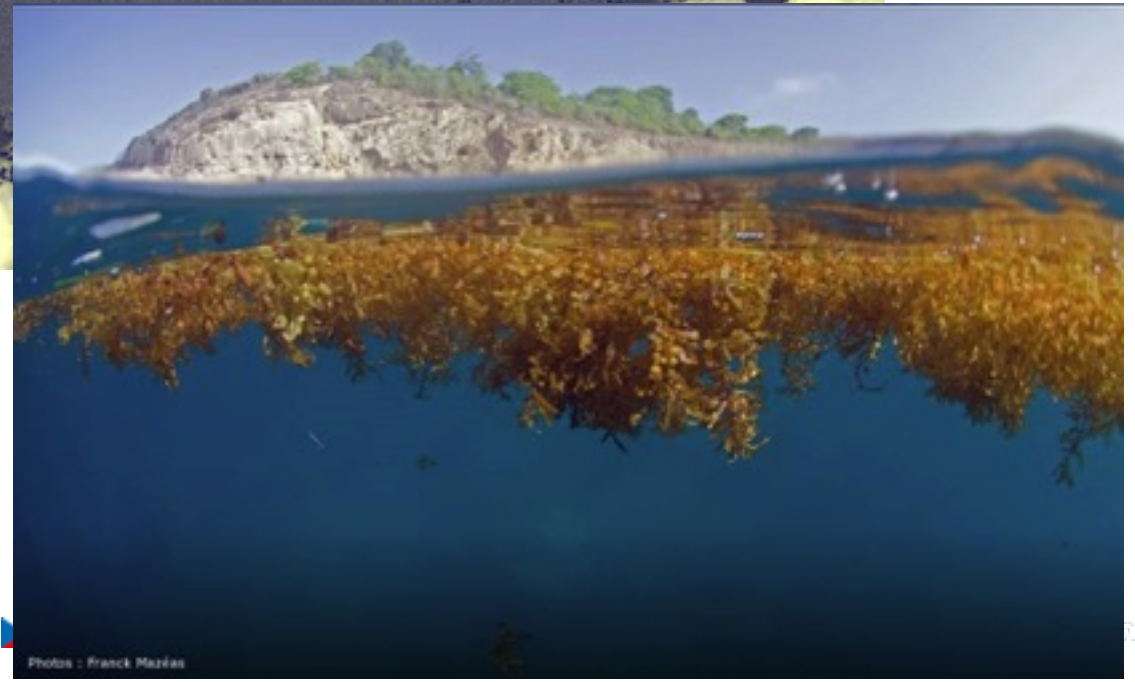
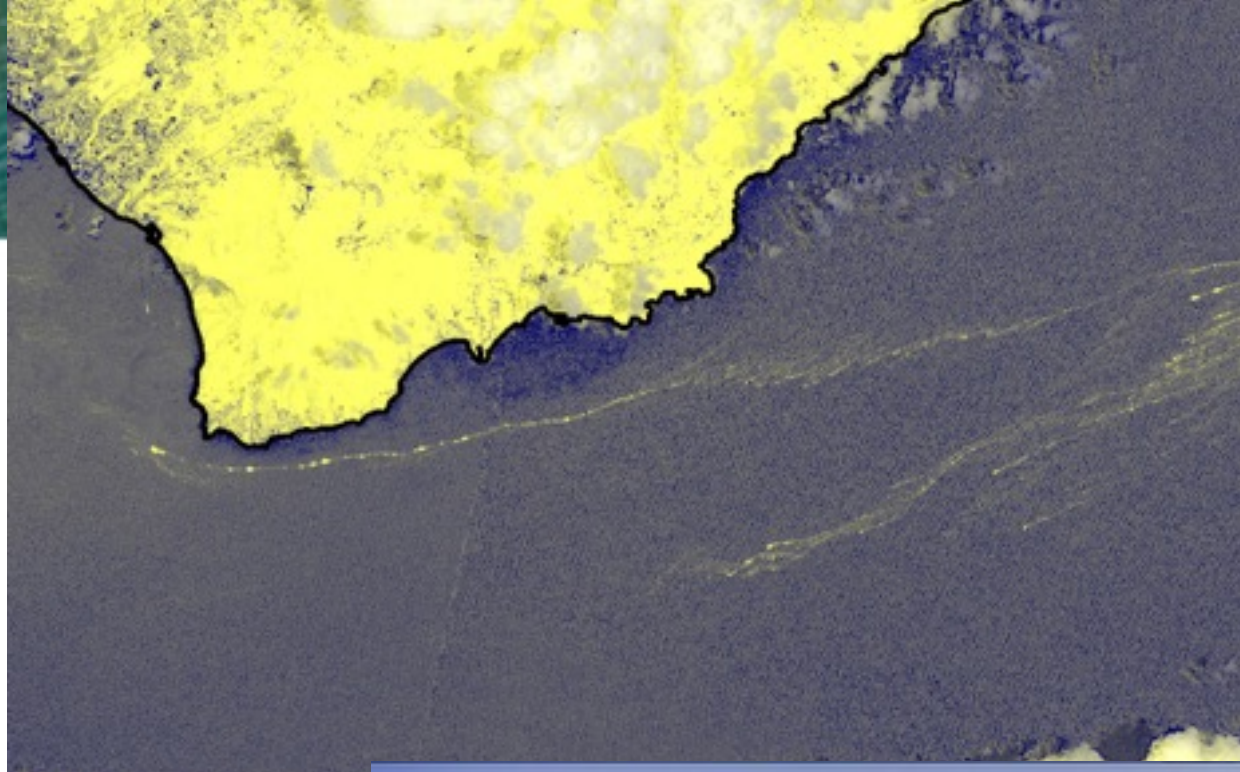




Assessment of WOC current products for Sargassum drift prediction with MOTHY

- Impact assessment study for Theme 3
- WOC 2022, World Ocean Circulation User Consultation Meeting
 - 10-12 October 2022, ESA-ESRIN Frascati, Italy

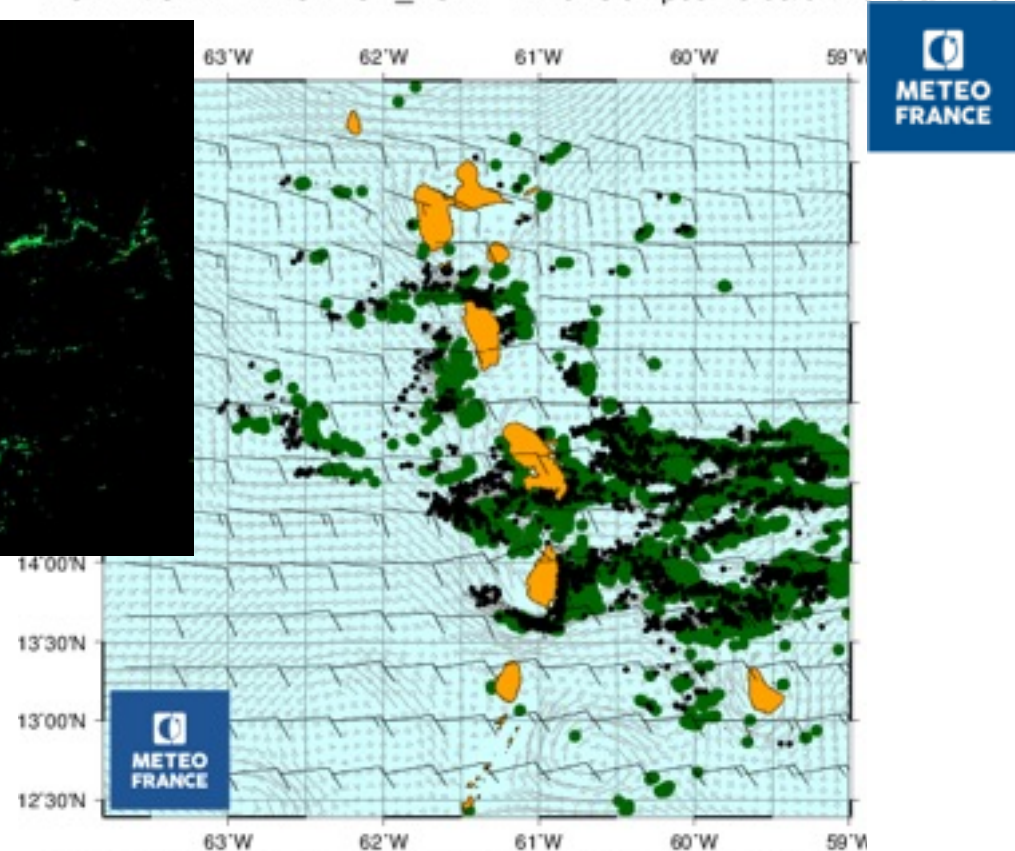
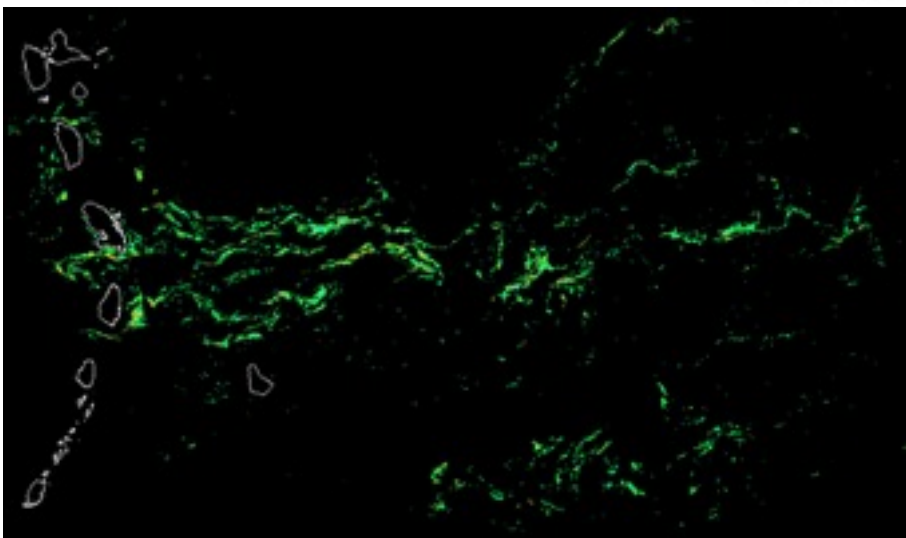
Sargassum



Monitoring and prediction of sargassum strandings

- Meteo-France operates a sargassum drift prediction system since March 2019

MOTHY/CEP MERCATOR_PSY4 : Prévion pour le 09/01/2019 à 17 UTC



**Bulletin de surveillance et de prévision
d'échouage des sargasses pélagiques
pour la Martinique**
Vendredi 22 Mai 2020
Carte de risques d'échouages pour les 4 prochains jours



- Observation (Lannion)
- Prediction (Toulouse)
- Beaching (Martinique)

Attention : document technique de prévision de dérive d'hydrocarbure, réalisé à partir d'un seul point choisi dans
Caution: Technical support for oil drift forecast from a single point out of a complex set of slicks (observed or not)

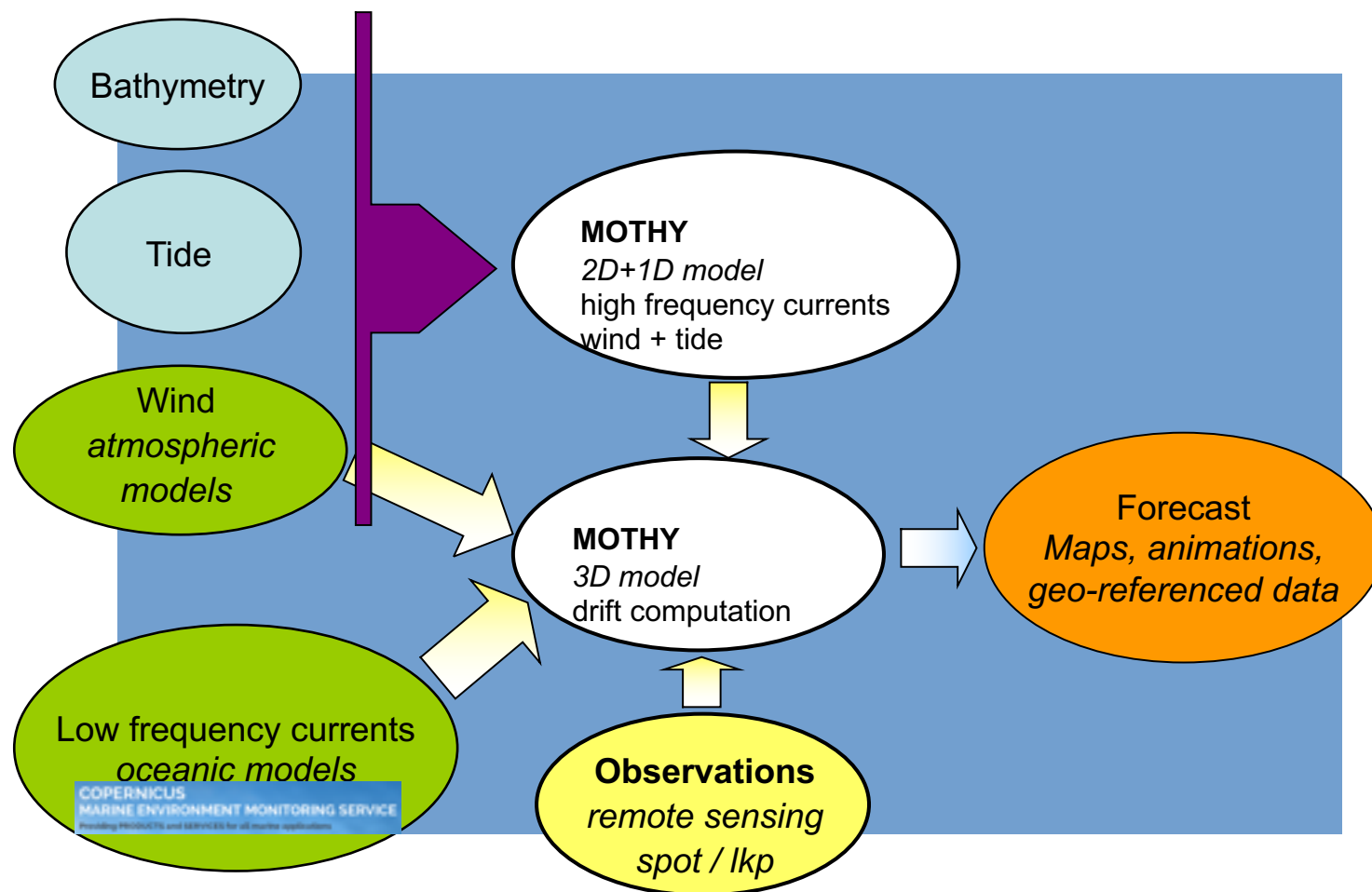
Indice de confiance : 3 / 5

MOTHY drift prediction system

- Oil spills, containers, search & rescue targets, sargassum

• For sargassum :

- Oil spill version without weathering
- Heavy product in the water column



Experiments with WOC products

- Two sets of sargassum drift observations :
 - Case 1 : May 2019, 4 x 24h (from satellite observation)
 - Case 2 : July-August 2018, 4 drifters in sargassum rafts (*Putman, et al., Improving transport predictions of pelagic Sargassum, Journal of Experimental Marine Biology and Ecology, 529, 2020.*)

- Two sets of ocean currents:
 - WOC current: hourly at 15 m depth, 1/4°, https://data-cersat.ifremer.fr/projects/woc/products/theme3/ocean_currents/woc-l4-cureul-natl-1h/v2.0/
 - CMEMS current : daily at the base of the Ekman layer, 1/12°, GLOBAL_ANALYSIS_FORECAST_PHY_001_024

Case 1, from satellite observation

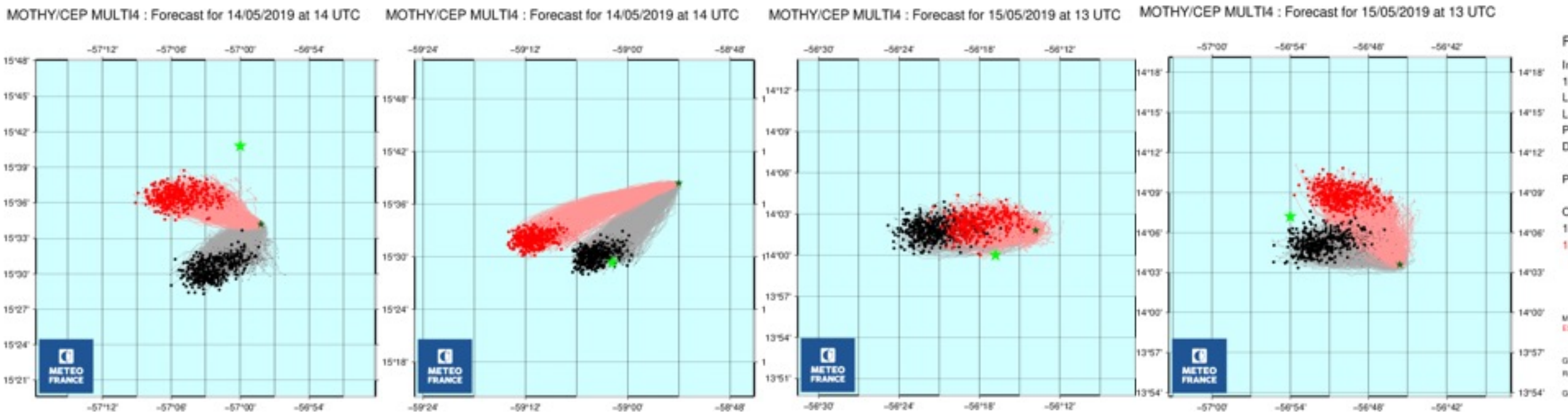
4 sargassum rafts :

Small green star : initial observation

Large green star : observation 24h later

In black : drift modelled with CMEMS

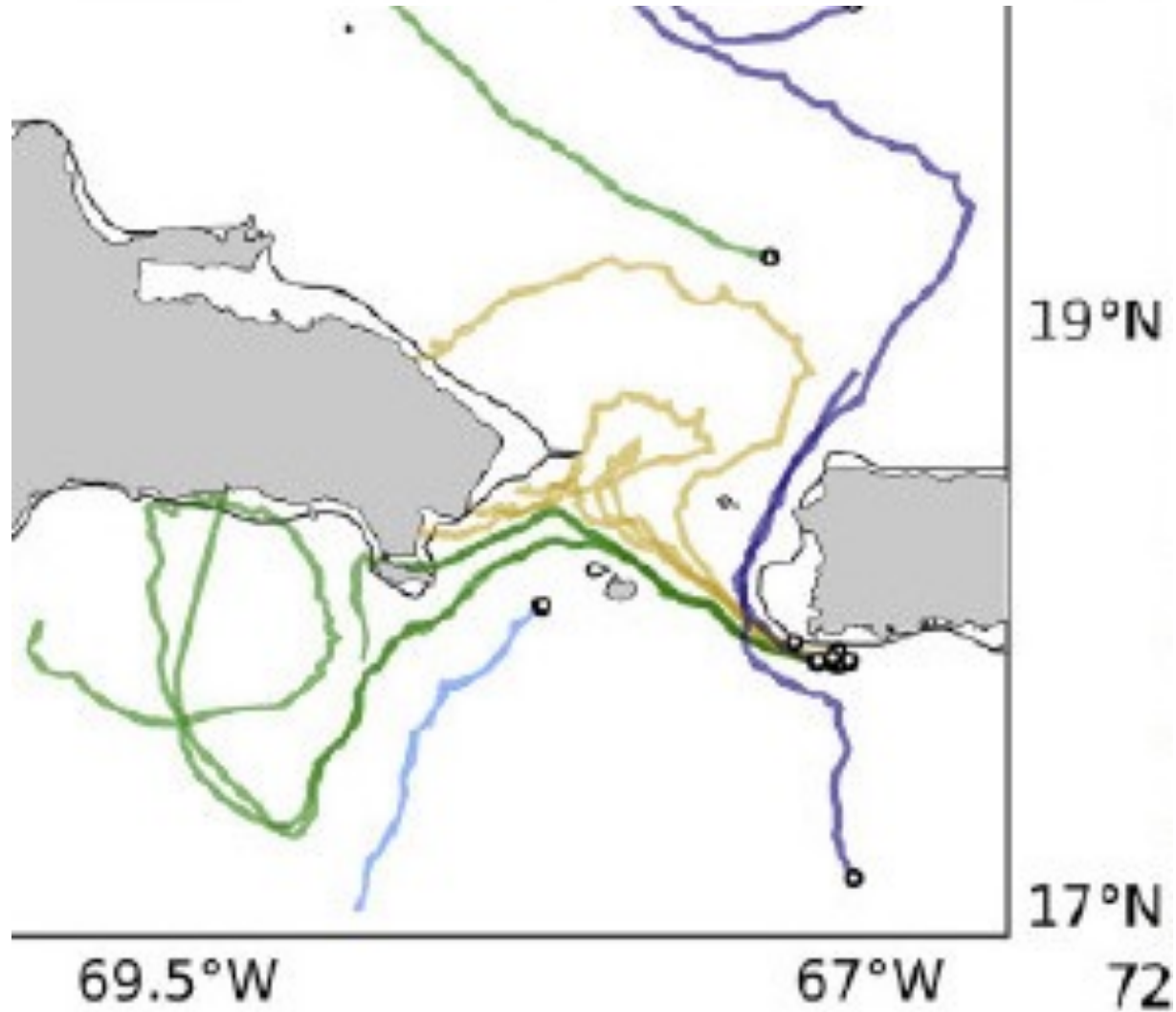
In red : drift modelled with WOC



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Case 2, from in-situ observation

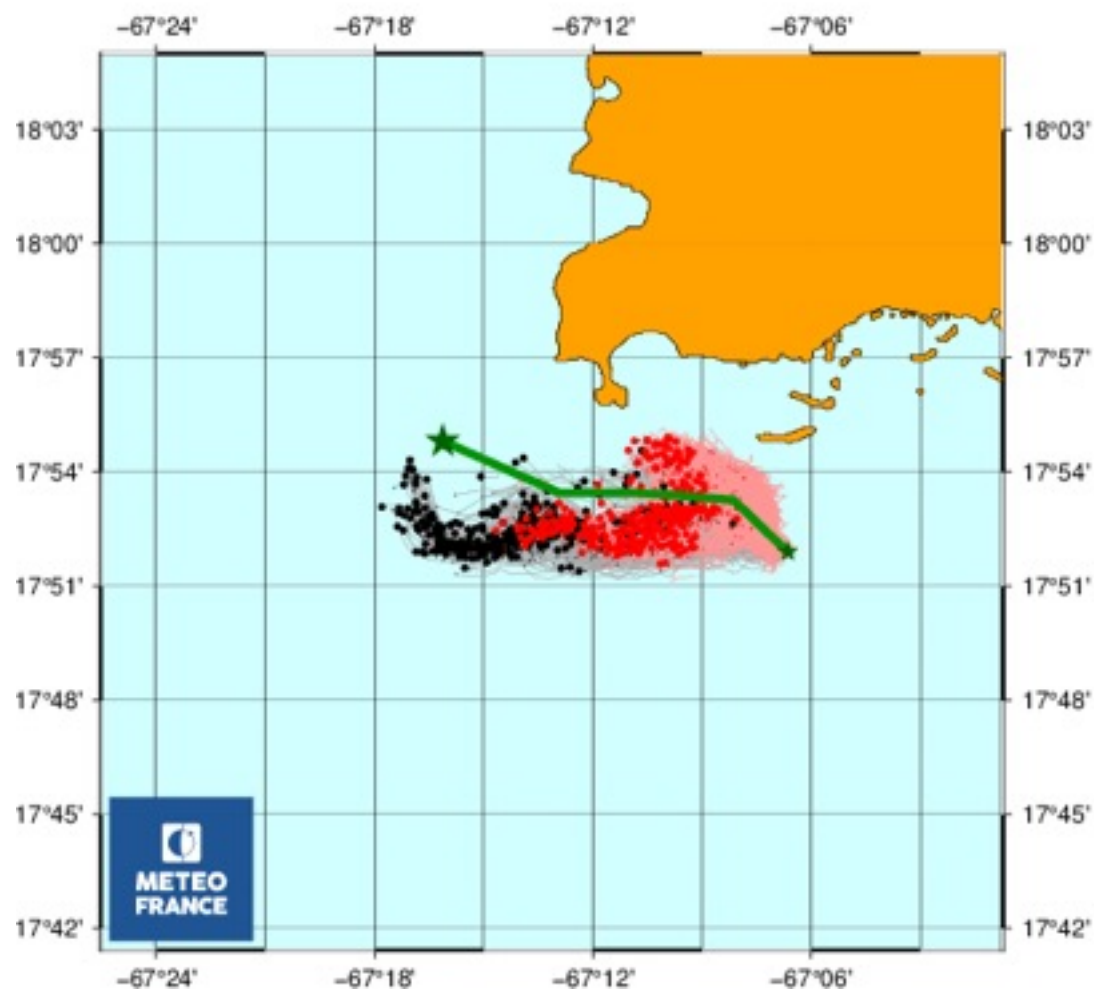
- 4 GPS drifters embedded in sargassum rafts (yellow tracks)
- 49 days of cumulative drift
- Mona Passage (140 km wide) between Puerto Rico and Hispaniola.



Case 2, from in-situ observation

- 49 24h-run

MOTHY/CEP MULTI4 : Forecast for 22/07/2018 at 20 UTC



Forward drift

Initial position :
 21/07/2018 at 20h00 UTC
 Latitude : 17° 51,91'
 Longitude : -67° 06,65'
 Pollutant : Sargassum
 Density : 1020 kg/m³

Particles : 1000

Oil slick head
 17°52,52'N / 67°15,19'W
 17°52,88'N / 67°11,50'W

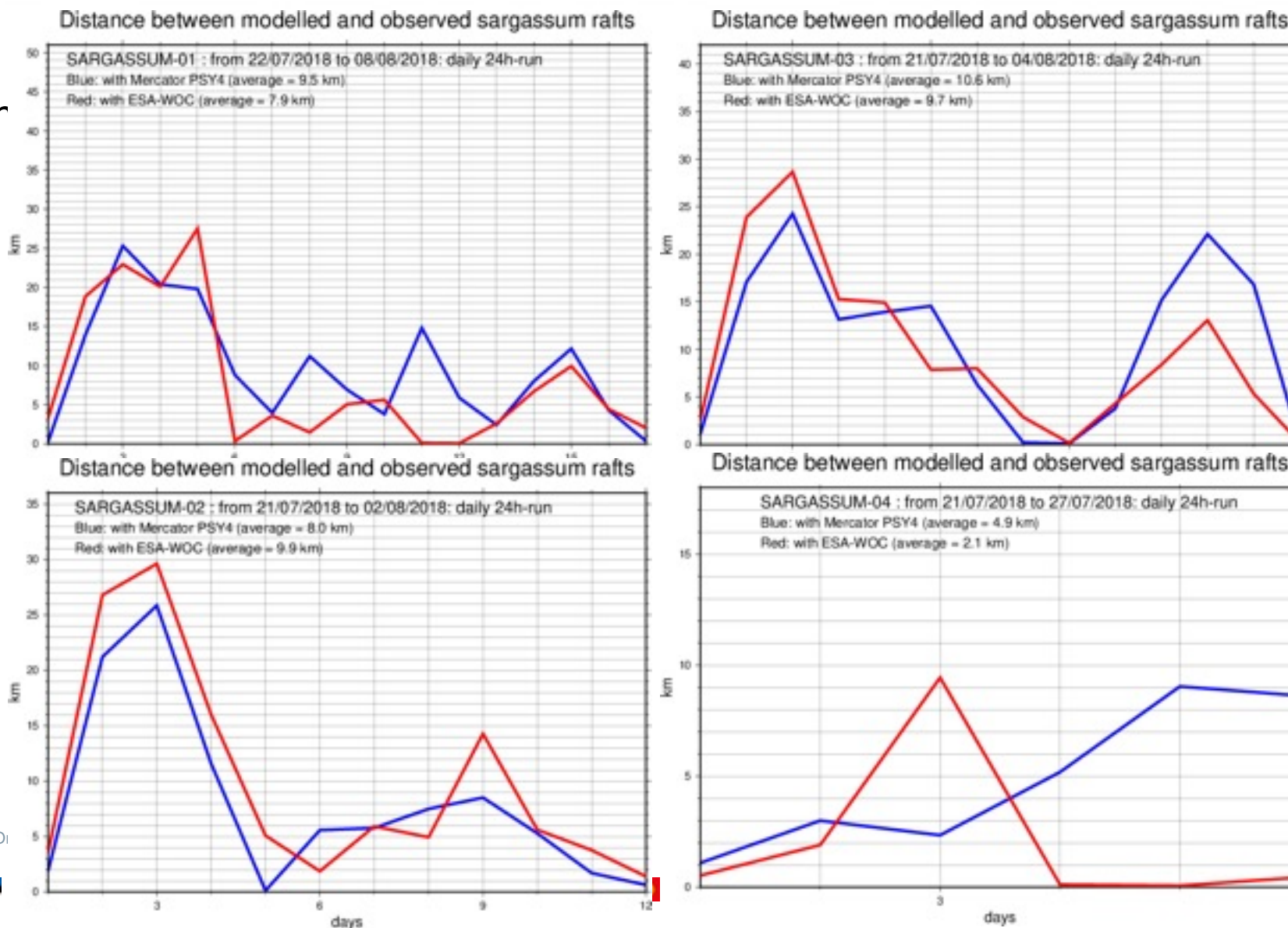
MERCATOR PSY4 Ekman 1/12°
 ESA WOC 15 m 1/4°

GEBCO 1 minute
 Resolution: 1 (minute)

Geodetic system: WGS 84

Case 2, from in-situ observation

- Distance :
- CMEMS : 8.9 km
- WOC : 8.2 km



Conclusions and outlook

- Not enough observations to conclude on the contribution of WOC data.
- + some in unfavourable coastal areas (Mona Passage)

- Outlook
- Use of new products or application techniques :
 - surface current / 15 m
 - uncertainty around starting point → not appear to be decisive

- use of new observation data when available :
 - In-situ data from field measurement campaigns (research projects)