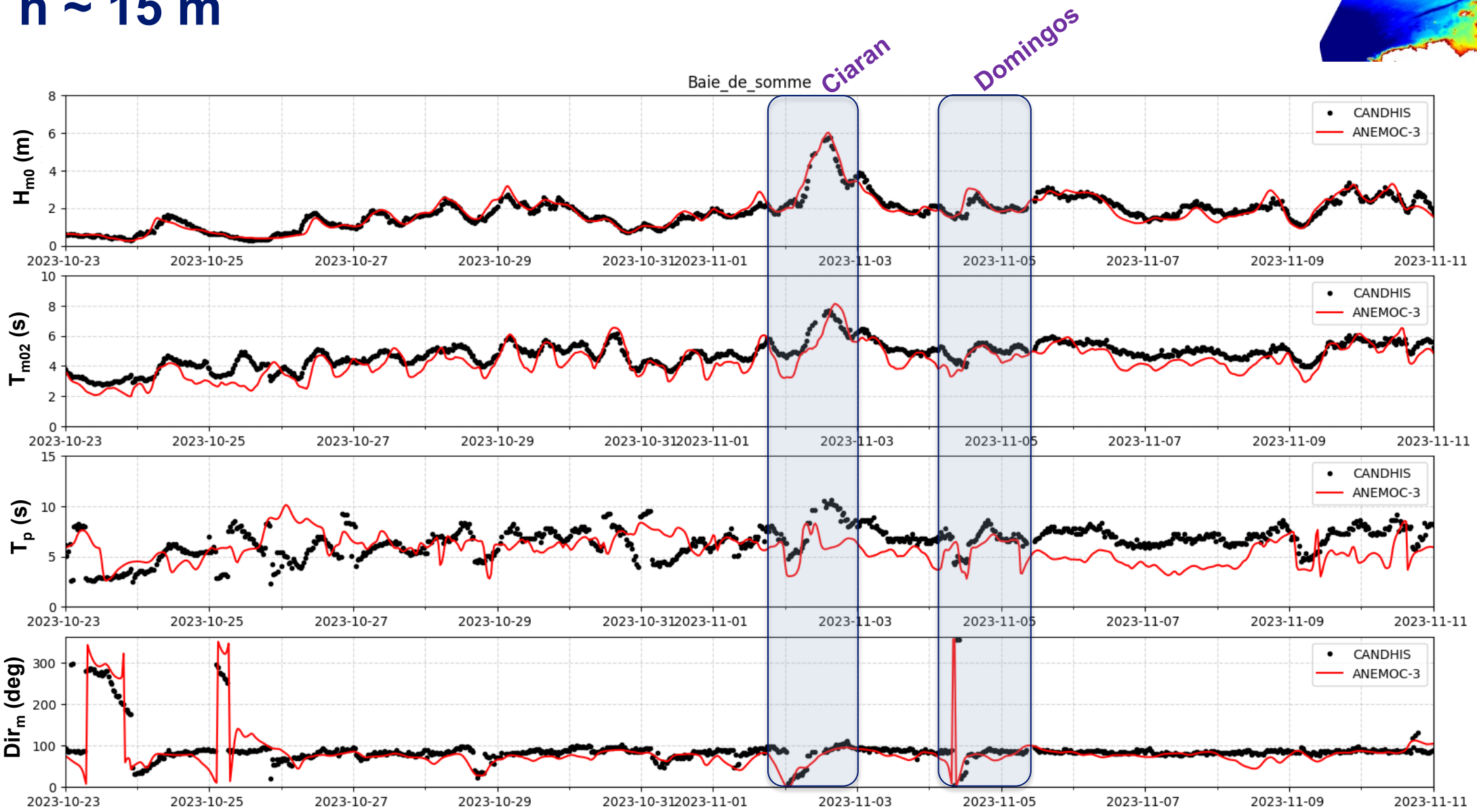
Domingos storm



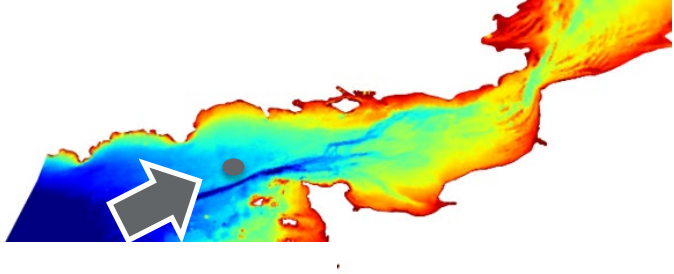


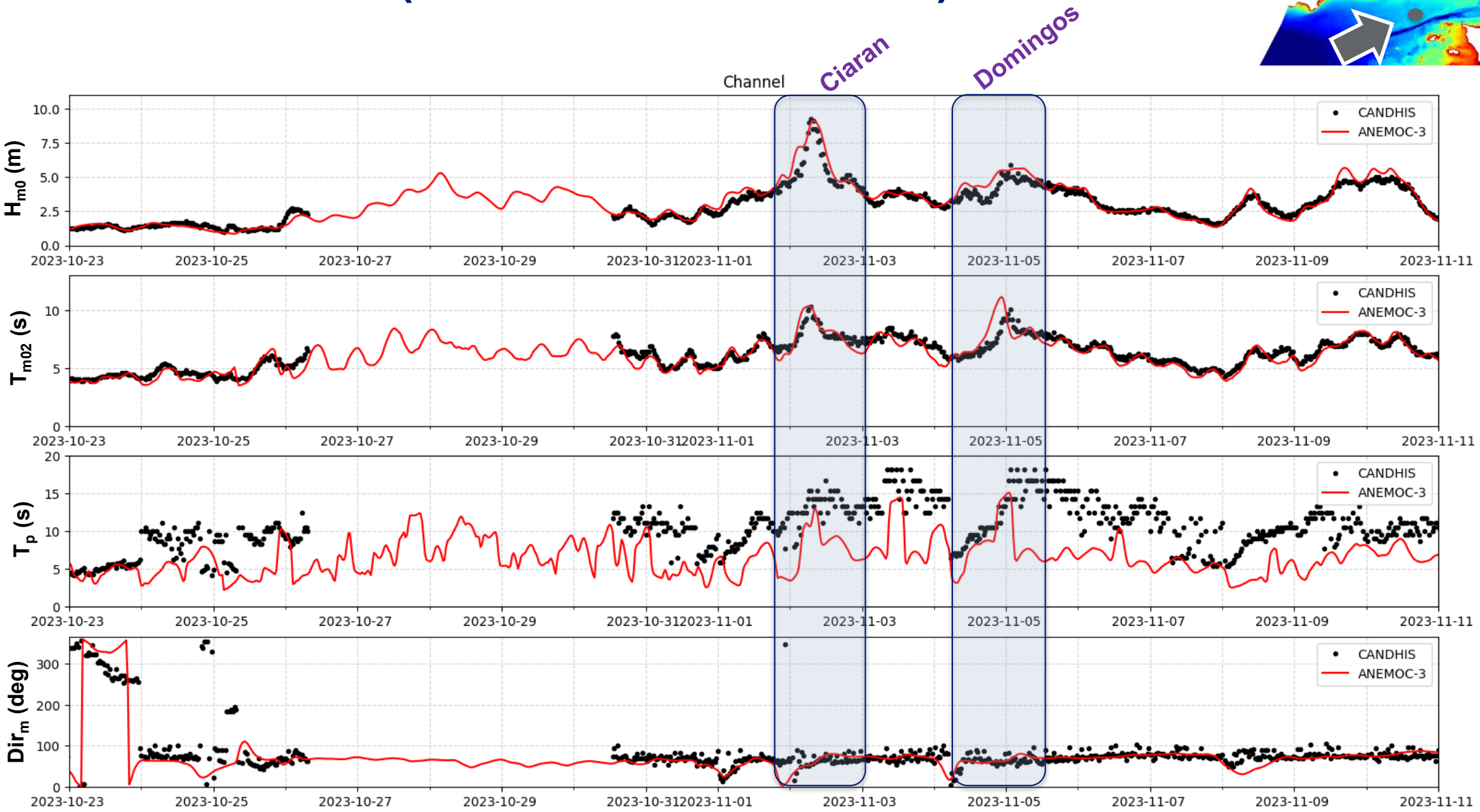
Bouée Baie de Somme (Datawell DWR MkIII 08002)
h ~ 15 m



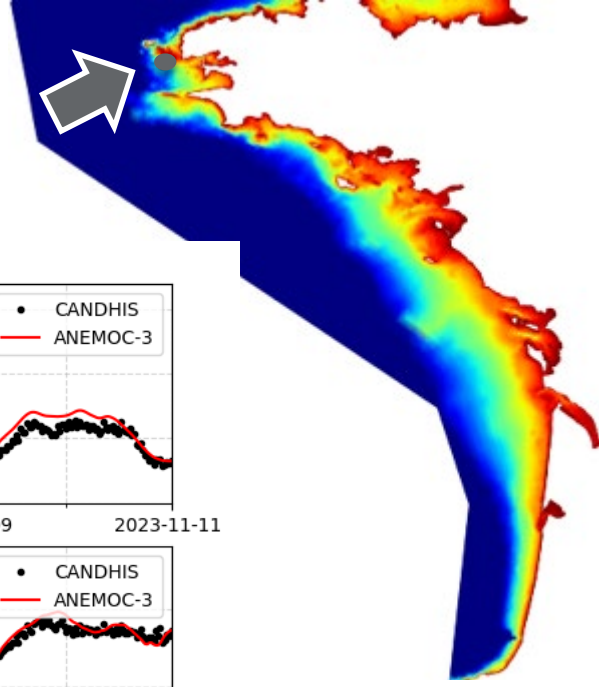


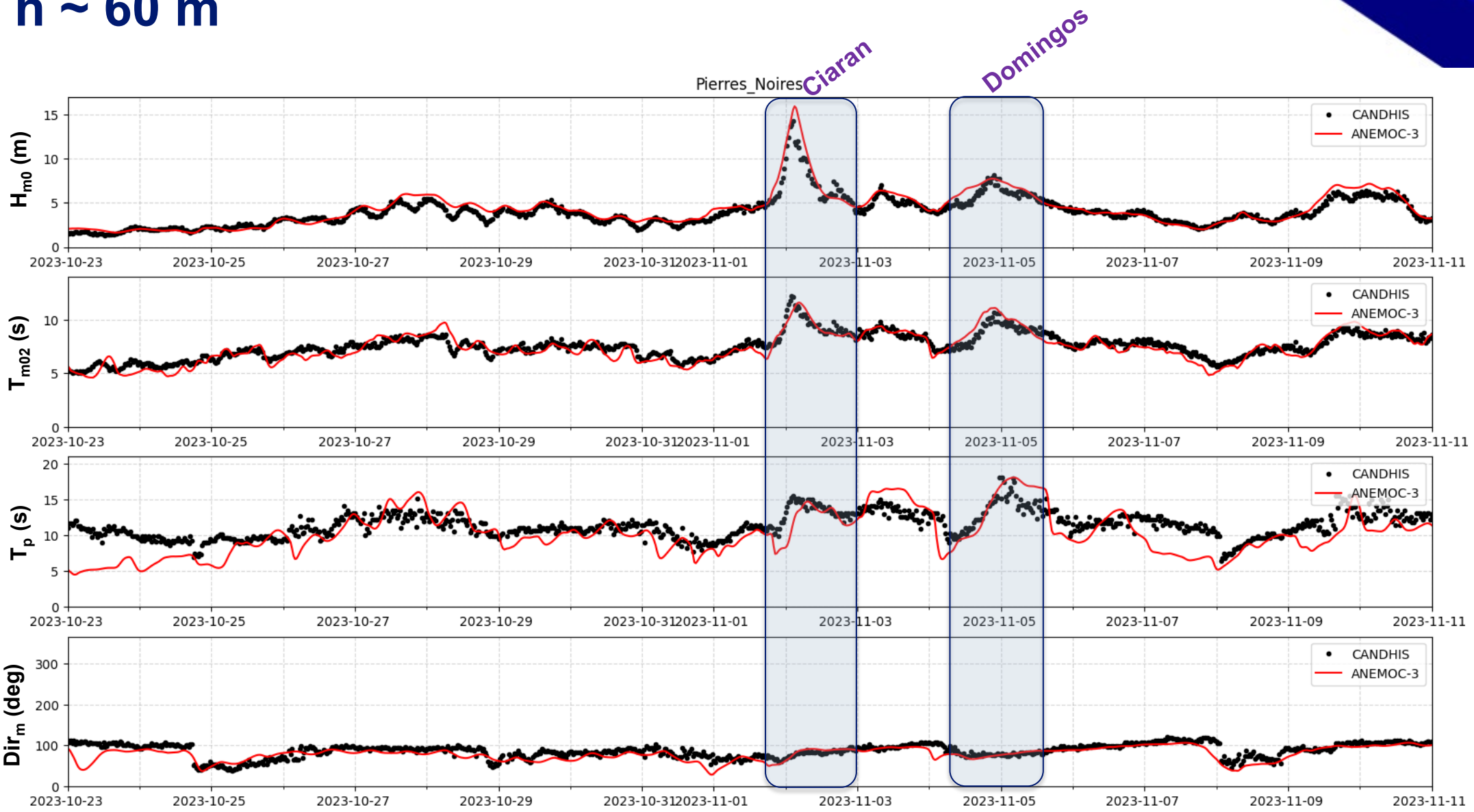
Bouée Channel (Directional Waverider) h ~ 63 m



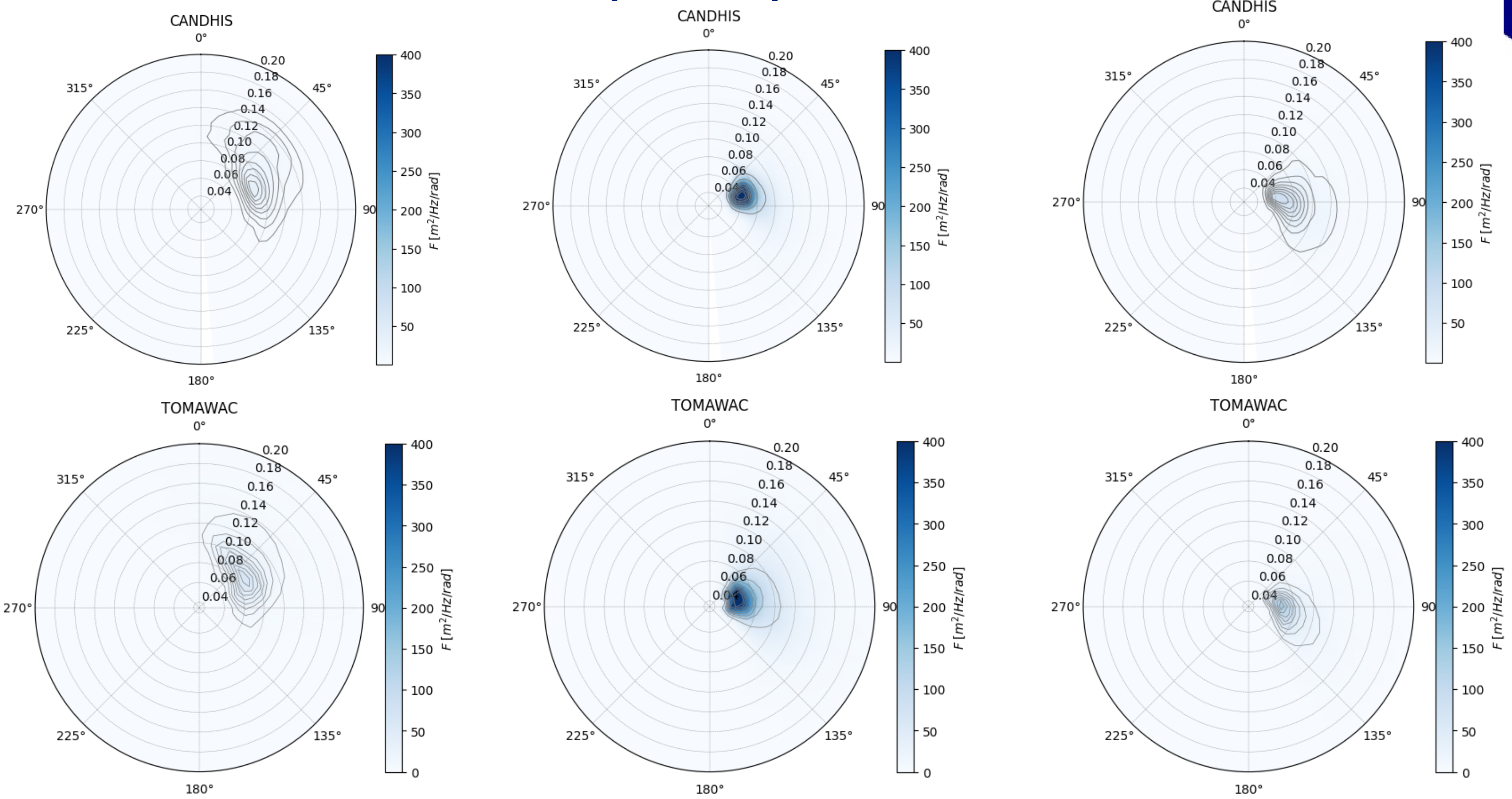


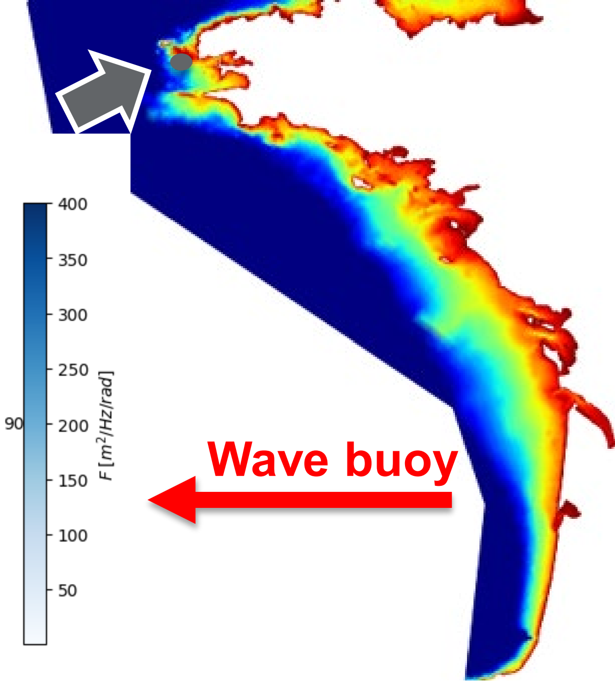
Bouée Pierres Noires (Datawell DWR MkIII 02911)
h ~ 60 m





Bouée Pierres Noires (02911) h ~ 60 m





Wave buoy

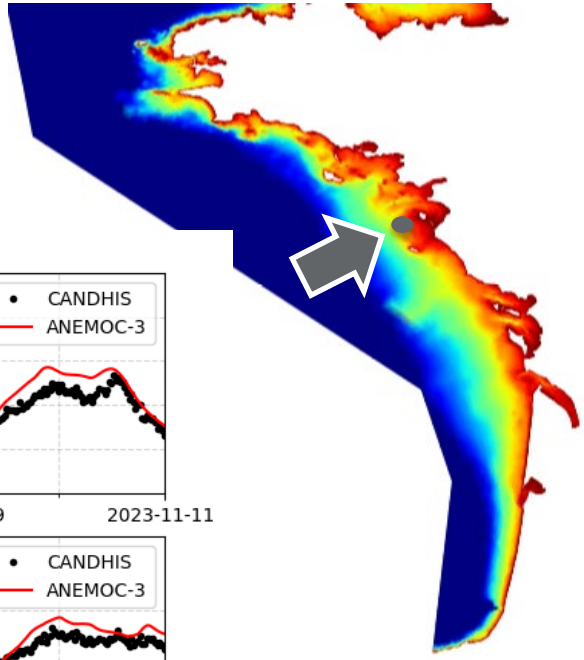
ANEMOC-3

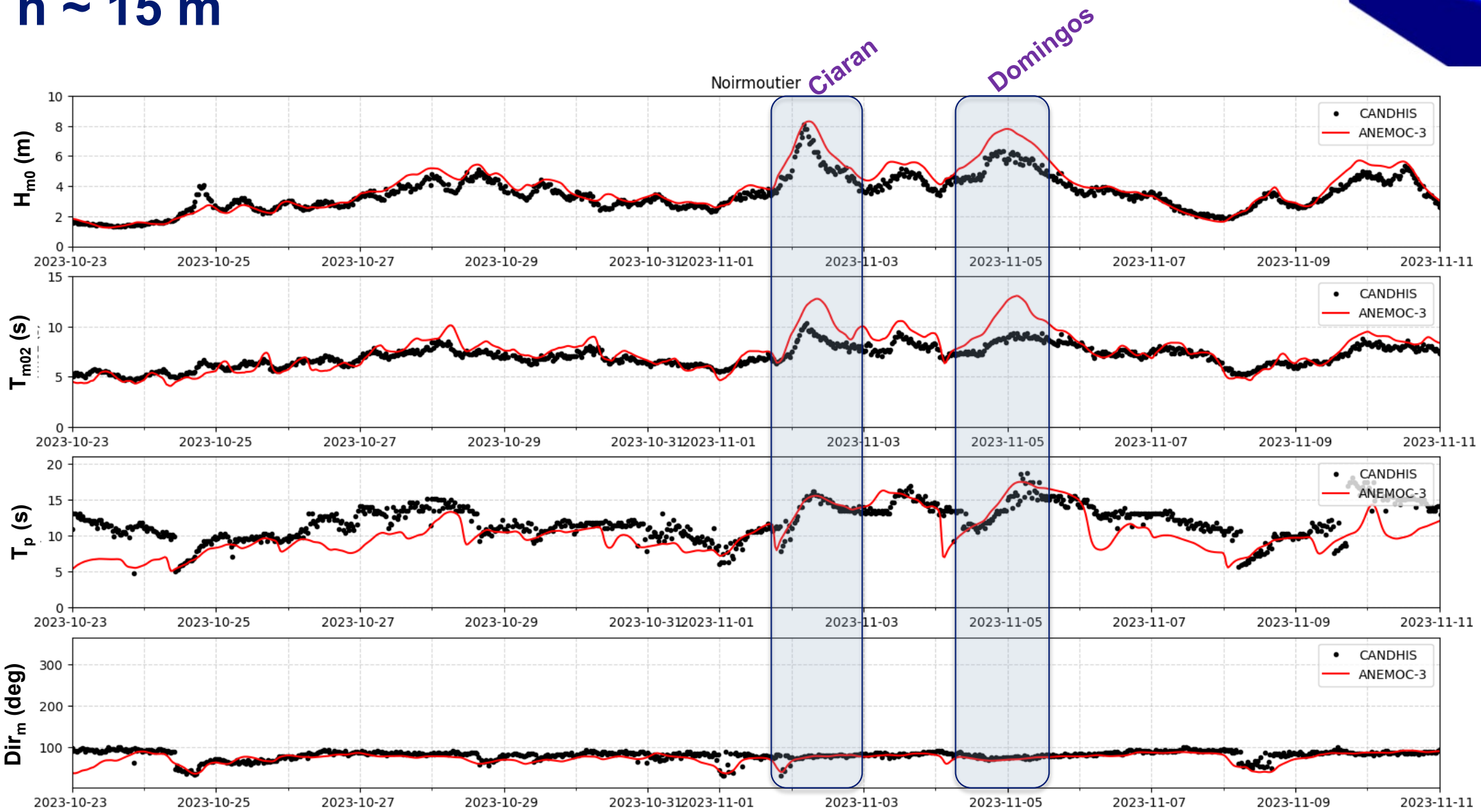
01/11 8:30pm UTC

02/11 2:30am UTC

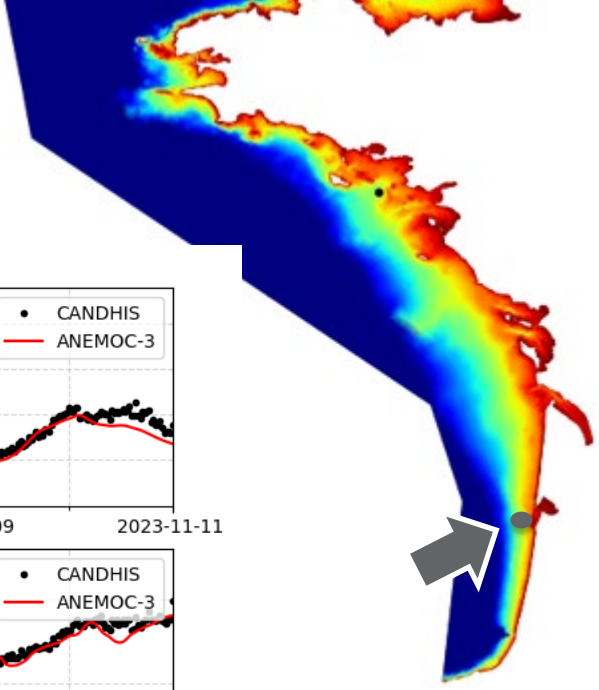
02/11 8:30am UTC

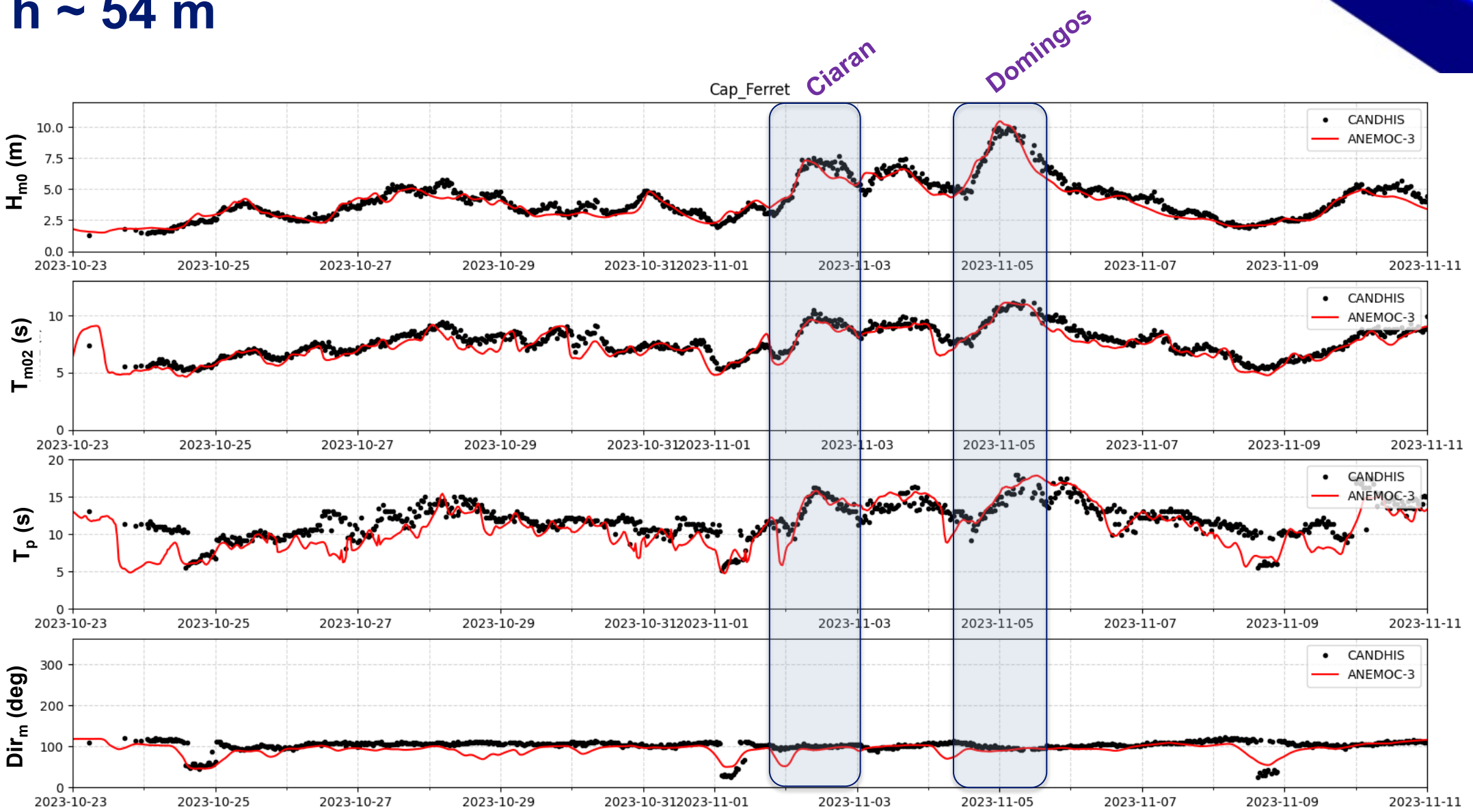
Bouée Noirmoutier (Datawell DWR MkIII 08505)
h ~ 15 m





Bouée Cap Ferret (Datawell DWR MkIII 03302) h ~ 54 m





5

Conclusions et prespectives

Conclusions

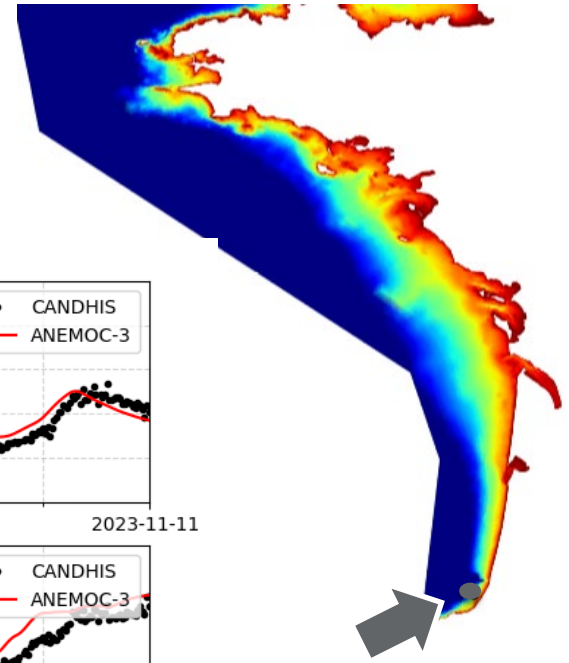
- Extension d'ANEMOC-3 à 2024 (46 ans de séries temporelles de paramètres de vagues)
- Amélioration des pics extrêmes de Hs (relativement à la version de base d'ANEMOC-3)

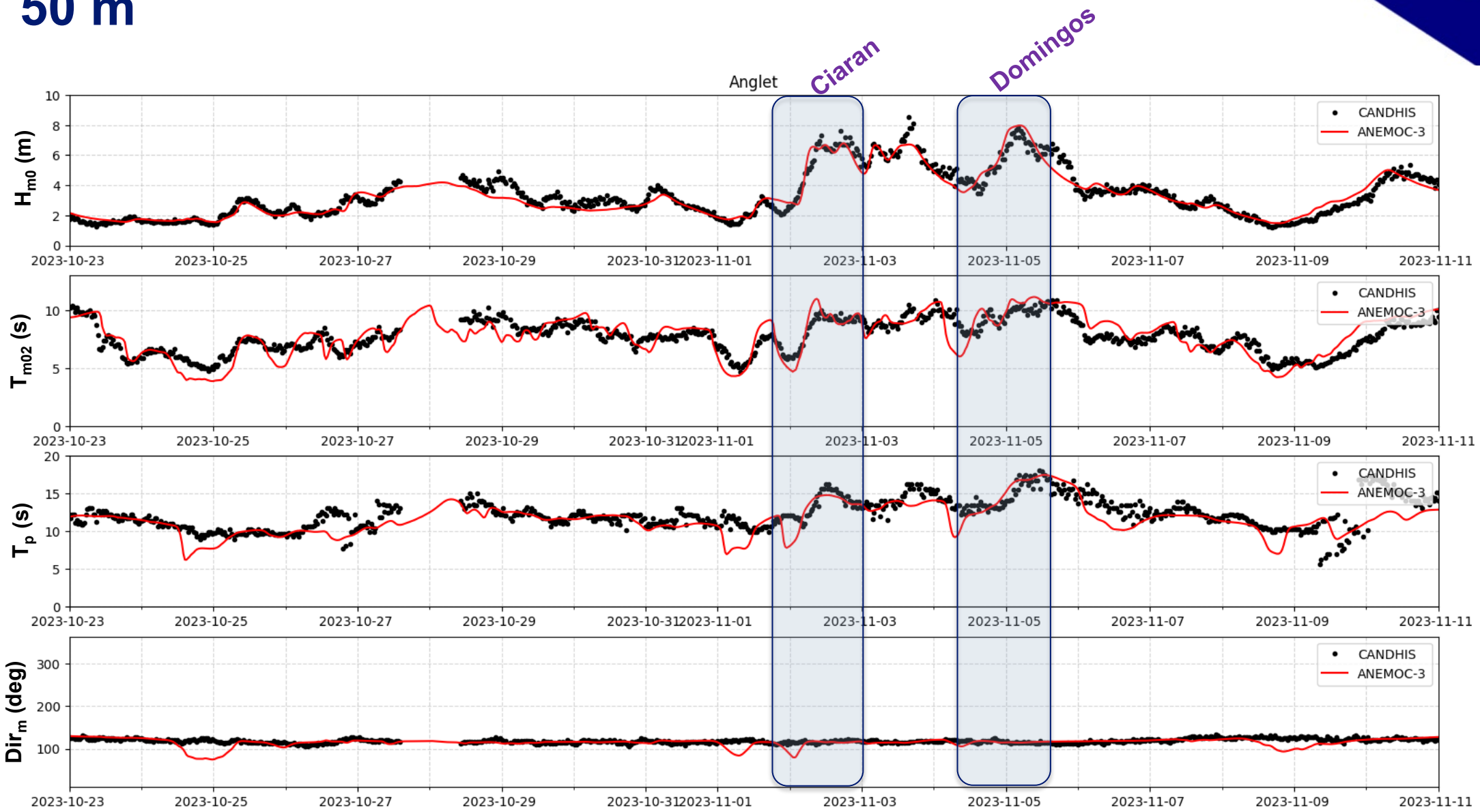
Ongoing and further work

- Comparaisons avec données satellitaires (Hs et spectres).
- Assimilation de données pour la calibration de Hs (Goeury *et al*., 2023 ; Fouquet *et al*., 2024).
- Tests de sensibilité sur le forçage de vents, sur d'autres paramétrisations (frottement au fond, terme de dissipation ST4, …), ou résolution de maillage proche des côtes.
- Etude de l'évolution du climat de vagues du futur
- Etude de vagues induites par les typhons

Merci!

Anglet buoy (Datawell DWR MkIII 06402) h ~ 50 m





Saint Jean de Luz buoy (Datawell DWR-G 06403) h ~ 20 m