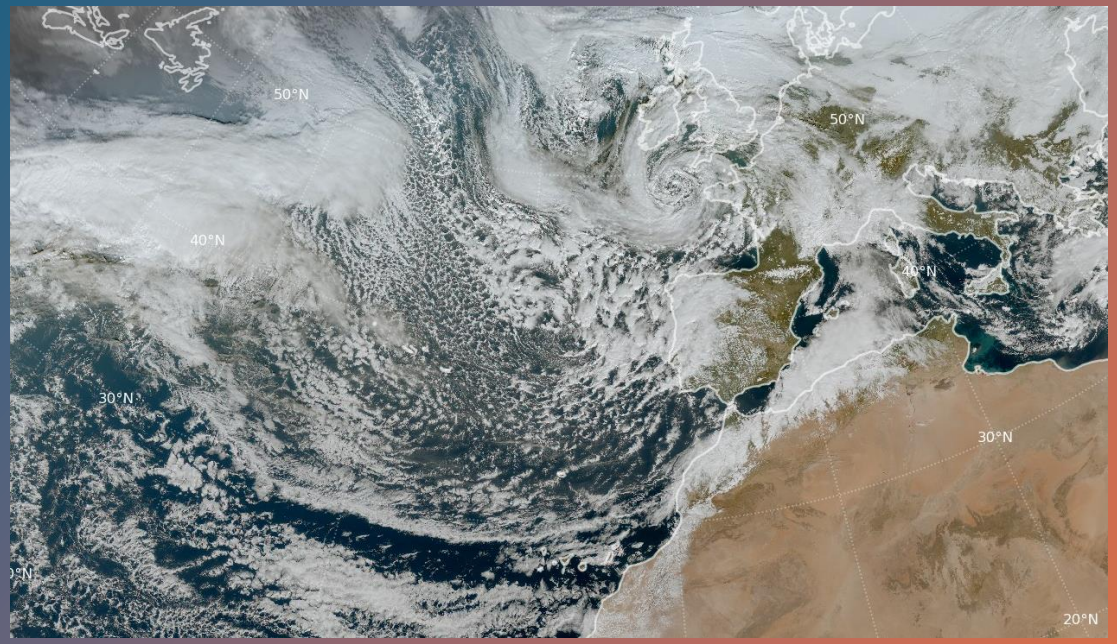
ROYAUME DU MAROC
Ministère de l'Equipement,
Direction Générale de la Météorologie
المديرية العامة للأرصاد الجوية

Marine Forecast Case study
-STORM INGRID-
23-24 JANUARy 2026

Event week on tropical meteorology 20 to 22 October 2026





• This presentation examines the passage of storm Ingrid (23-24 January 2026) and its severe impacts along the Moroccan coastline using satellite observations and remote sensing data. We will analyze the key oceanographic and meteorological features of the storm, highlighting how satellite imagery aids in monitoring extreme events and improving coastal vigilance.

OUTLINE

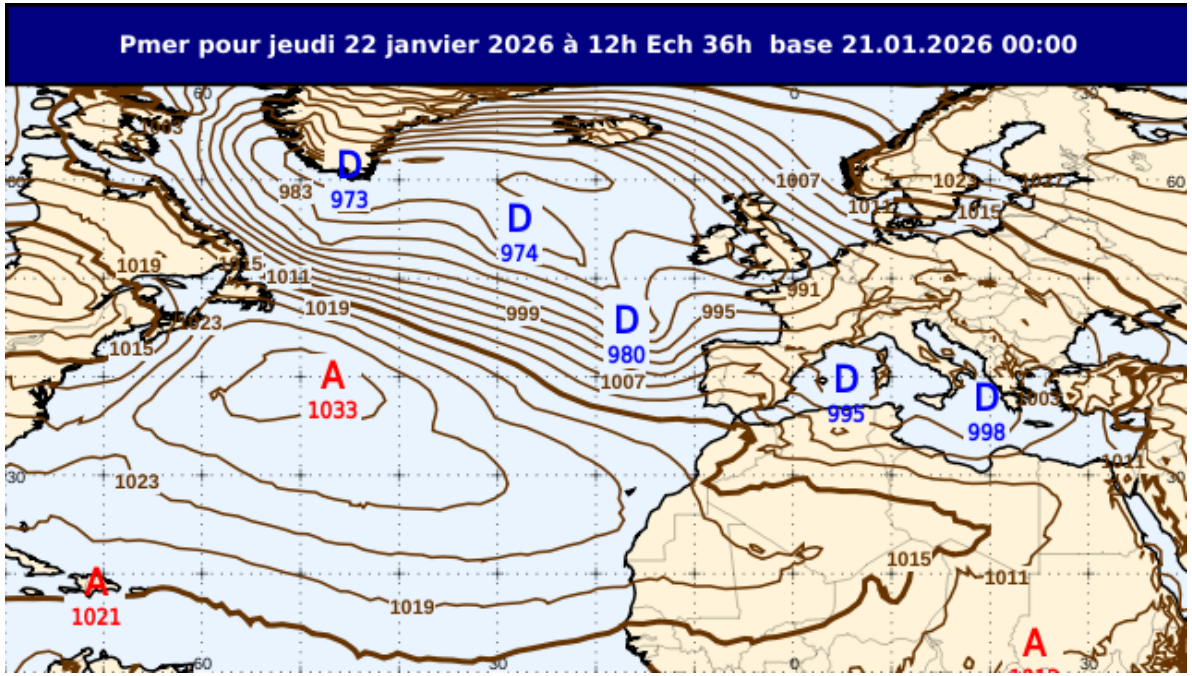
- General Weather Situation
- Models Forecasting
- Observations
- Weather Warnings: Bulletins & Charts
- Impacts and Synthesis

GENERAL WEATHER SITUATION

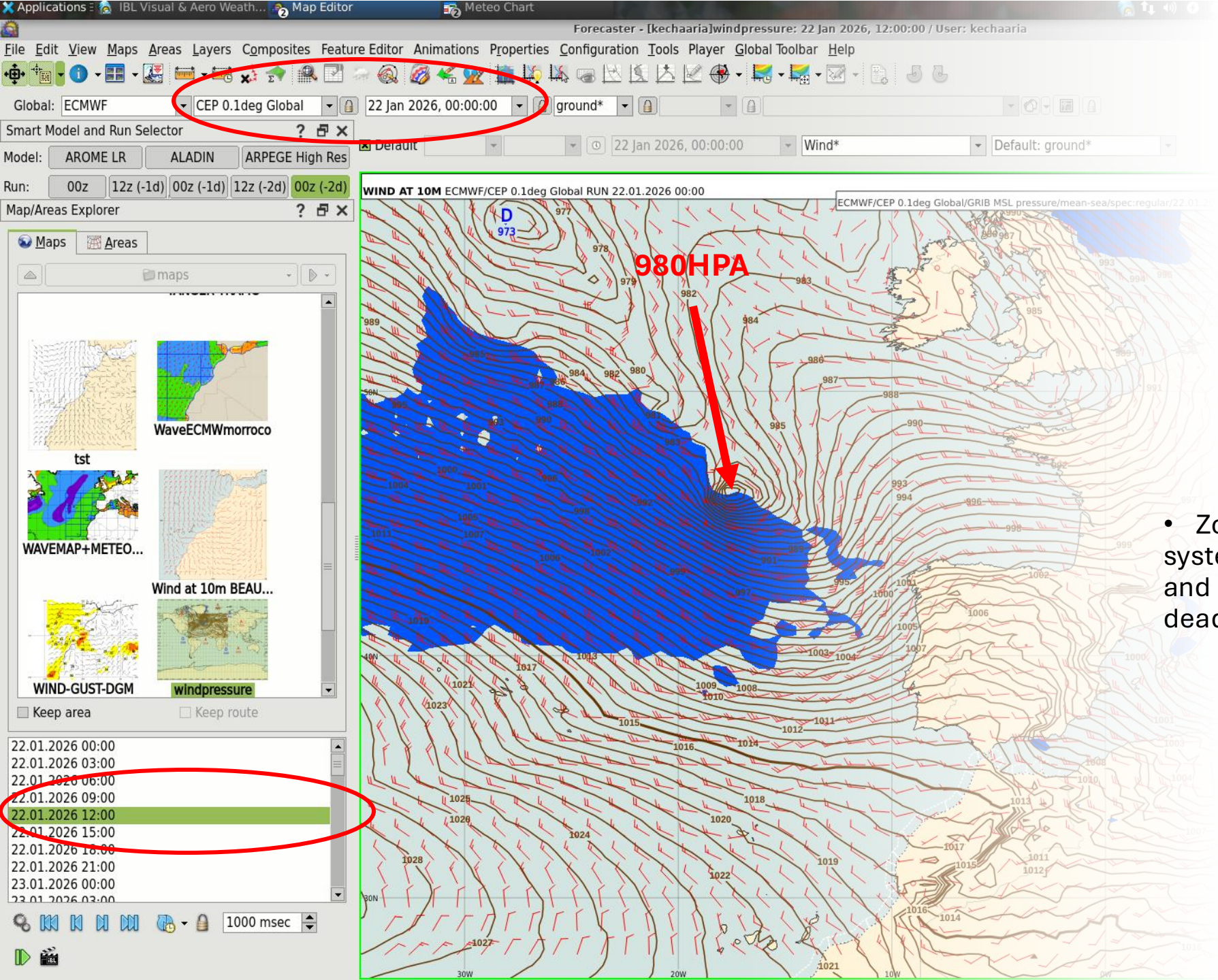
SYNOPTIC CHARTS : MEAN SEA LEVEL PRESSURE

By Looking at the synoptic charts we can describe the curent situation in weather terms by analyzing pressure patterns fronts and winds and also see how they evolve over the coming days.

If we take a look at this map of 22 at 12 we can see low pressure systems over the north atlantic ocean and the meditareen sea and also a high pressure system « center value 1033hpa » over the center of atlantic ocean.

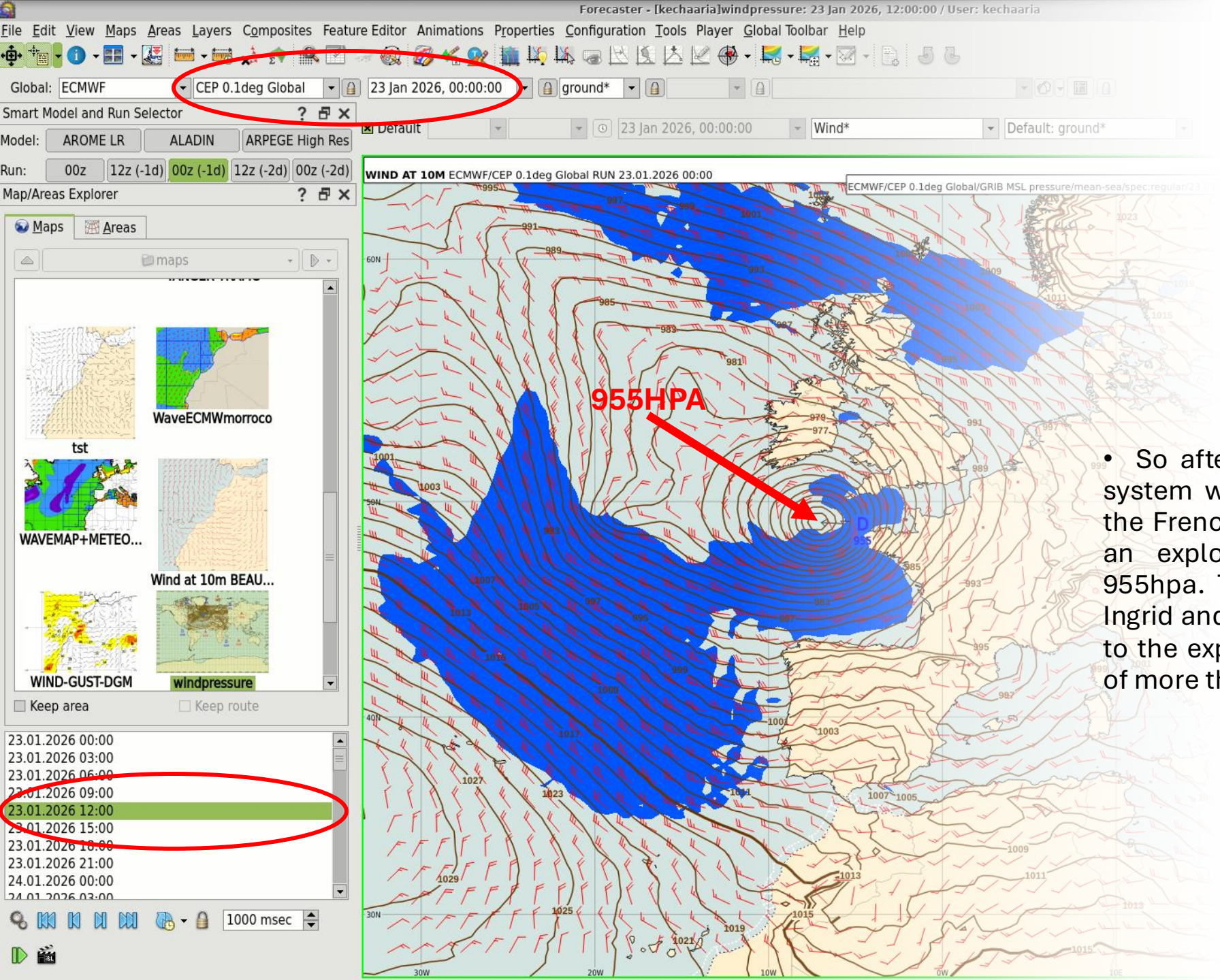


MEAN SEA LEVEL PRESSURE



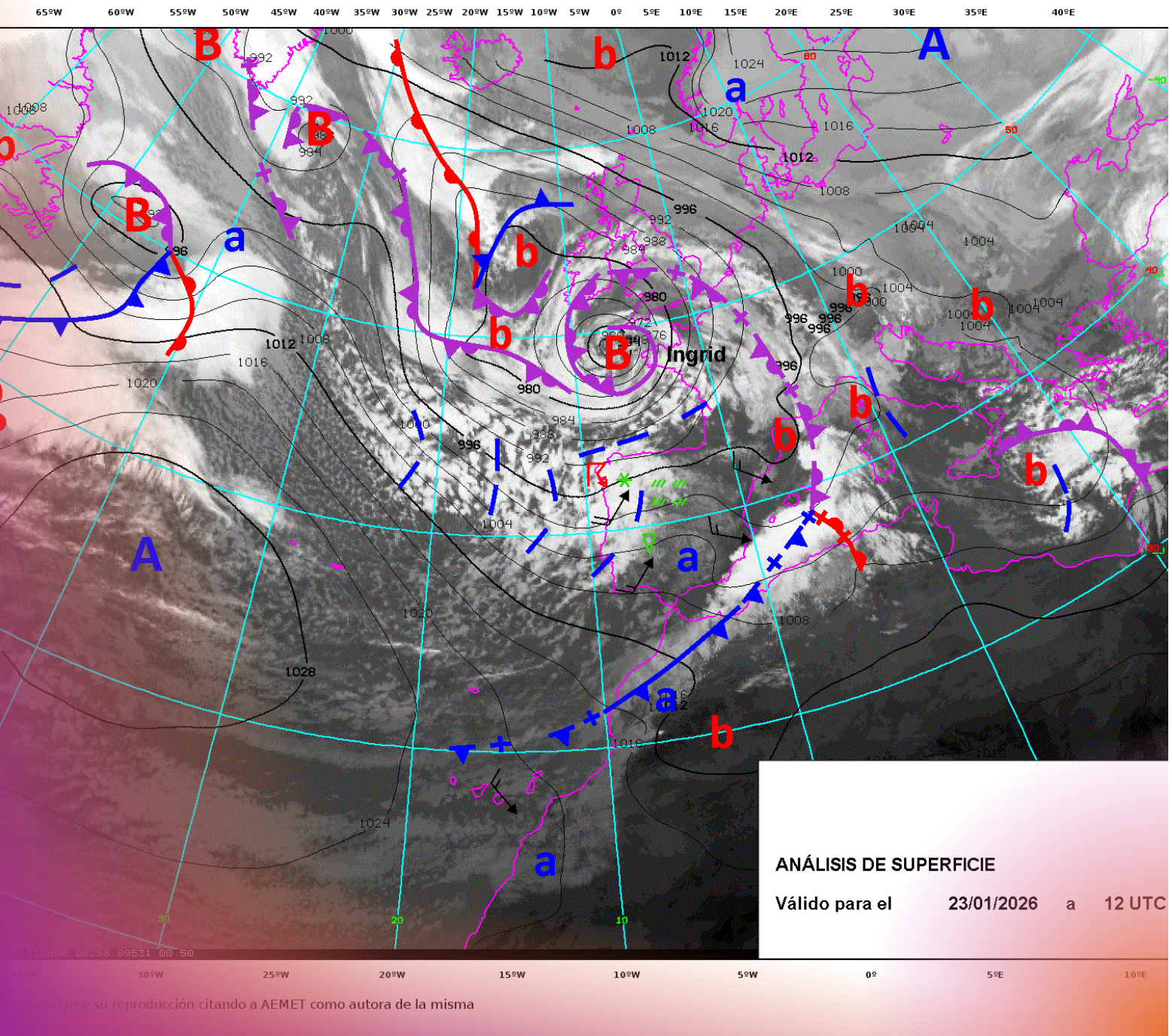
- Zoom in for this local low pressure system CV 980hpa offshore of BISCAY BAY and see how it evolves over the coming deadline

MEAN SEA LEVEL PRESSURE



- So after 24hours this low local pressure system will move fastly to east and struck the French Atlantic coasts and Brittany with an explosive drop of pressure reaching 955hpa. This strom will be named after by Ingrid and described as a weather bomb due to the explosive deepening (a pressure drop of more than 24 hPa in 24 hours).

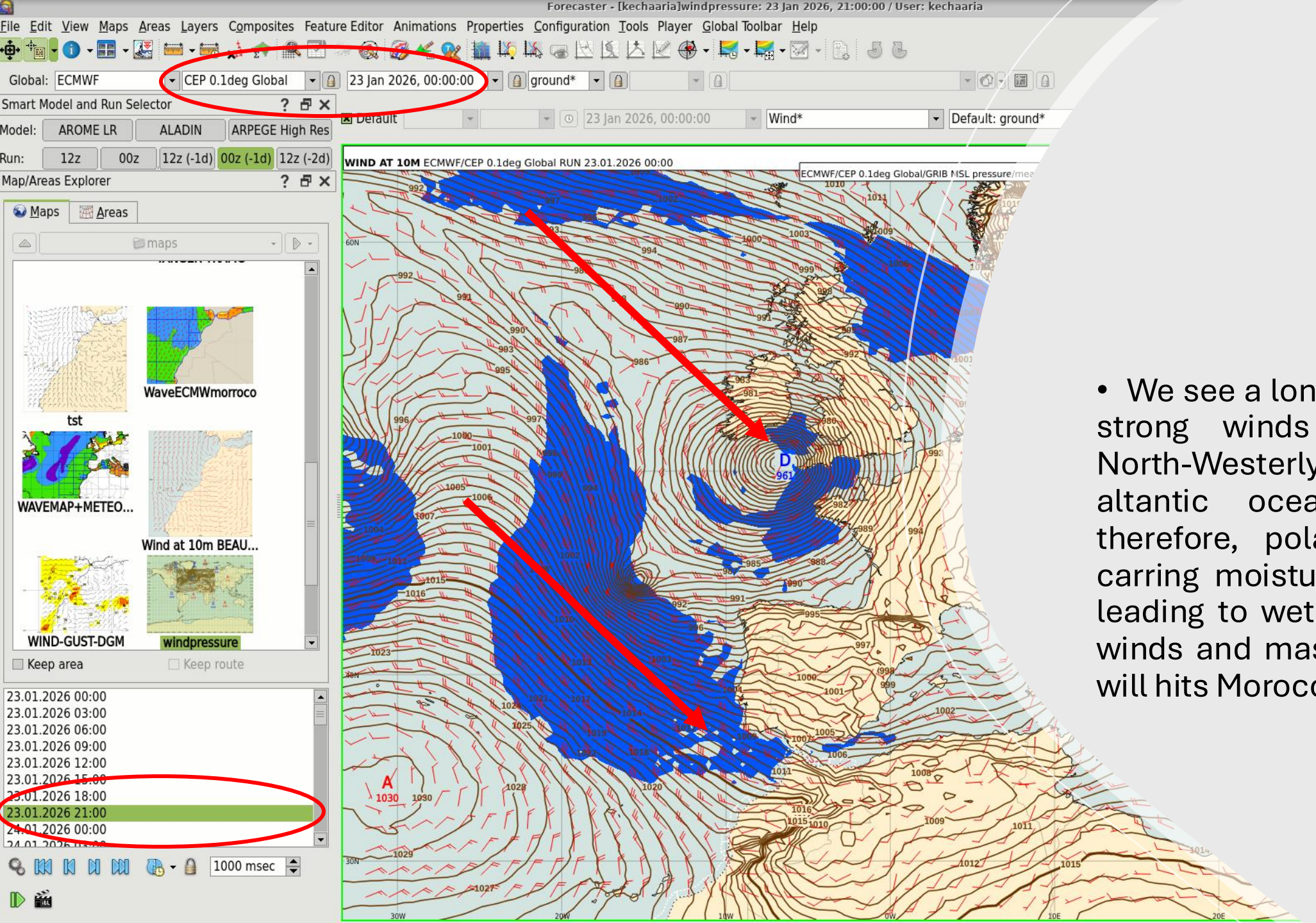
SURFACE ANALYSIS



- COLD FRONTOLYSIS OVER MOROCCO

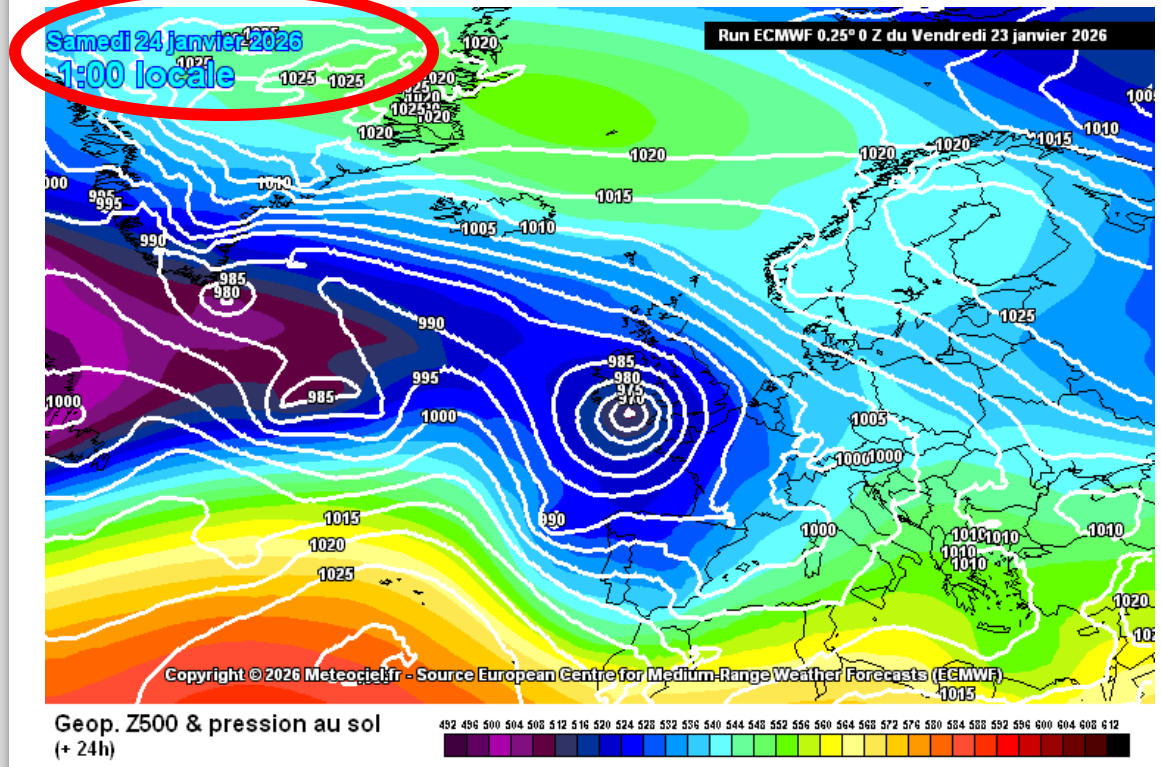
This system triggered a severe winter spell characterized by intense marine storms, violent winds, and low-altitude snowfall—particularly in Britanny, French and the northwest of Iberian Peninsula—as well as widespread precipitation. Its impact was linked to highly active Atlantic circulation, driven by the storm's rapid development and intensification, which brought in a maritime polar air mass and caused a sharp drop in temperatures.

MEAN SEA LEVEL PRESSURE

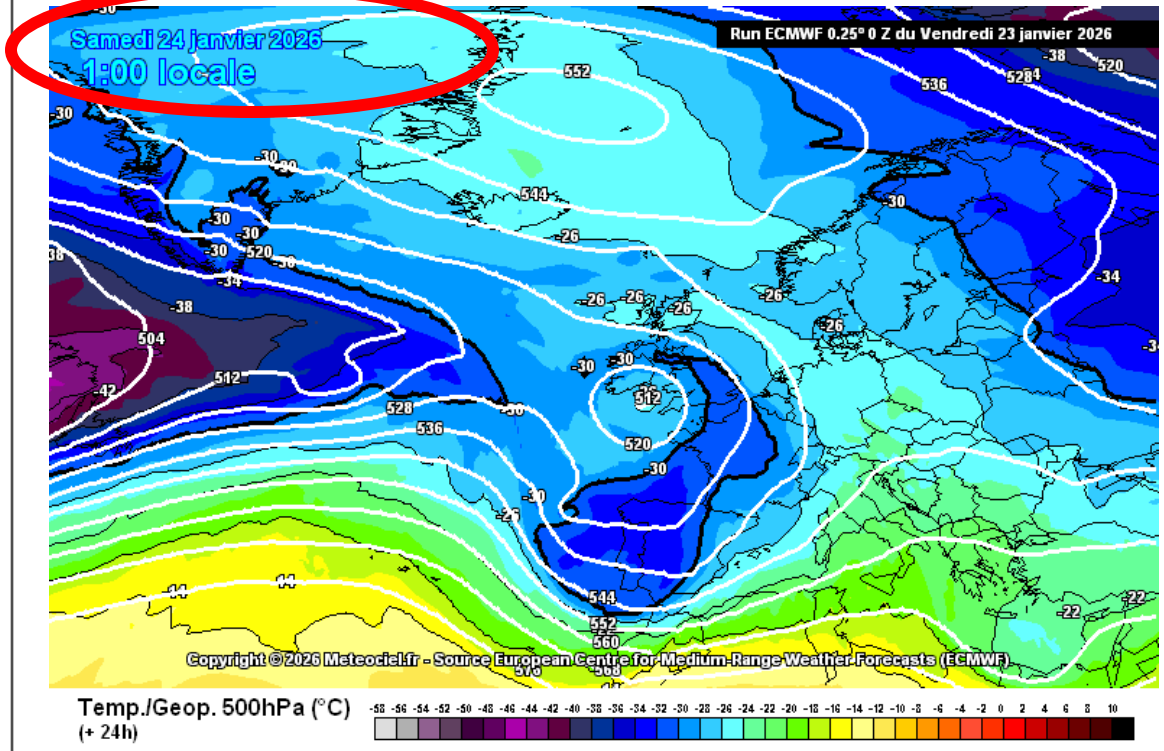


- We see a long fetch of steady strong winds blowing from North-Westerly over the altantic ocean picking up therefore, polar maritime air carring moisture and so often leading to wet weather, strong winds and massive waves that will hits Moroccan coasts.

500MB ALTITUDE LEVEL



Geop. Z500 & pression au sol
(+ 24h)

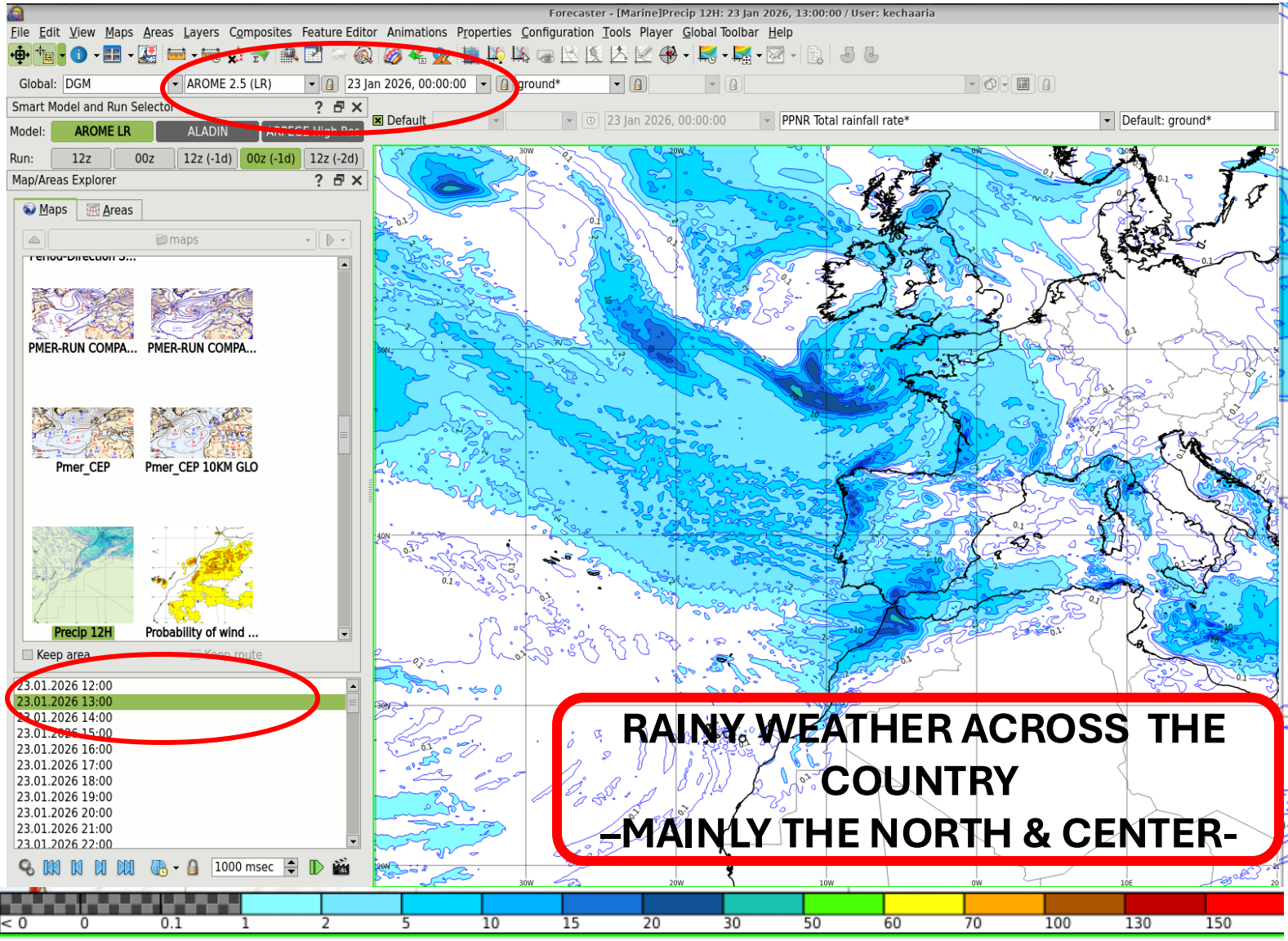


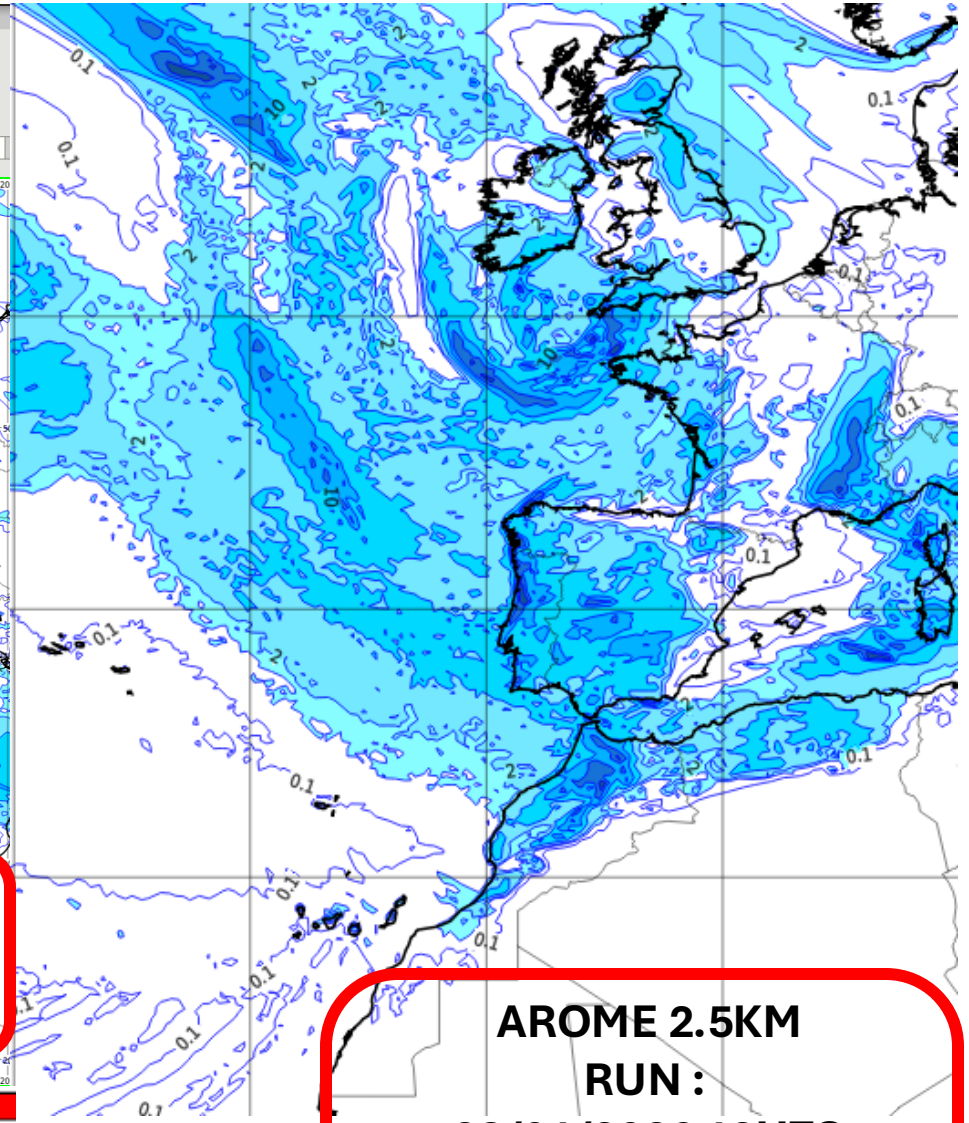
Temp./Geop. 500hPa (°C)
(+ 24h)

- By analyzing 500hpa geopotential we see a through over Iberia Peninsula and France, associated also to a Cut-off at -30°C indicating cold unsettled and stormy weather with rain shower, snow and hails



MODELS FORECASTING



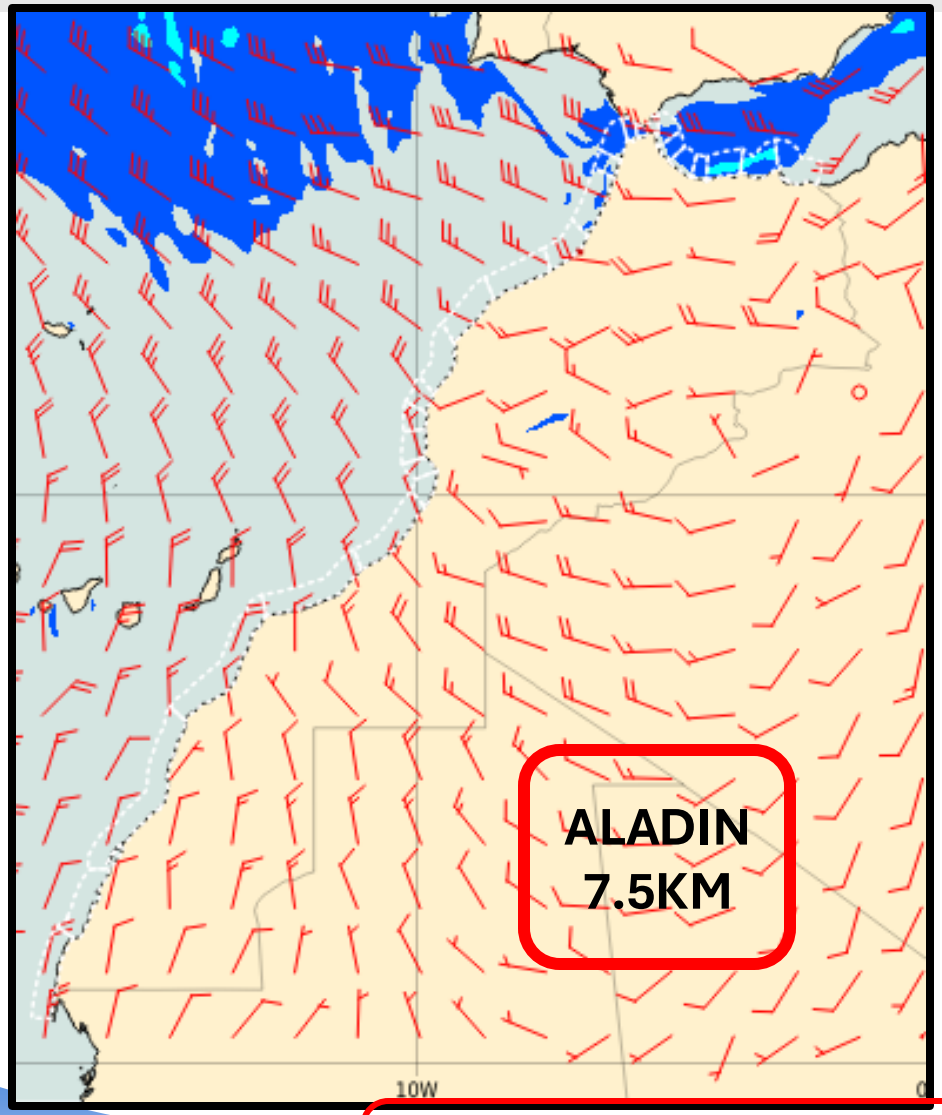


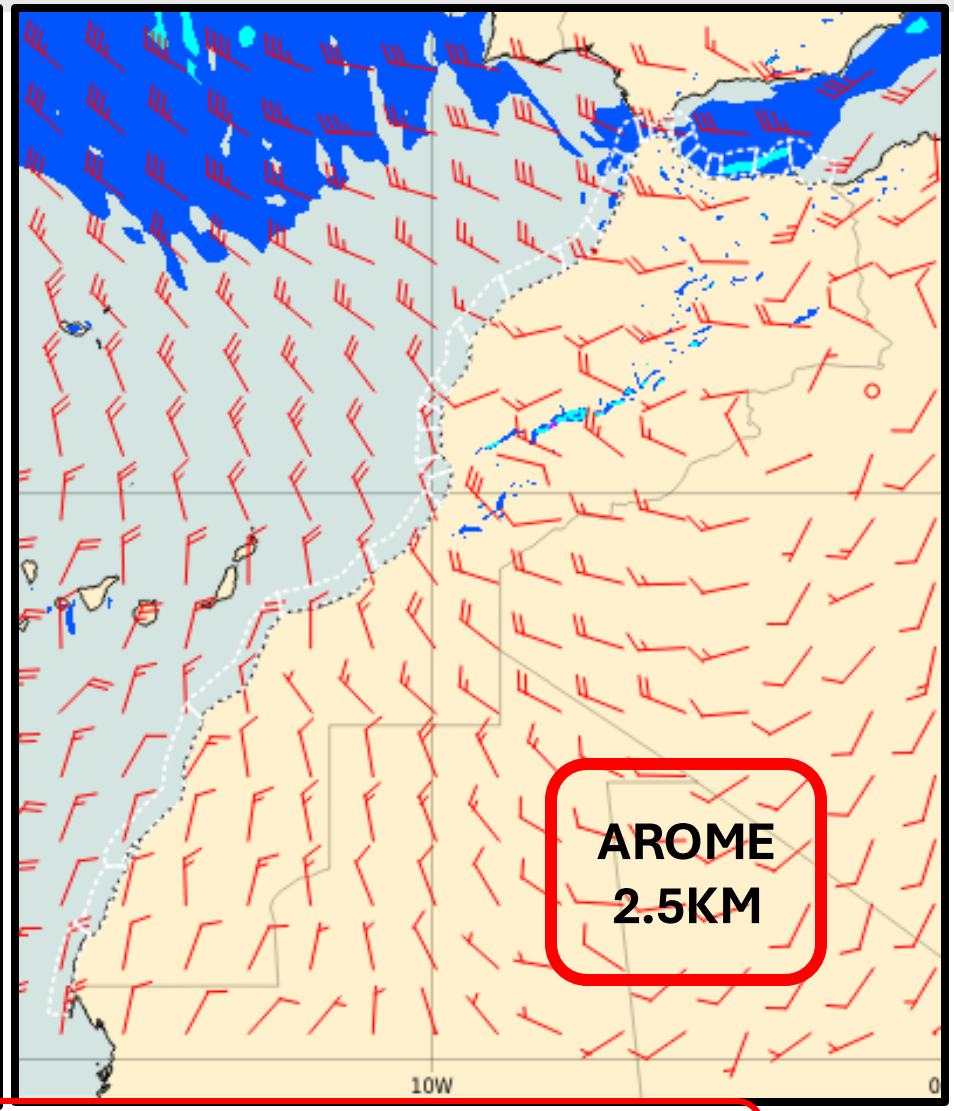
AROME 2.5KM
RUN :
23/01/2026 12UTC

RAIN ACCUMULATION-12h VALID:
24/01/2026 00UTC

- Based on arome2,5km rainfall accumulation forecast, we expect that precipitation will reach 50mm over the extreme north of Morocco.

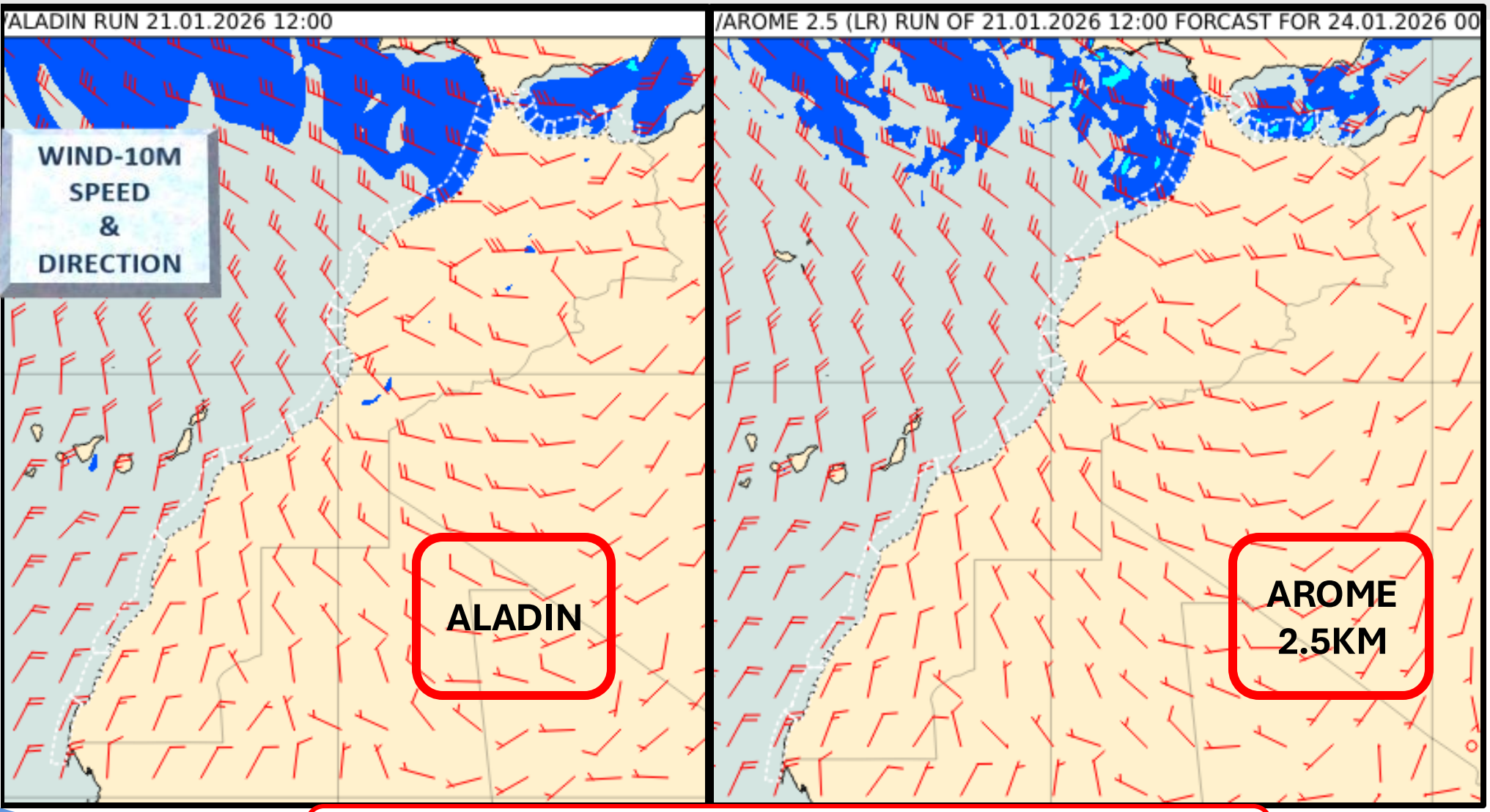
WIND-10M SPEED & DIRECTION





- Based on wind's model forecast aladin and arome we expect gale to strong gale from west over the mediterranean sea. Gale over gibraltar-strait. Near gale to gale over the north of atlantic moroccan coasts.

RUN 24/01/2026 00UTC VALID FOR 24/01/2026 00UTC

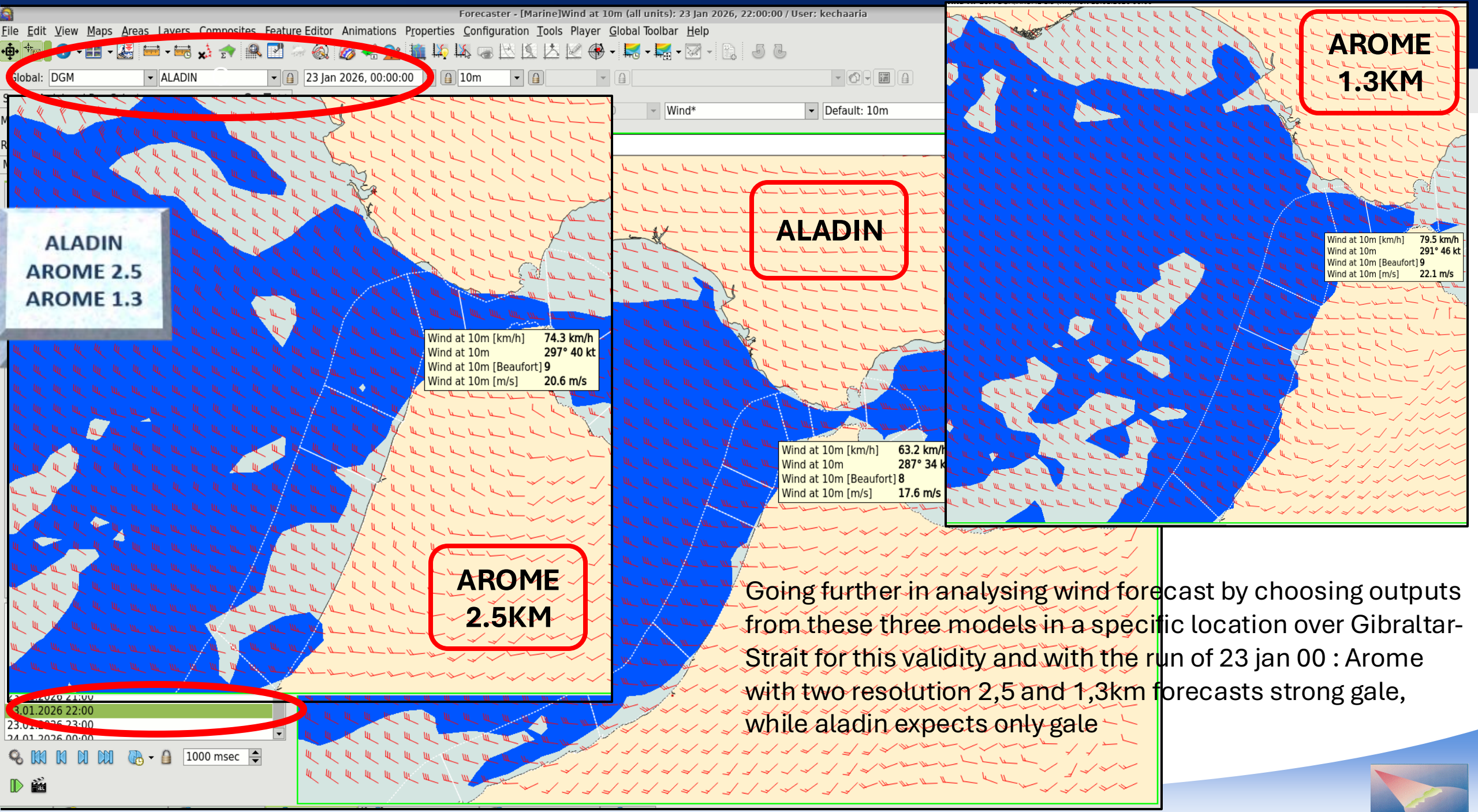


Here we present another run of 21 january at12 UTC of wind forecasting of the same models wich will be very handy to check the model's stability

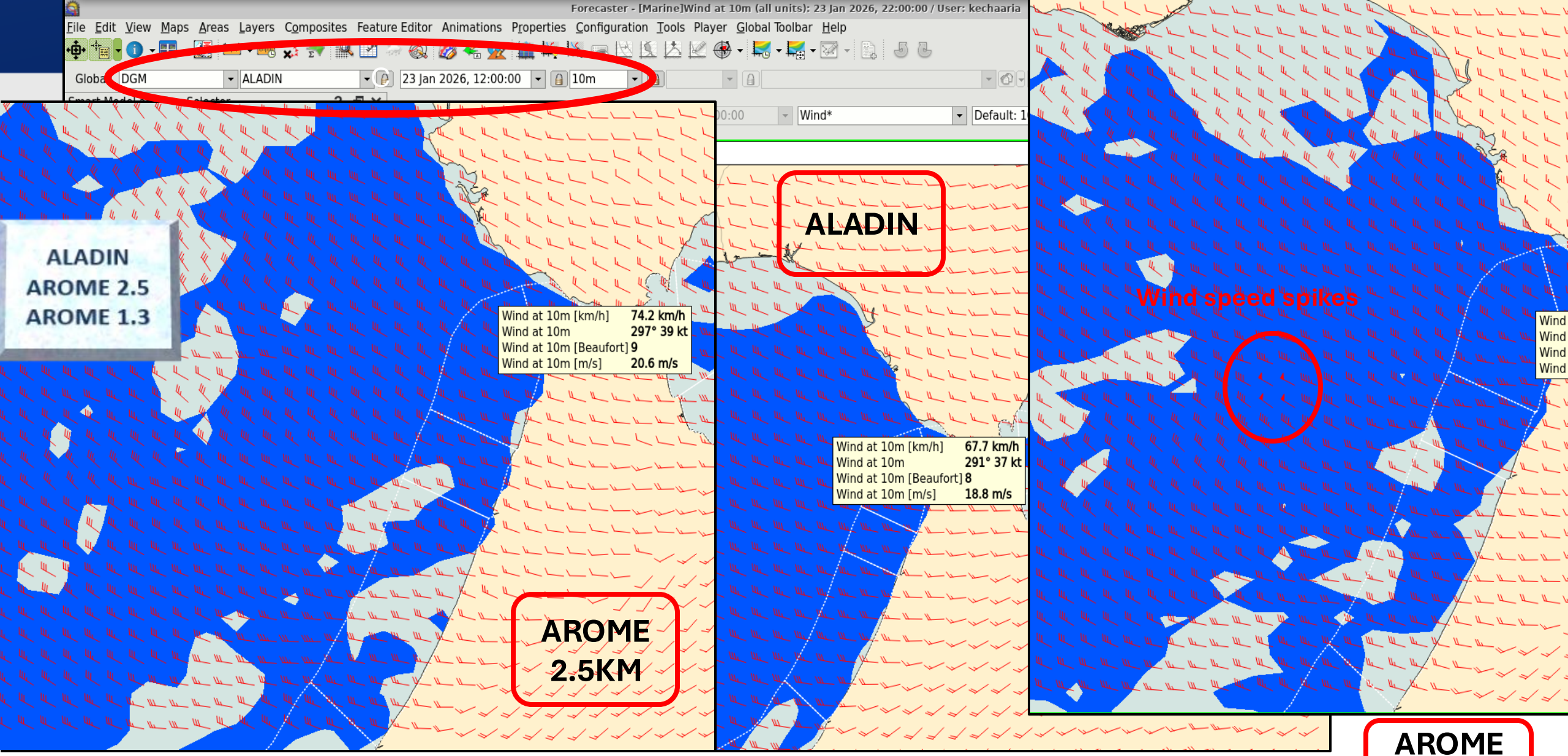
We see that aladin forecat only gale over the mediterranean sea, while arome was forecasting gale to strong gale over it

We could say arome is much pessimistic than aladin

RUN 21/01/2026 12UTC VALID FOR 24/01/2026 00UTC



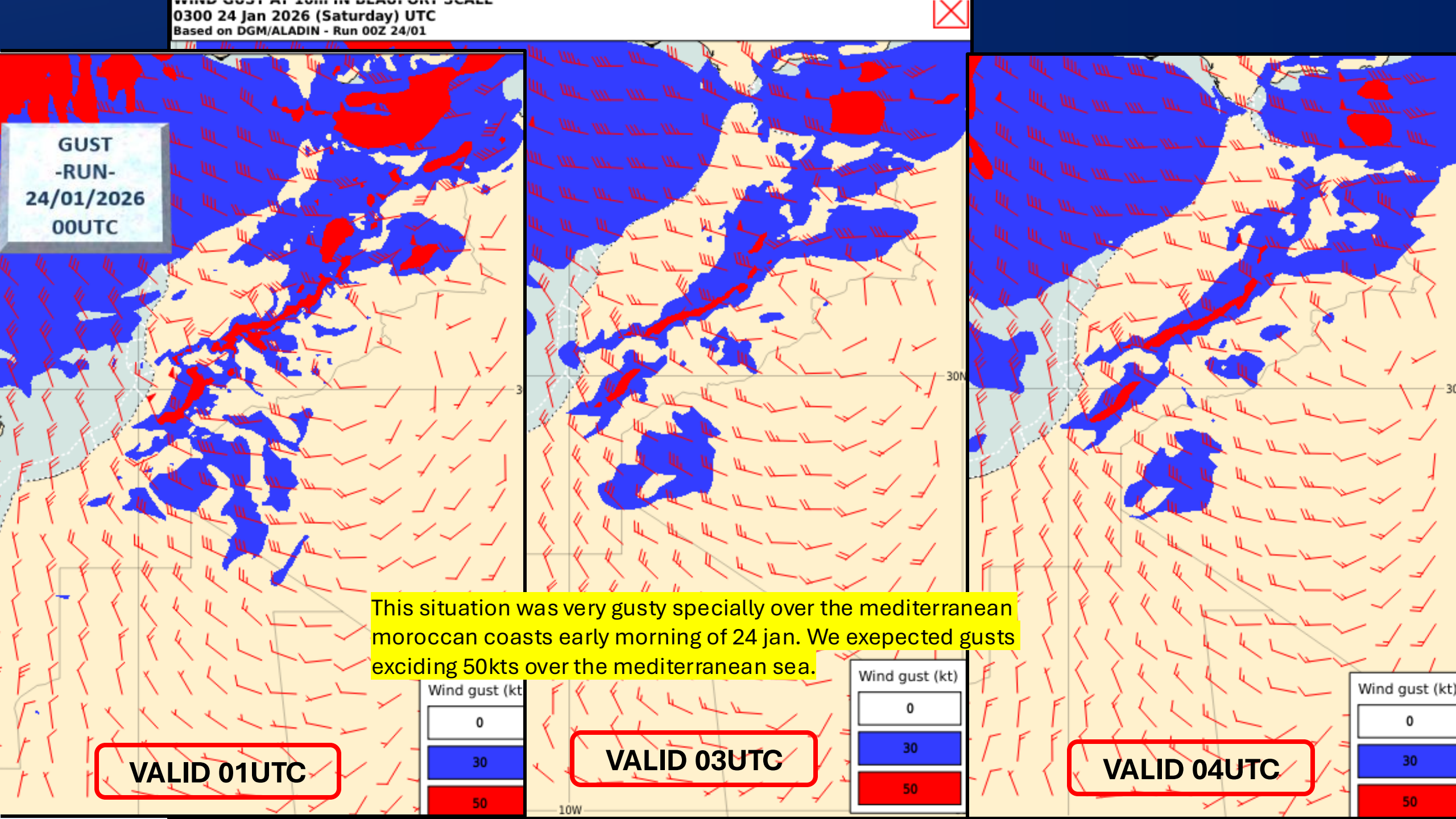
Going further in analysing wind forecast by choosing outputs from these three models in a specific location over Gibraltar-Strait for this validity and with the run of 23 jan 00 : Arome with two resolution 2,5 and 1,3km forecasts strong gale, while aladin expects only gale

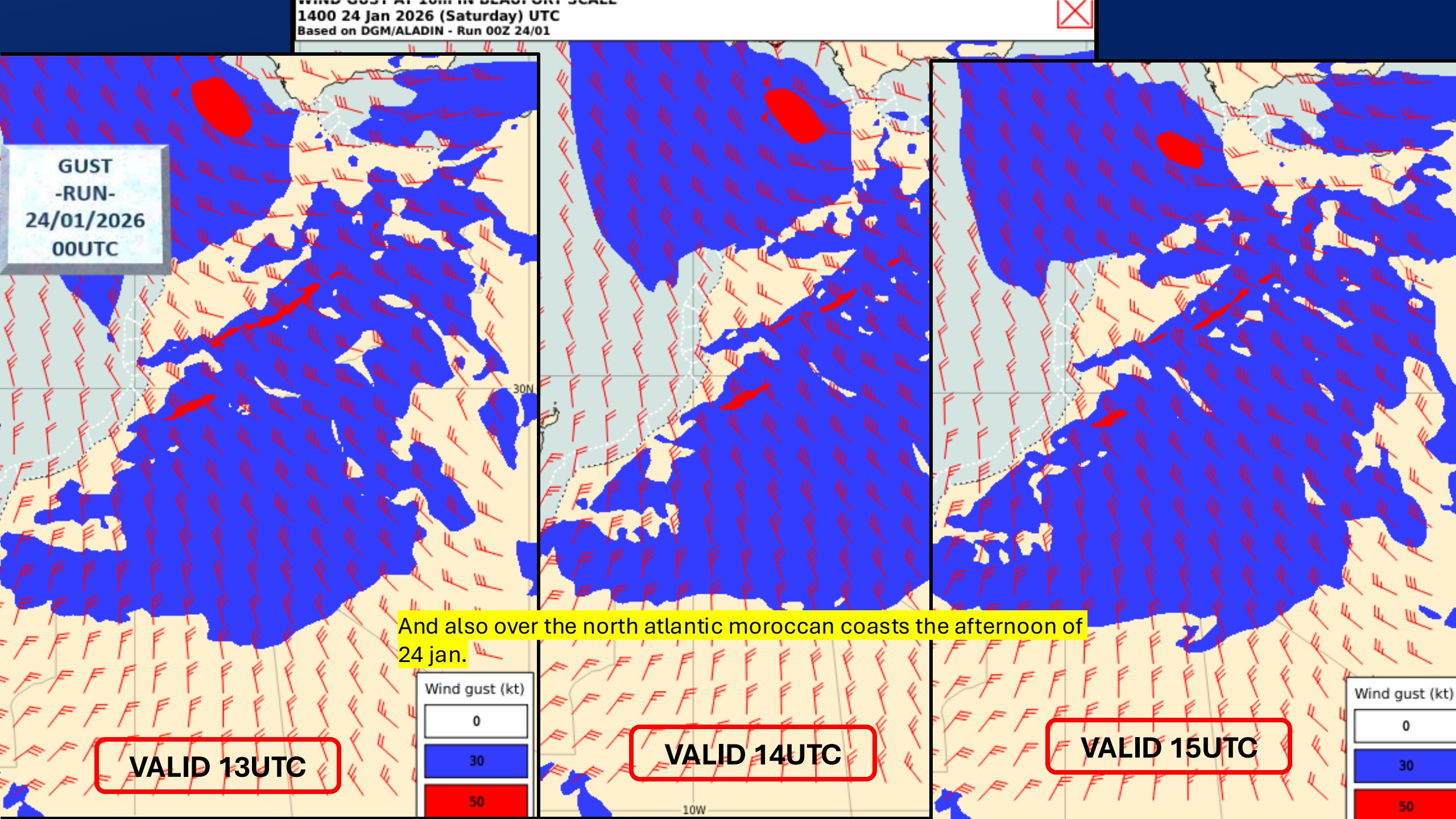


Changing the run to 23 jan 12 and for the same validity and same location we find the same forecasting scenario
We could see also locally here wind speed spikes are DOWNBURSTS (rafales descendantes) caused by convective downdrafts (courant descendant): an area of highly localized extreme strong wind 50knts next to area of strong wind 34-40knts –pop up on high resolution chart of arome1,3km

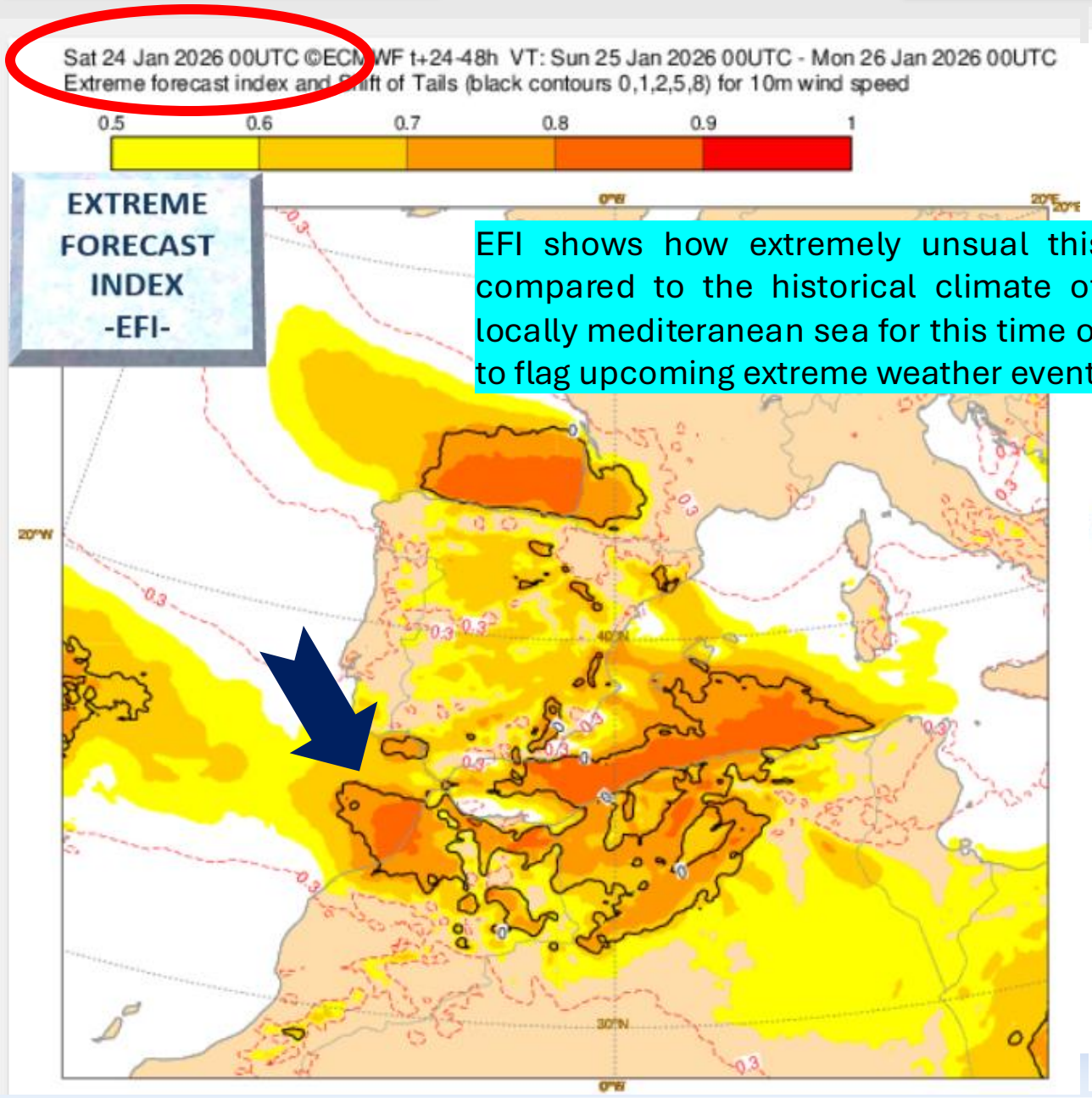


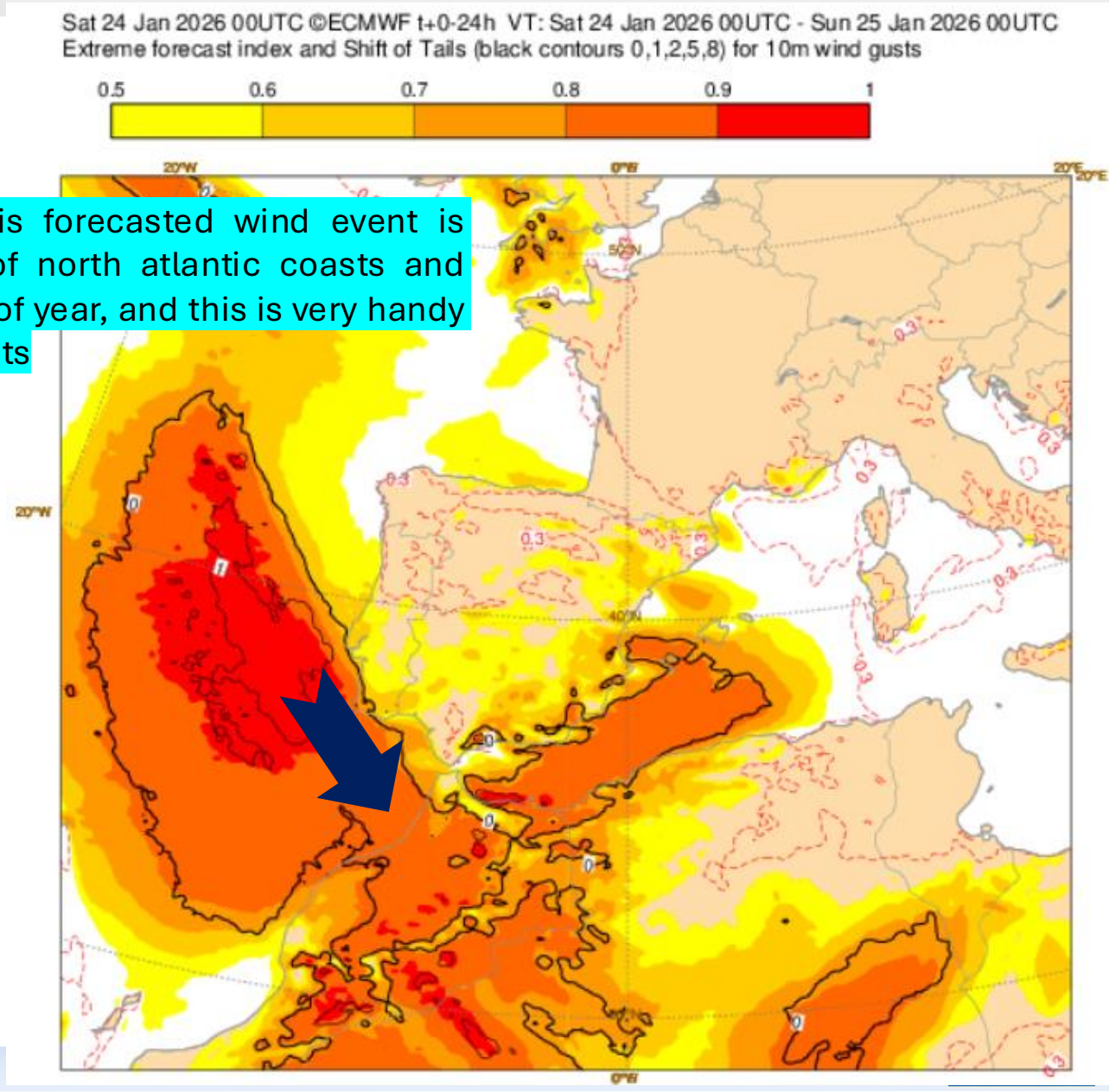
For the east of the moroccan mediterraneen coast between 9 and 11 of 24 jan
We could say that Arome is more pessimestic than Aladin by forecasting a broader area of gale force winds. We choosed this acc
the pass of scaterrometers wich we will see later


0300 24 Jan 2026 (Saturday) UTC
Based on DGM/ALADIN - Run 00Z 24/01
GUST
-RUN-
24/01/2026
00UTC
This situation was very gusty specially over the mediterranean moroccan coasts early morning of 24 jan. We exepected gusts exciding 50kts over the mediterranean sea.
Wind gust (kt)
0
30
50
VALID 01UTC
VALID 03UTC
VALID 04UTC
10W

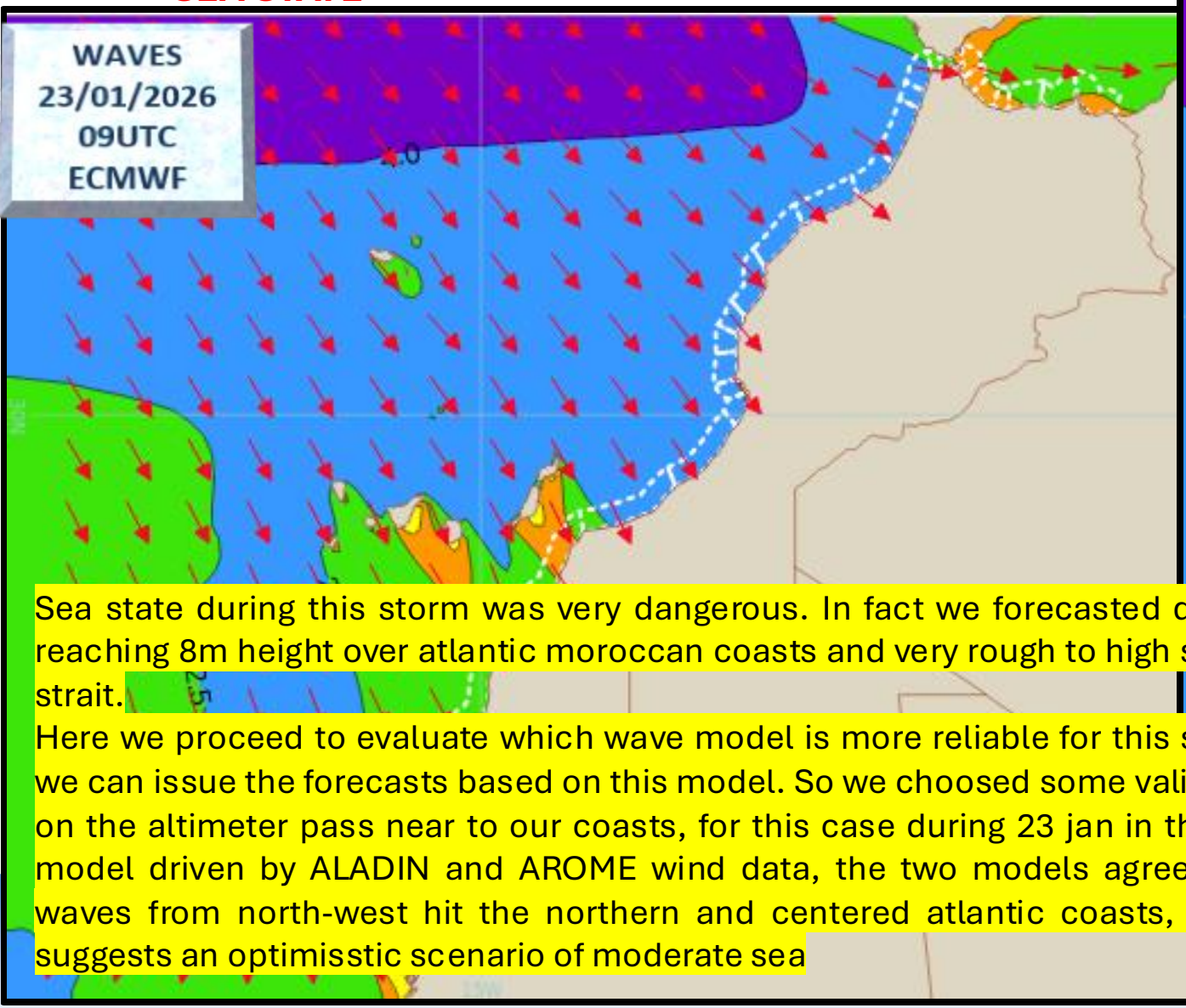


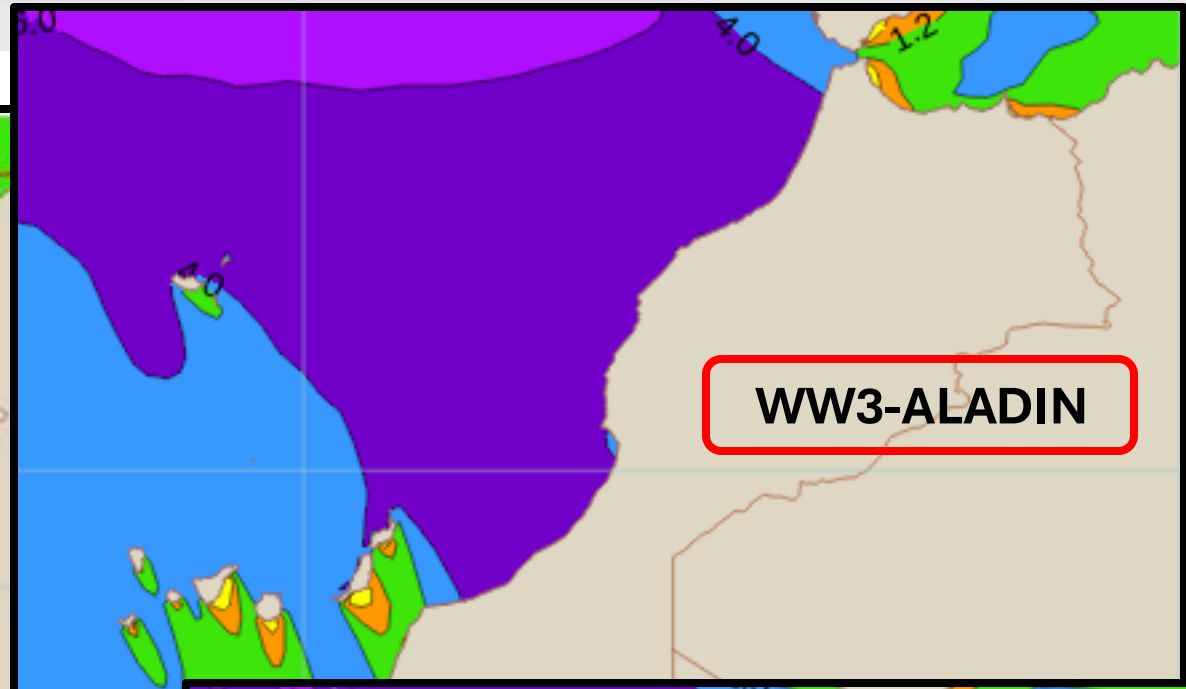
And also over the north atlantic moroccan coasts the afternoon of 24 jan.

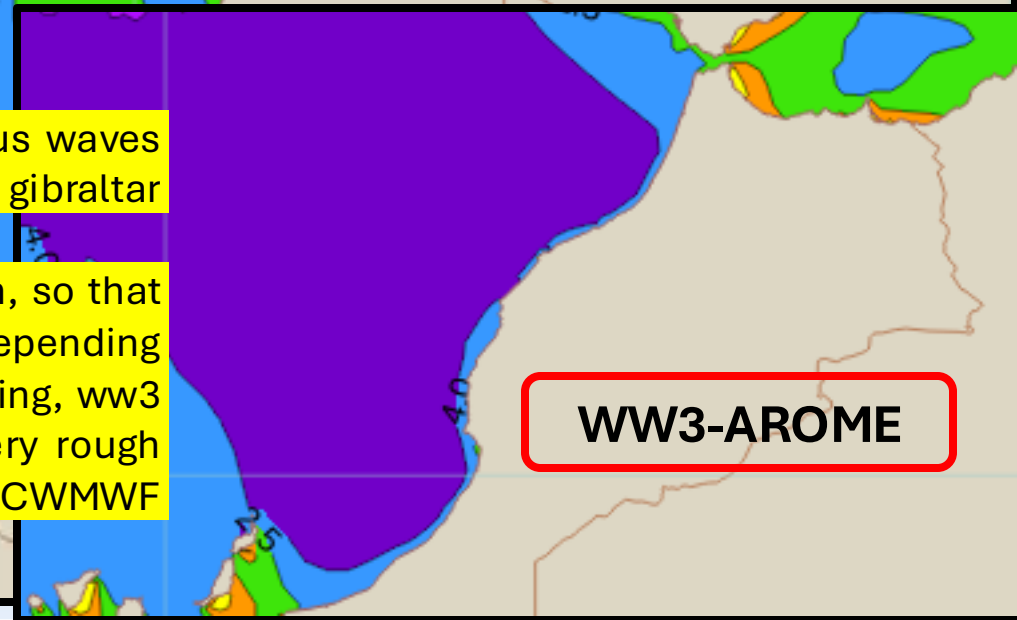

Sat 24 Jan 2026 00UTC ©ECMWF t+24-48h VT: Sun 25 Jan 2026 00UTC - Mon 26 Jan 2026 00UTC
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for 10m wind speed
0.5 0.6 0.7 0.8 0.9 1
EXTREME FORECAST INDEX -EFI-
EFI shows how extremely unsual this forecasted wind event is compared to the historical climate of north atlantic coasts and locally mediteranean sea for this time of year, and this is very handy to flag upcoming extreme weather events


Sat 24 Jan 2026 00UTC ©ECMWF t+0-24h VT: Sat 24 Jan 2026 00UTC - Sun 25 Jan 2026 00UTC
Extreme forecast index and Shift of Tails (black contours 0,1,2,5,8) for 10m wind gusts
0.5 0.6 0.7 0.8 0.9 1

SEA STATE

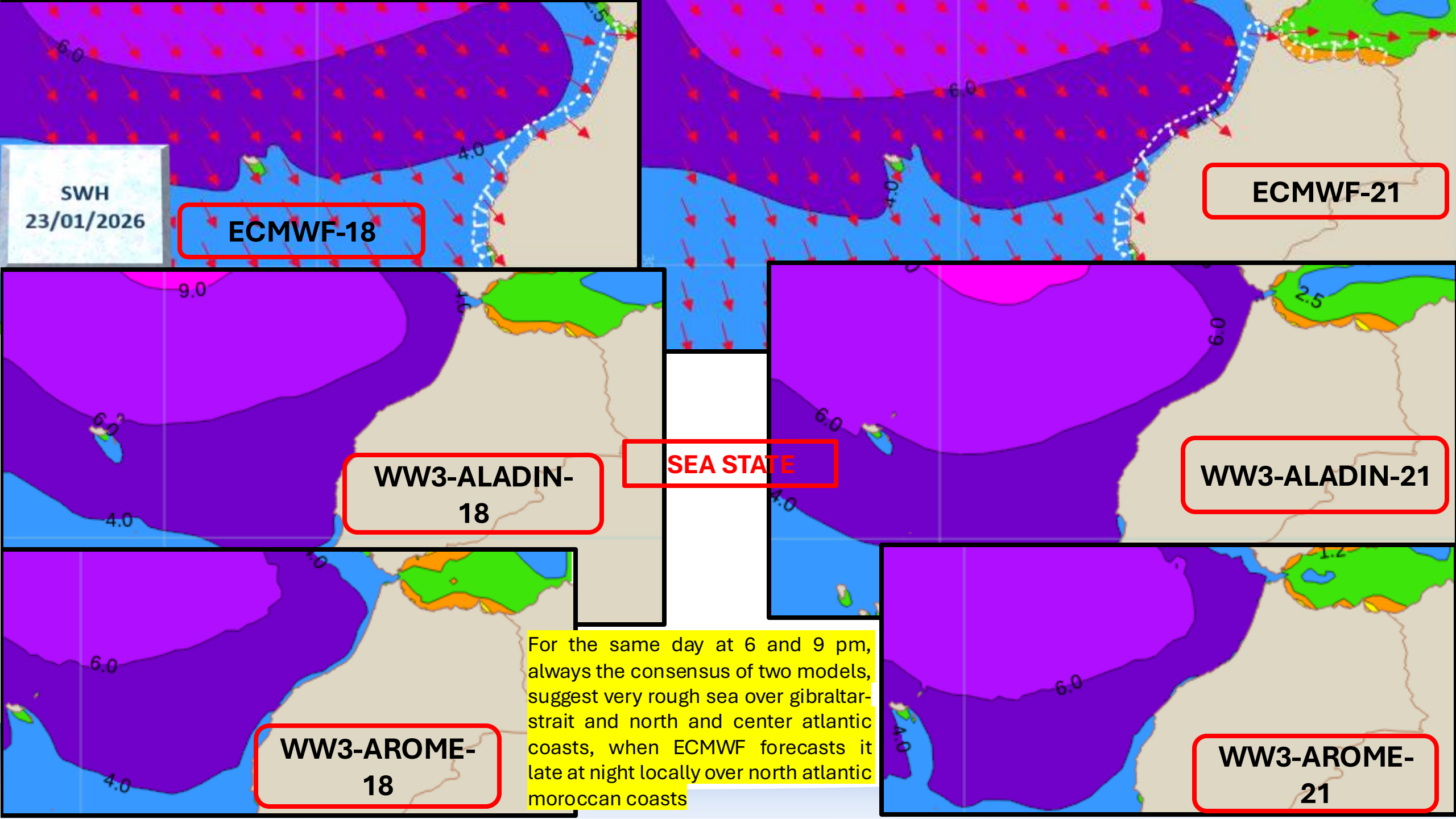


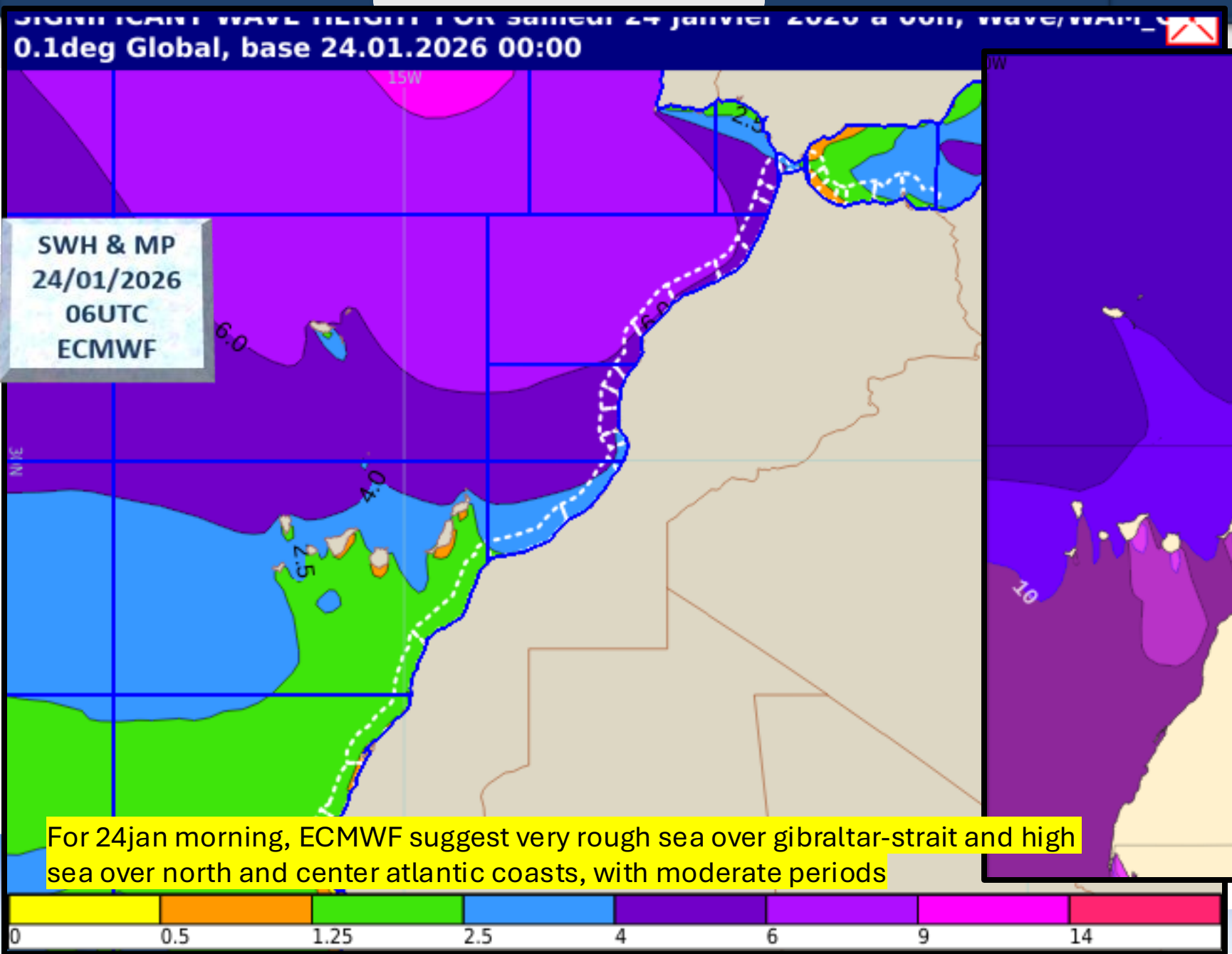


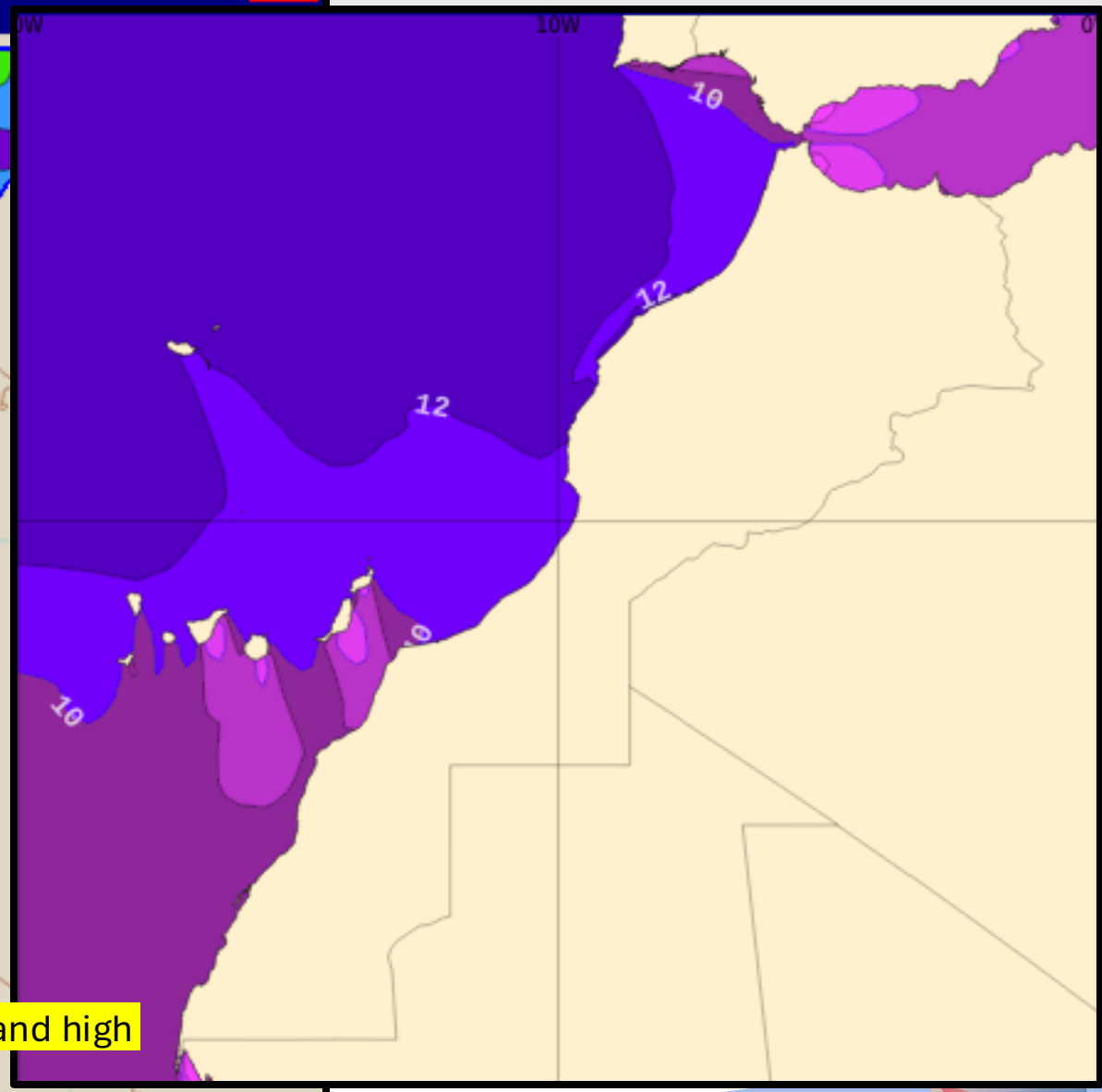


Sea state during this storm was very dangerous. In fact we forecasted dangerous waves reaching 8m height over atlantic moroccan coasts and very rough to high sea over gibraltar strait.

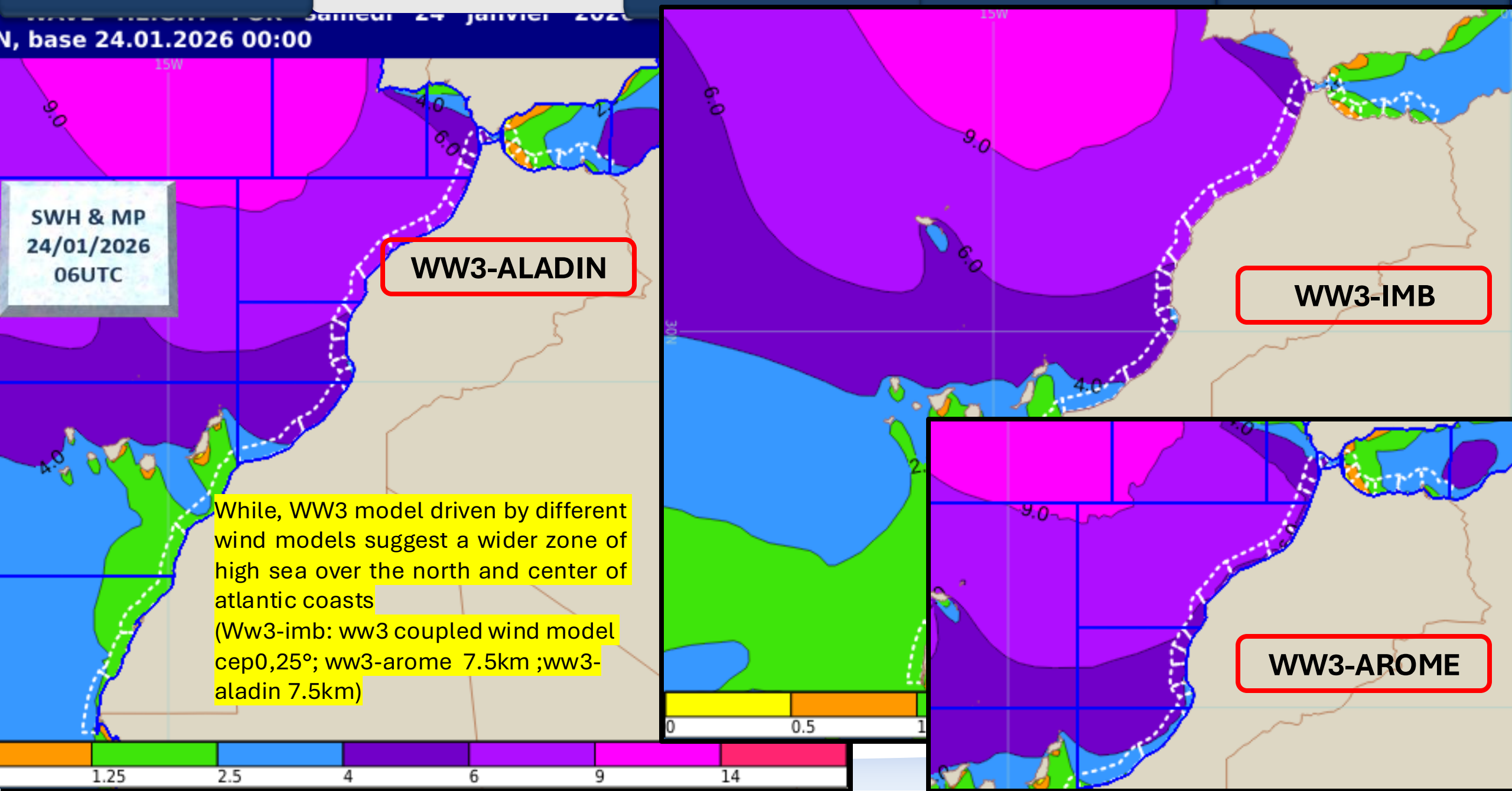
Here we proceed to evaluate which wave model is more reliable for this situation, so that we can issue the forecasts based on this model. So we choosed some validities depending on the altimeter pass near to our coasts, for this case during 23 jan in the morning, ww3 model driven by ALADIN and AROME wind data, the two models agree that very rough waves from north-west hit the northern and centered atlantic coasts, when ECWMWF suggests an optimisstic scenario of moderate sea

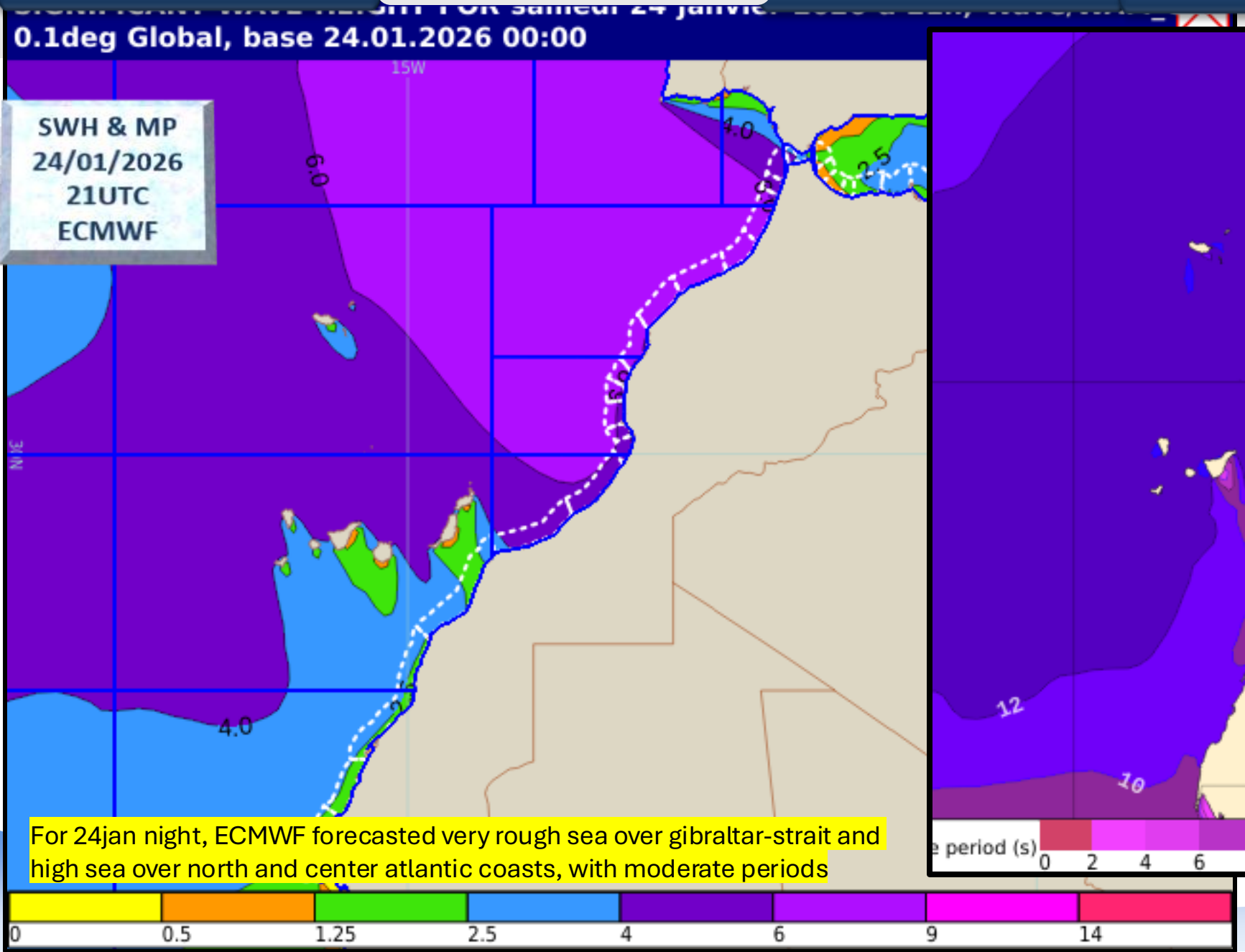

SWH
23/01/2026
ECMWF-18
ECMWF-21
WW3-ALADIN-18
SEA STATE
WW3-ALADIN-21
WW3-AROME-18
WW3-AROME-21
For the same day at 6 and 9 pm, always the consensus of two models, suggest very rough sea over gibraltar-strait and north and center atlantic coasts, when ECMWF forecasts it late at night locally over north atlantic moroccan coasts

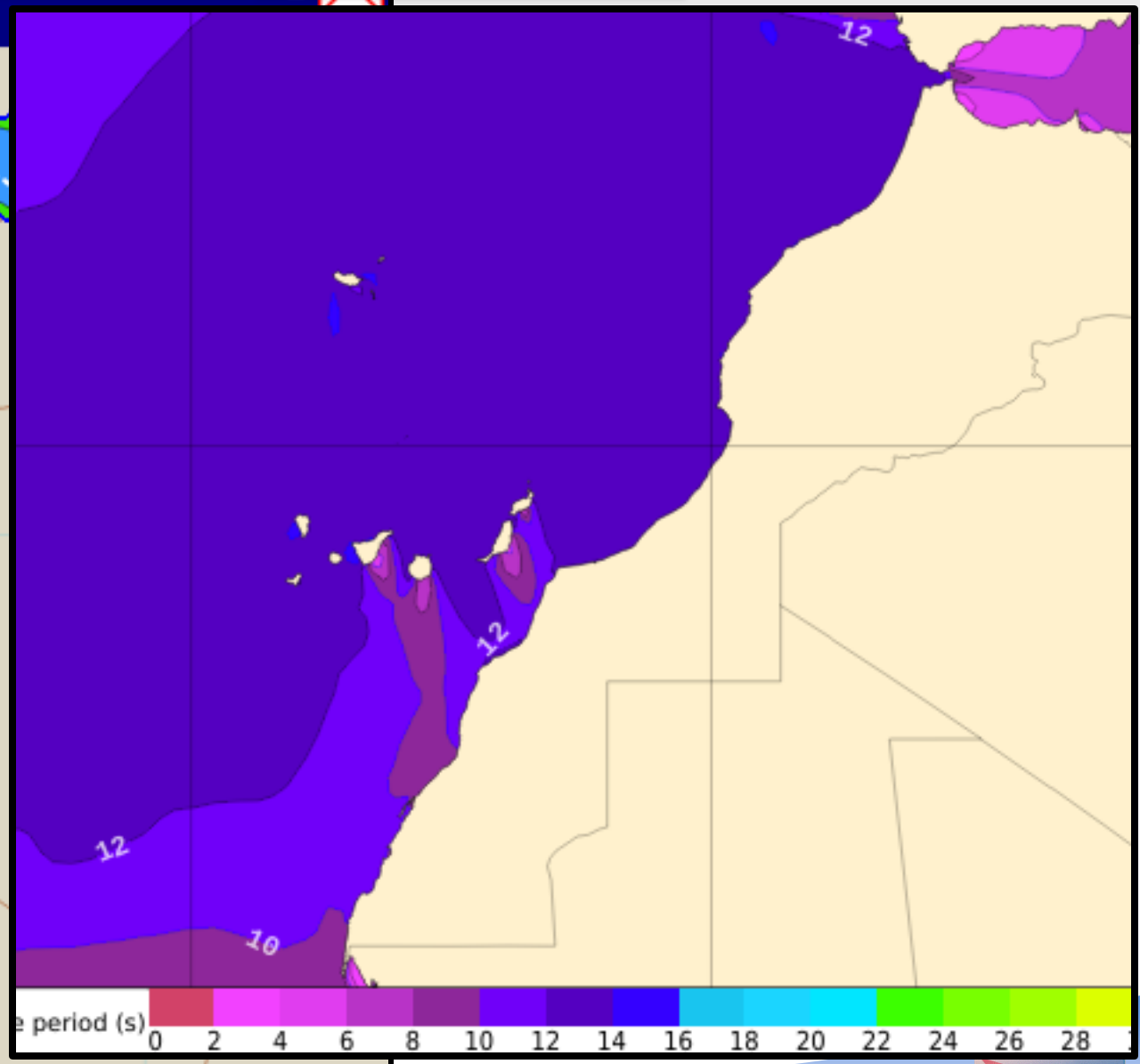




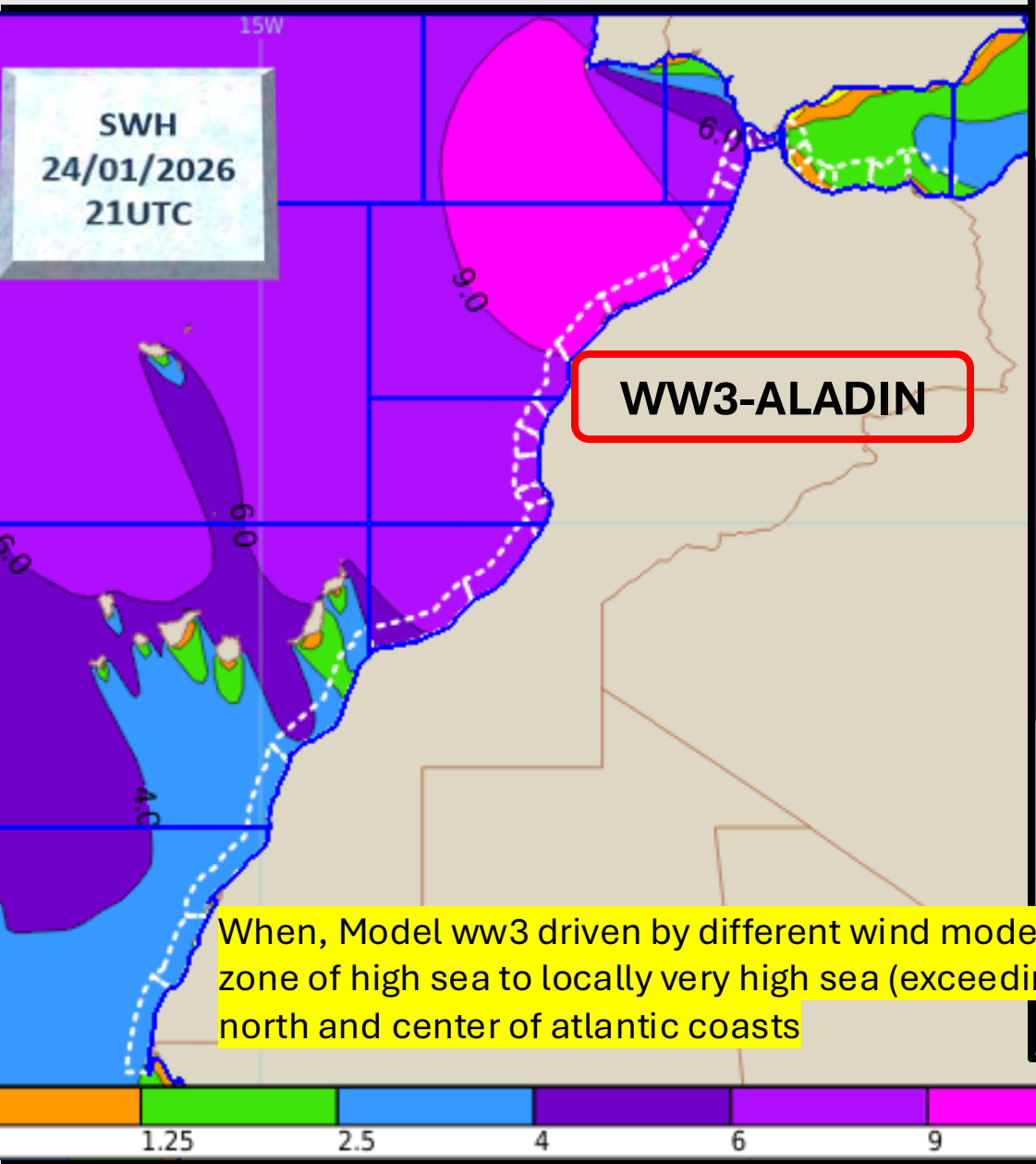
For 24jan morning, ECMWF suggest very rough sea over gibraltar-strait and high sea over north and center atlantic coasts, with moderate periods


N, base 24.01.2026 00:00
SWH & MP
24/01/2026
06UTC
WW3-ALADIN
WW3-IMB
WW3-AROME
While, WW3 model driven by different wind models suggest a wider zone of high sea over the north and center of atlantic coasts
(Ww3-imb: ww3 coupled wind model cep0,25°; ww3-arome 7.5km ;ww3-aladin 7.5km)
0
0.5
1.25
2.5
4
6
9
14

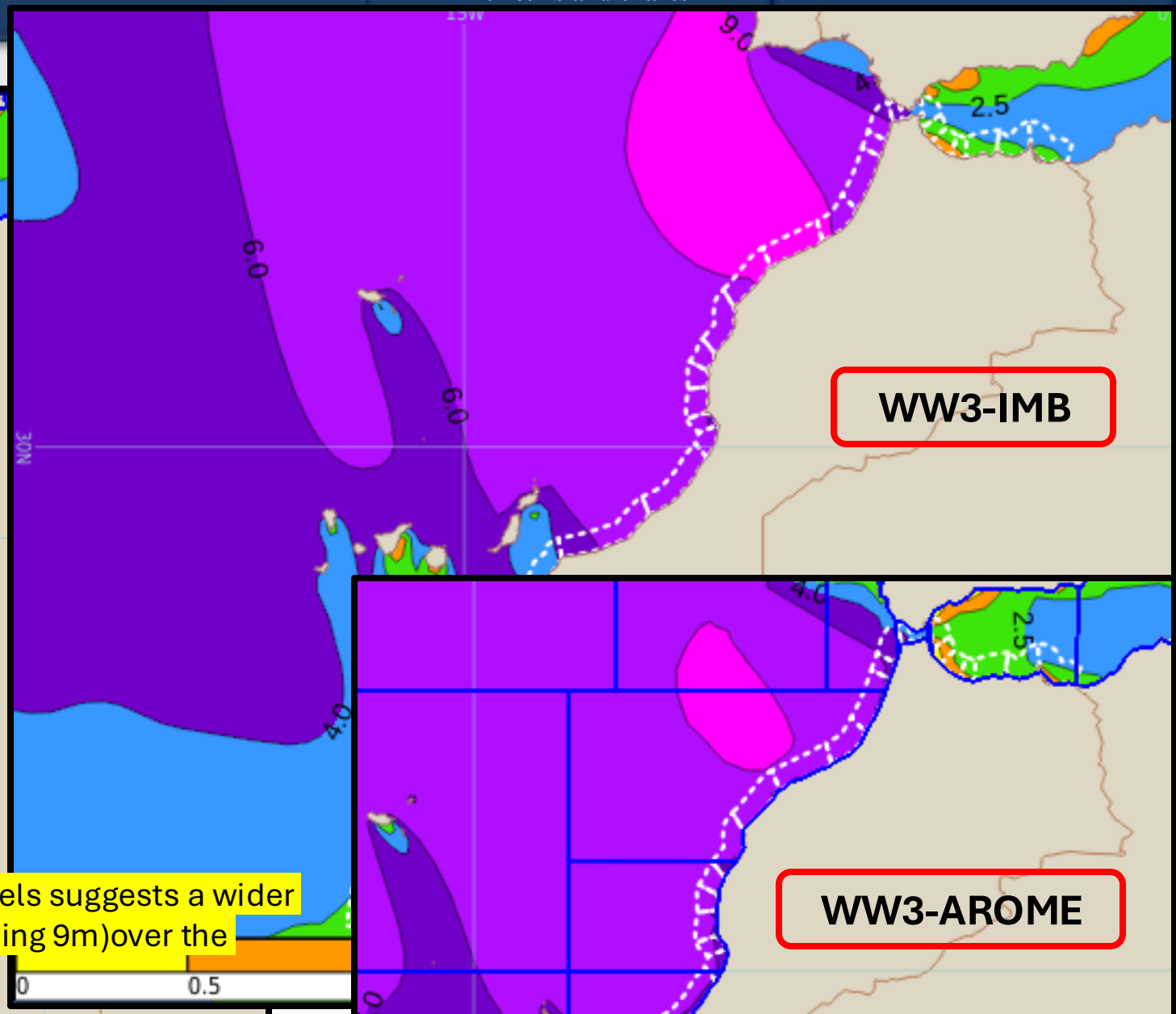




For 24jan night, ECMWF forecasted very rough sea over gibraltar-strait and high sea over north and center atlantic coasts, with moderate periods



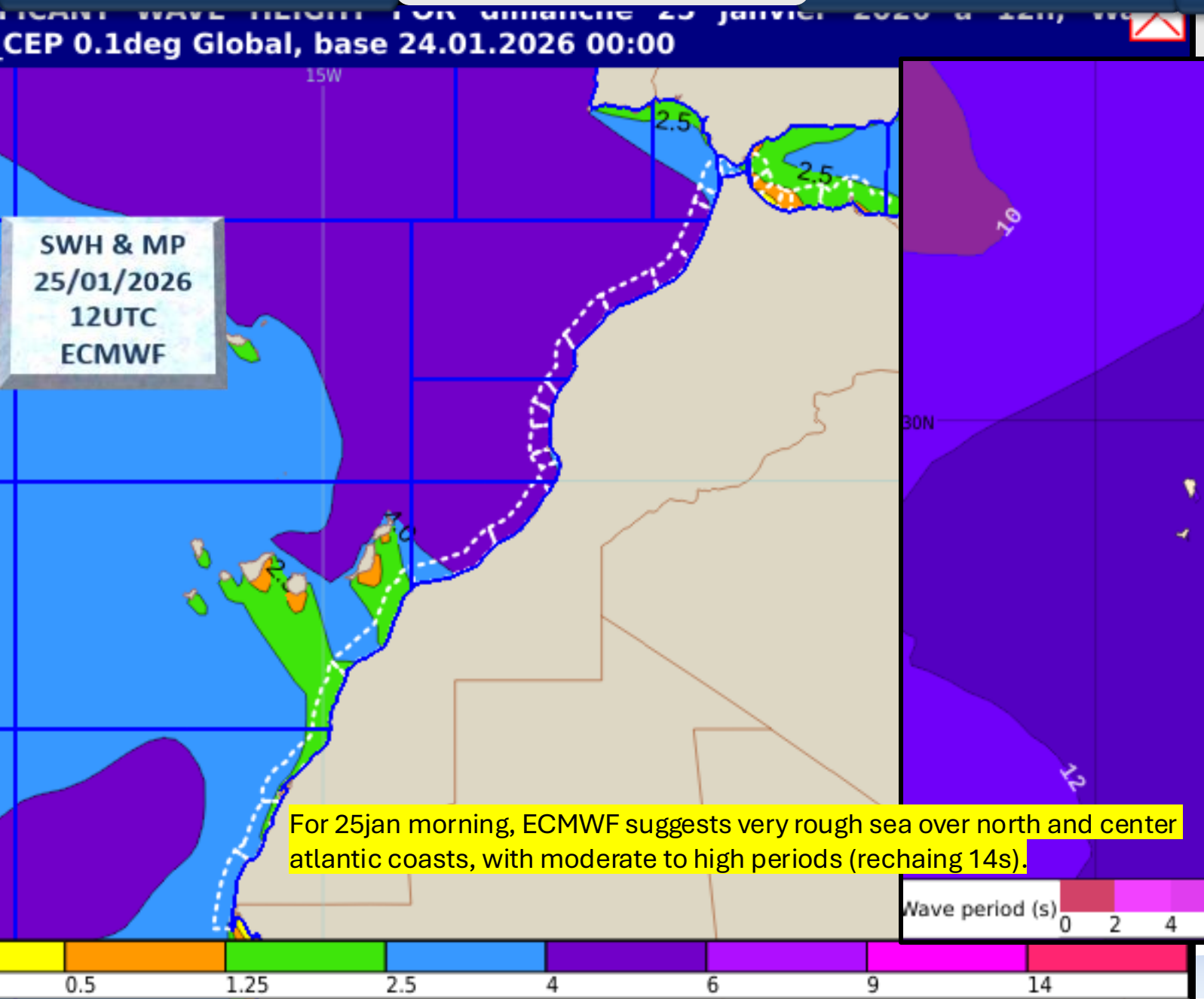
WW3-ALADIN

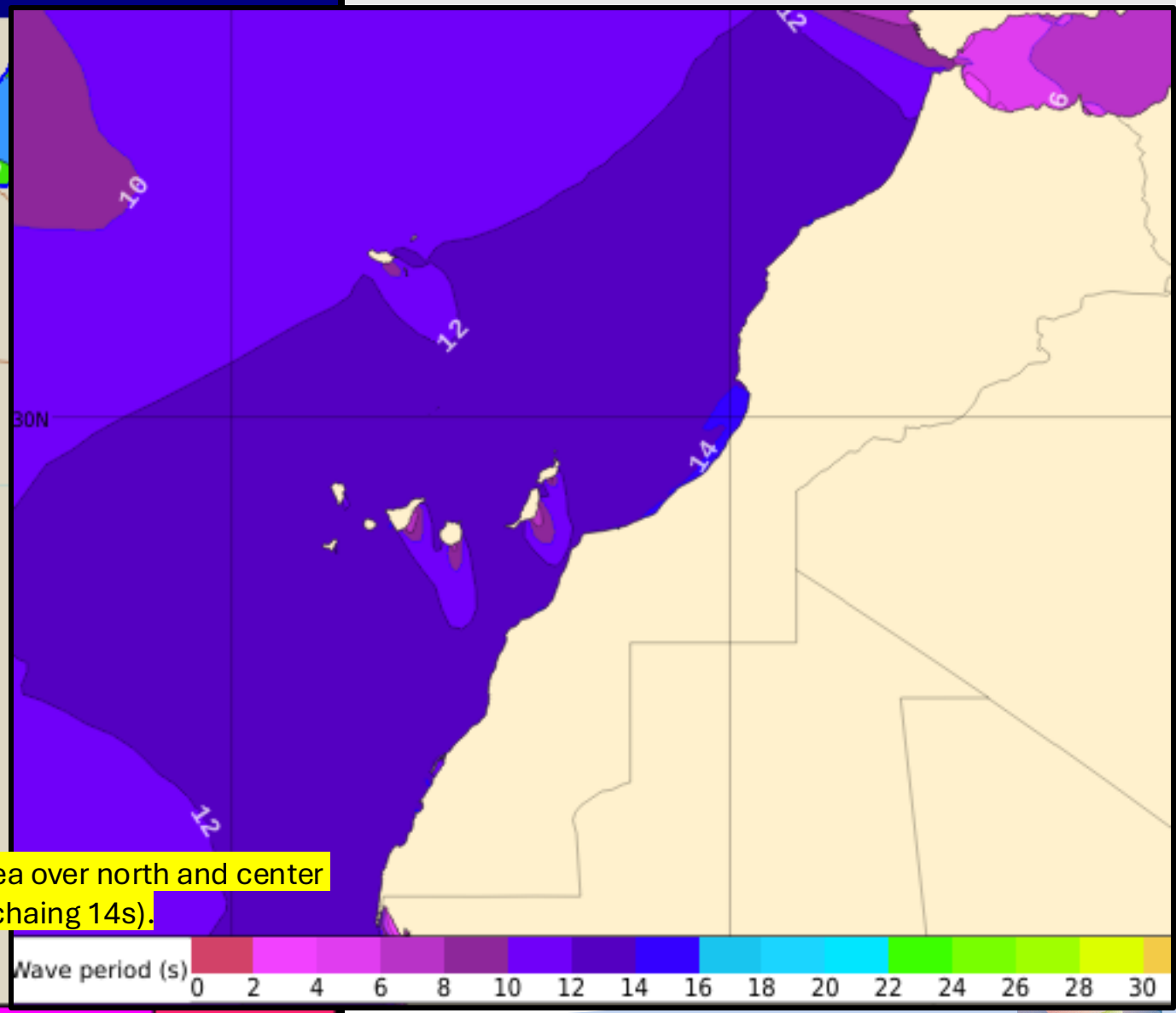


WW3-IMB

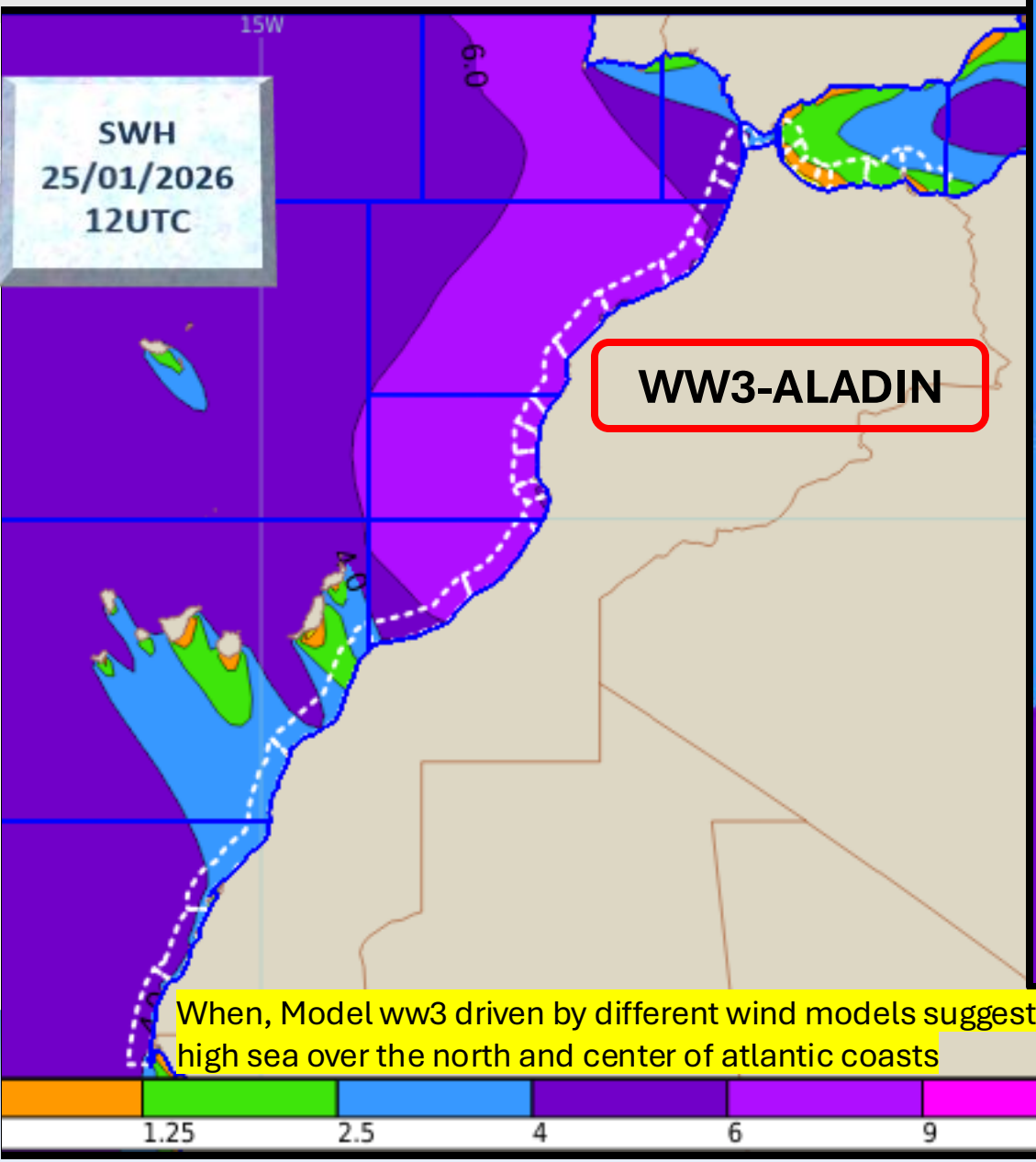
WW3-AROME

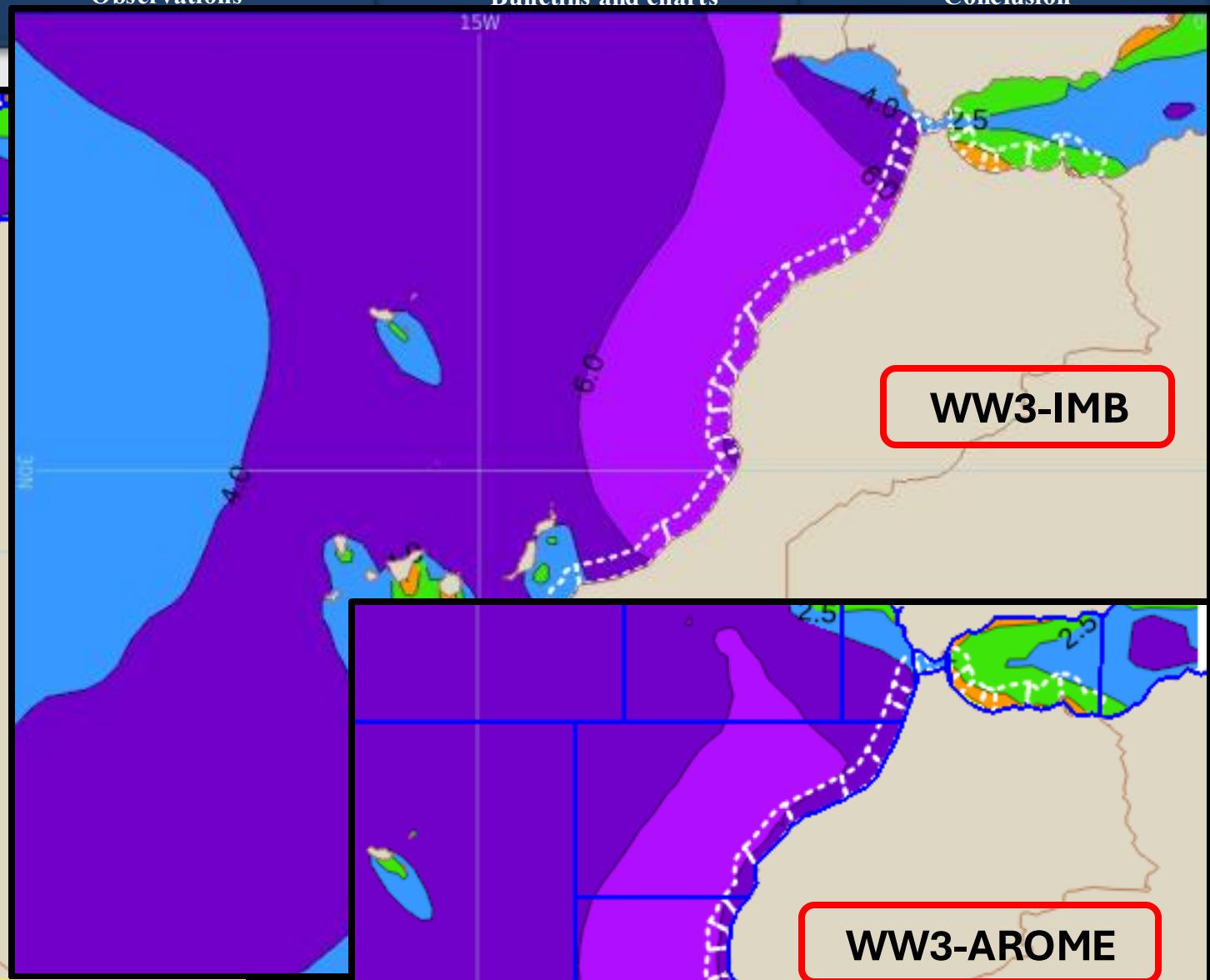
When, Model ww3 driven by different wind models suggests a wider zone of high sea to locally very high sea (exceeding 9m)over the north and center of atlantic coasts





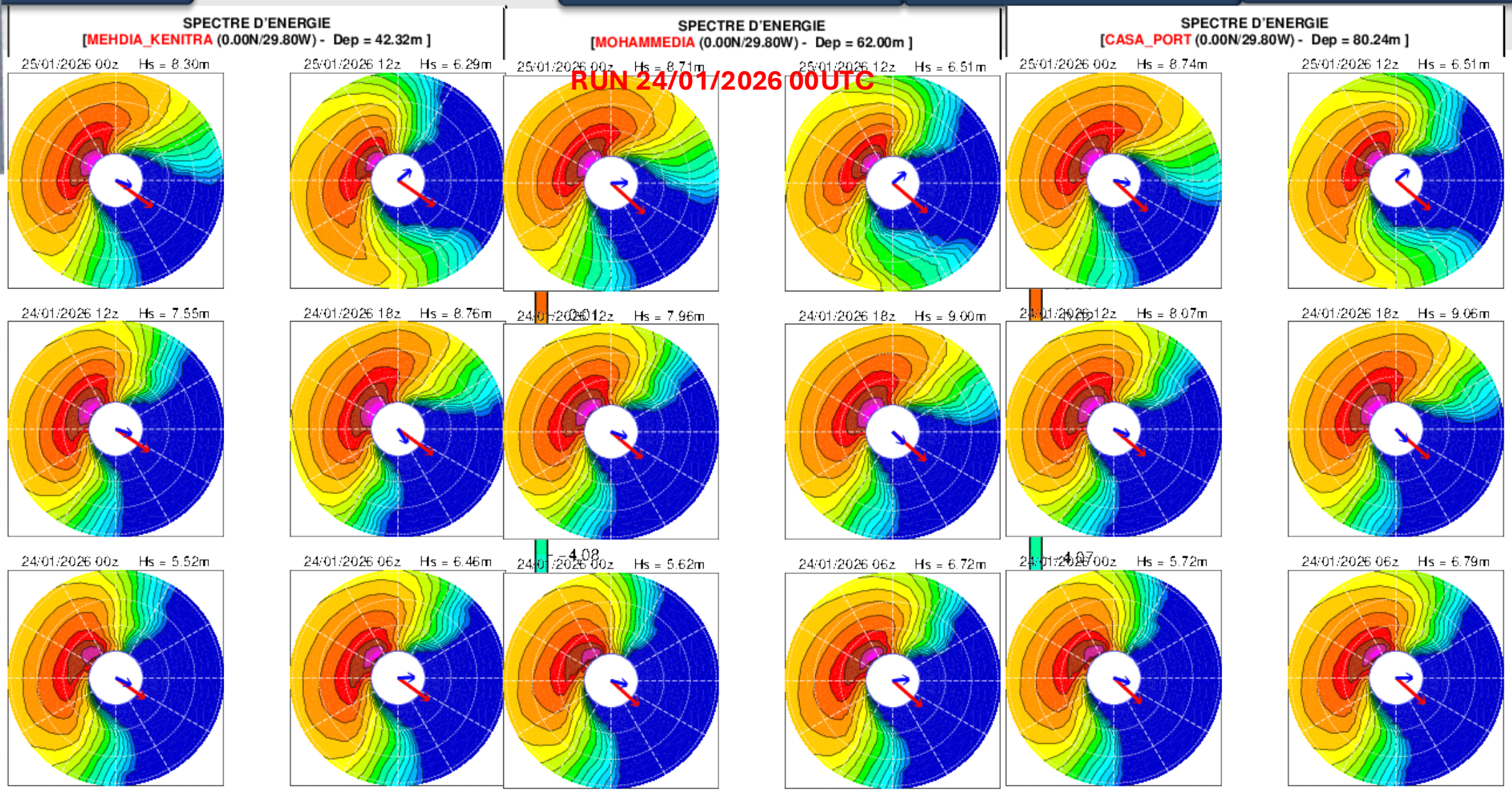
For 25jan morning, ECMWF suggests very rough sea over north and center atlantic coasts, with moderate to high periods (rechaing 14s).





When, Model ww3 driven by different wind models suggests a wider zone of high sea over the north and center of atlantic coasts

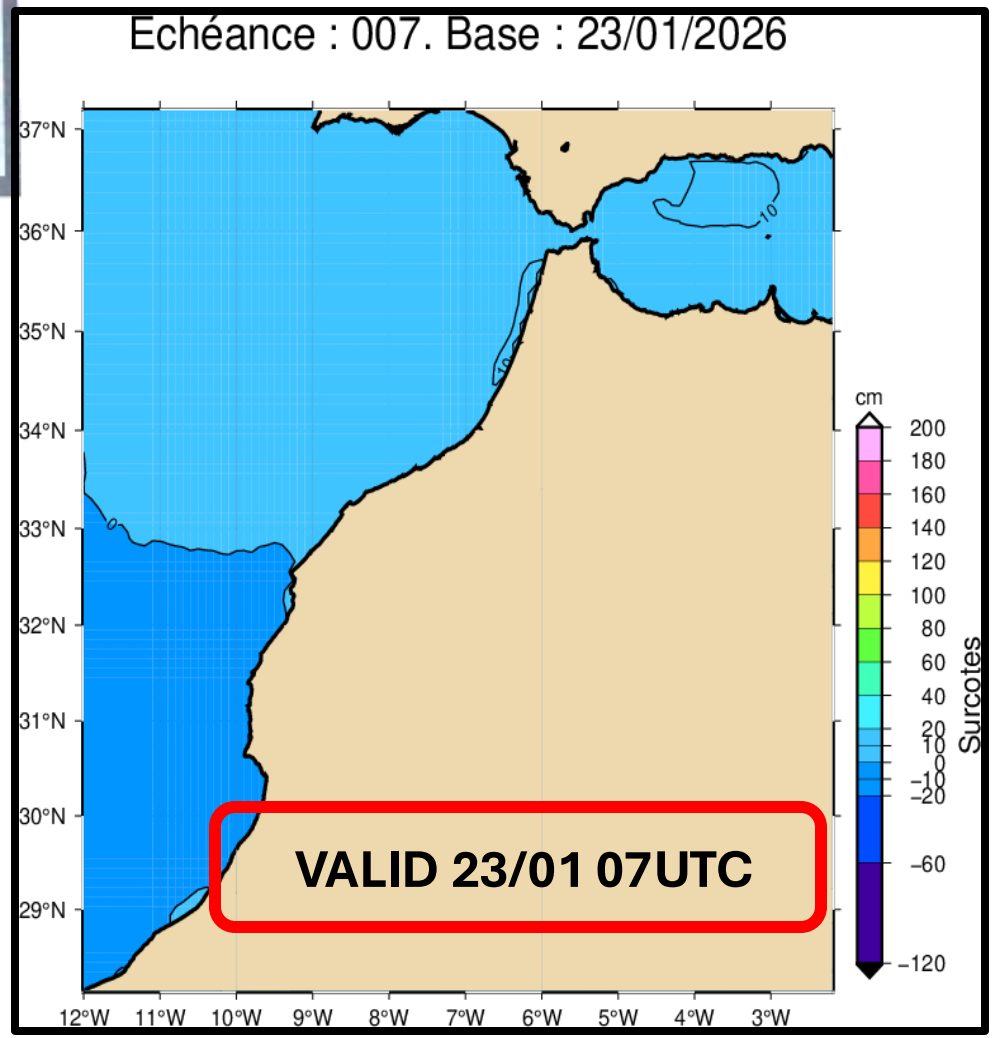
WAVE DIRECTIONAL ENERGY SPECTRUM

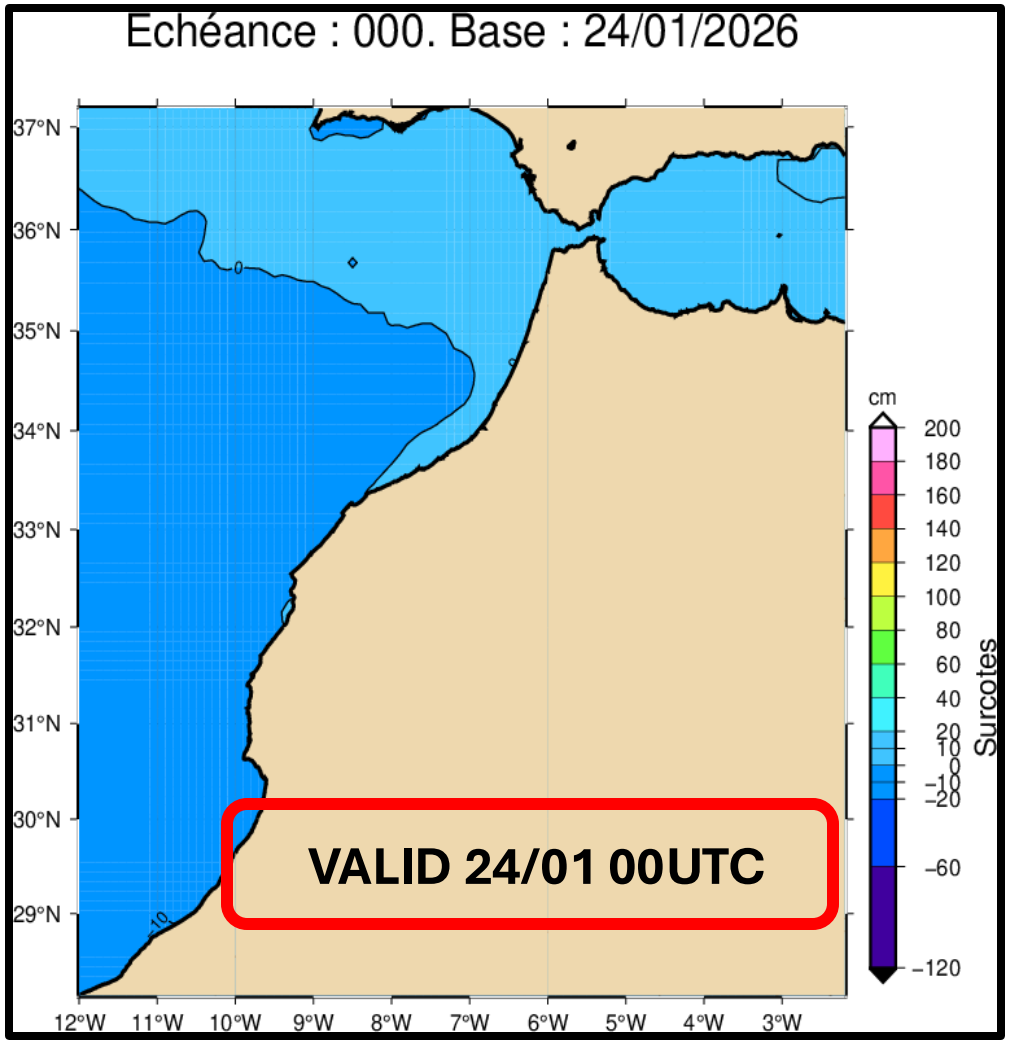


Wave spetrum helps us to analyse distribution of wave energy accross frequencies and directions. So we could say here for some ports belonging to north atlantic coasts for 24jan, that we have a concentration of wave energy with peak energy well organized around the mean direction north-west, wich corresponds to swell's direction. While wind seas scatter their energy in westely sector as the local wind pattern.

Coupled wind model: AROME 1.3km

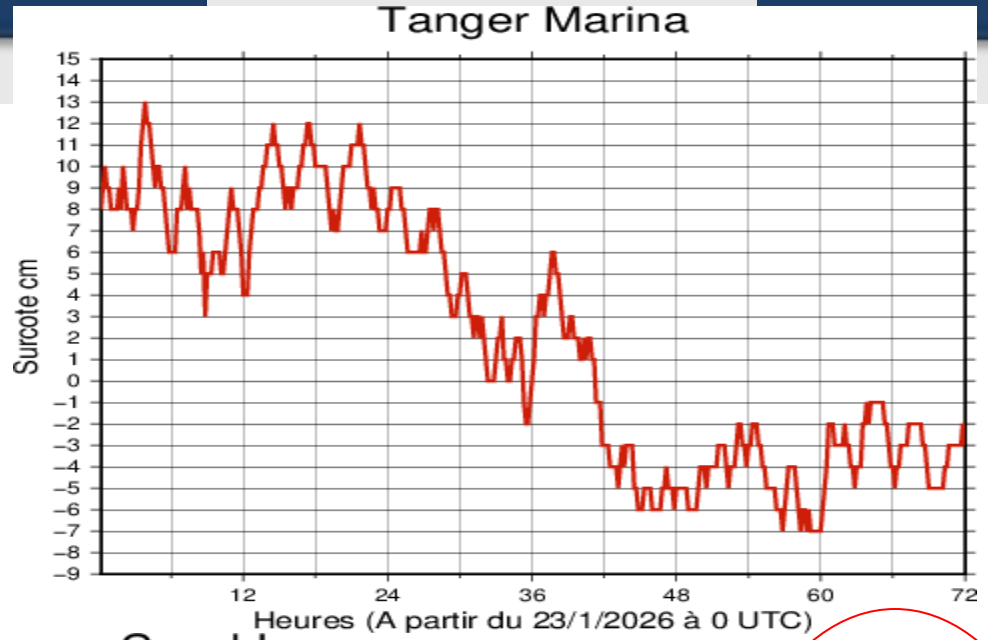
STORM SURGE

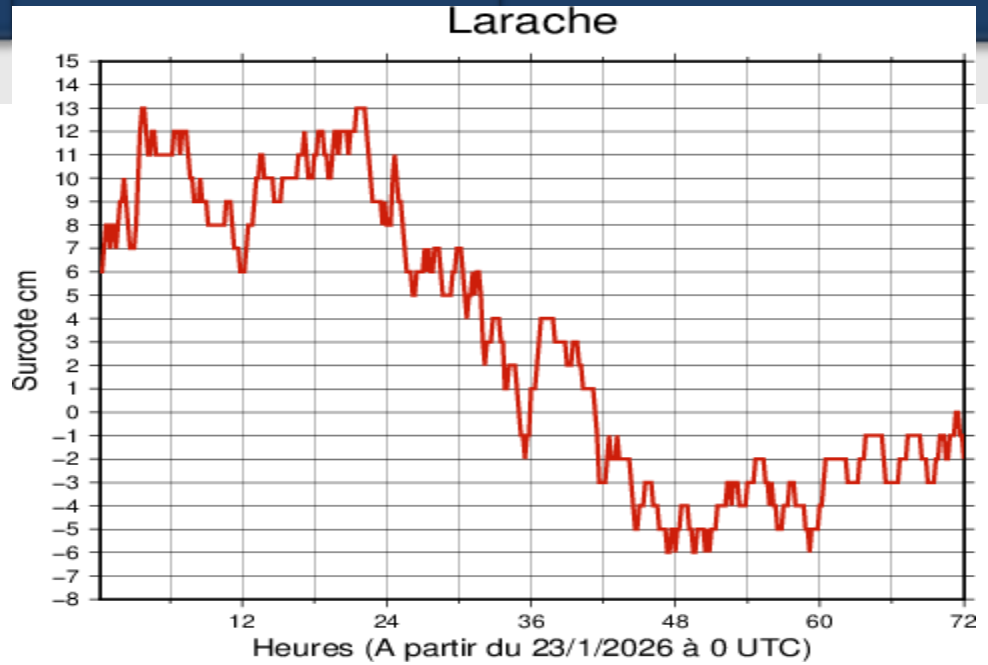


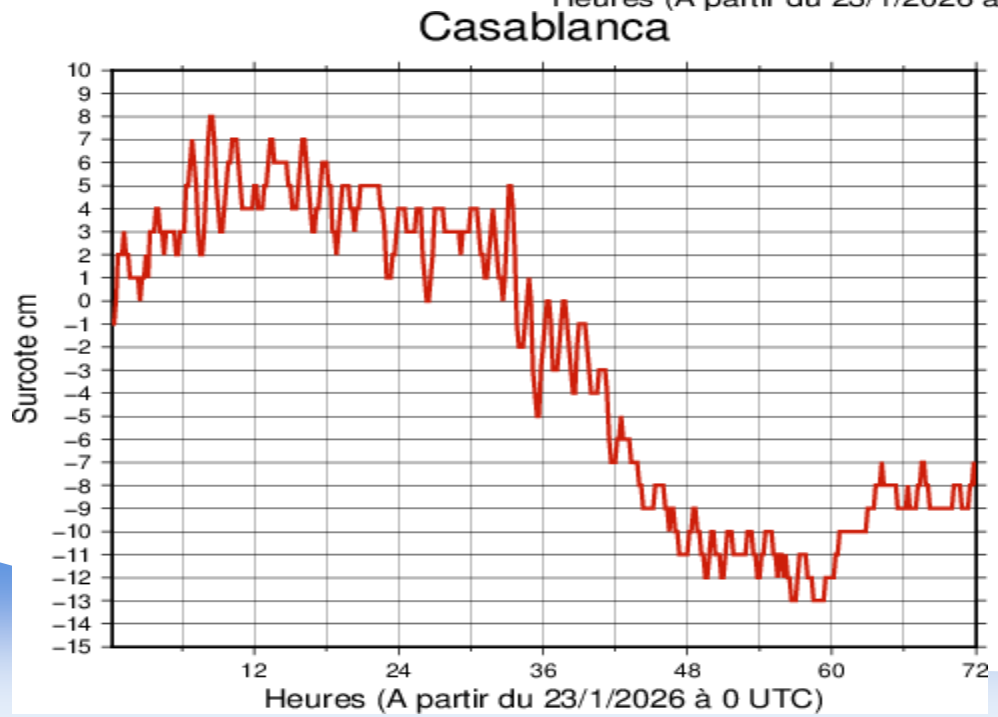


So here we have Surge model that helps us having an idea about the impact of the storm on the sea level. So we can see that wave Surge effect pops up over the north moroccan coasts exactly due to the action of strong onshore winds and the impact of the low pressures (elevation of 13cm due to the met effect).Storm tide, is the water level rise due to the combination of strom surge and astronomical tide.

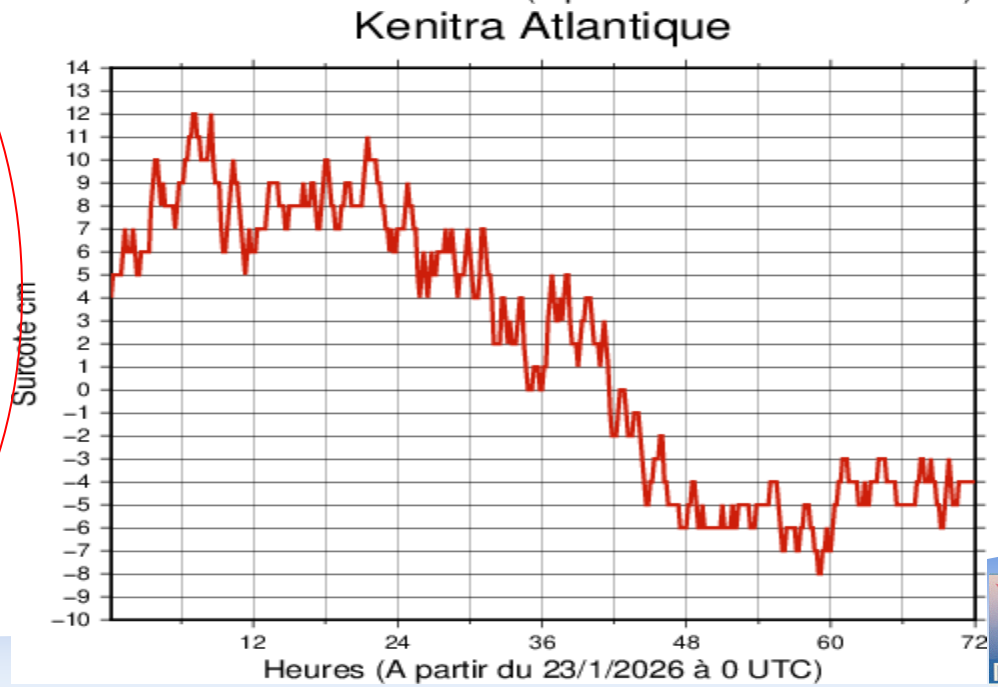
STROM SURGE







Surge reached maximum height of 13cm over northern moroccan coasts 23jan



ASTRONOMICAL TIDES

During this strom; our atlantic coasts experienced the phase of NEW MOON; wich creates Spring tides that are higher than usual or average heigh tides; as we see below for some ports.

Port de Mehdia

(35° 03' N , 06° 18' W)

Janvier 2026

Jour	Pleins mer				
	La première		La deuxiéme		La prer
	Heure	Hauteur	Heure	Hauteur	Heure
1 J	01:00	3.44	13:30	3.43	07:10
2 V	01:54	3.64	14:26	3.54	08:06
3 S	02:46	3.81	15:16	3.62	08:58
4 D	03:34	3.92	16:04	3.65	09:46
5 L	04:20	3.96	16:50	3.61	10:34
6 M	05:04	3.92	17:34	3.52	11:18
7 M	05:50	3.8	18:18	3.39	12:04
8 J	06:34	3.62	19:02	3.23	00:06
9 V	07:18	3.4	19:48	3.07	00:52
10 S	08:08	3.17	20:42	2.92	01:40
11 D	09:02	2.96	21:44	2.83	02:38
12 L	10:10	2.82	22:54	2.81	03:50
13 M	11:26	2.77			05:10
14 M	00:02	2.88	12:32	2.81	06:22
15 J	00:58	3.01	13:24	2.9	07:16
16 V	01:44	3.17	14:08	3.02	07:58
17 S	02:24	3.33	14:46	3.14	08:34
18 D	[illegible]	[illegible]	[illegible]	[illegible]	09:08
19 L	03:34	3.59	15:56	3.34	09:40
20 M	04:10	3.67	16:30	3.4	10:14
21 M	04:44	3.71	17:06	3.42	10:46
22 J	05:18	3.69	17:42	3.4	11:22
23 V	05:56	3.63	18:20	3.34	12:00
24 S	06:36	3.52	19:04	3.24	00:10
25 D	07:24	3.36	19:54	3.13	00:58
26 L	08:20	3.19	20:58	3.04	01:54

Port de Mohammedia

(33° 43' N , 07° 24' W)

Janvier 2026

Jour	Pleins mer				Bassee mer			
	La première		La deuxiéme		La première		La deuxiéme	
	Heure	Hauteur	Heure	Hauteur	Heure	Hauteur	Heure	Hauteur
1 J	00:56	3.41	13:26	3.39	07:10	1.11	19:30	1.1
2 V	01:50	3.6	14:20	3.5	08:06	0.93	20:22	0.99
3 S	02:40	3.76	15:12	3.57	08:58	0.79	21:08	0.92
4 D	03:28	3.86	15:58	3.59	09:46	0.72	21:54	0.89
5 L	04:16	3.89	16:44	3.55	10:32	0.73	22:38	0.93
6 M	05:00	3.84	17:28	3.46	11:16	0.82	23:22	1.02
7 M	05:44	3.72	18:12	3.33	12:00	0.96		
8 J	06:28	3.54	18:56	3.18	00:04	1.16	12:46	1.14
9 V	07:14	3.32	19:44	3.02	00:50	1.32	13:32	1.33
10 S	08:02	3.1	20:36	2.88	01:40	1.49	14:22	1.5
11 D	09:00	2.91	21:40	2.79	02:38	1.64	15:22	1.63
12 L	10:08	2.78	22:50	2.78	03:48	1.74	16:30	1.7
13 M	11:22	2.74	23:58	2.85	05:08	1.74	17:38	1.69
14 M	12:28	2.79			06:18	1.67	18:34	1.61
15 J	00:52	2.98	13:20	2.89	07:12	1.54	19:20	1.5
16 V	01:38	3.13	14:02	3.01	07:54	1.39	20:00	1.38
17 S	02:16	3.28	14:40	3.13	08:30	1.25	20:34	1.25
18 D	02:52	3.42	15:16	3.24	09:04	1.12	21:08	1.15
19 L	03:28	3.54	15:50	3.32	09:36	1.02	21:42	1.06
20 M	04:02	3.62	16:22	3.38	10:10	0.95	22:14	1.02
21 M	04:36	3.66	16:58	3.39	10:44	0.92	22:50	1.01
22 J	05:12	3.65	17:34	3.37	11:18	0.94	23:26	1.06
23 V	05:48	3.59	18:12	3.3	11:56	1.01		
24 S	06:30	3.48	18:56	3.21	00:06	1.14	12:38	1.13
25 D	07:18	3.33	19:48	3.09	00:52	1.26	13:28	1.27
26 L	08:16	3.15	20:54	2.99	01:50	1.4	14:30	1.42

NEW MOON

SPRING TIDES

ASTRONOMICAL TIDES

The forces that create tides are stronger when the moon, sun and earth line up twice a month – at the new moon and full moon-

Port de El-jadida

(33° 16' N , 08° 30' W)

Janvier 2026

Jour	Pleins mer				
	La première		La deuxiéme		La prer
	Heure	Hauteur	Heure	Hauteur	Heure
1 J	00:47	3.63	13:15	3.61	07:06
2 V	01:41	3.82	14:11	3.72	08:02
3 S	02:31	3.98	15:01	3.8	08:52
4 D	03:19	4.09	15:49	3.82	09:40
5 L	04:07	4.12	16:35	3.78	10:26
6 M	04:51	4.08	17:21	3.69	11:12
7 M	05:37	3.96	18:05	3.56	11:56
8 J	06:21	3.77	18:49	3.4	12:40
9 V	07:07	3.56	19:37	3.24	00:46
10 S	07:55	3.34	20:29	3.1	01:34
11 D	08:51	3.14	21:31	3.02	02:32
12 L	09:59	3.01	22:43	3.01	03:42
13 M	11:15	2.96	23:49	3.08	05:02
14 M	12:19	3.01			06:12
15 J	00:43	3.2	13:11	3.1	07:06
16 V	01:27	3.35	13:53	3.21	07:50
17 S	02:07	3.5	14:31	3.33	08:26
18 D	02:43	3.65	15:05	3.44	09:02
19 L	03:17	3.76	15:41	3.52	0:34
20 M	03:53	3.84	16:15	3.58	1:08
21 M	04:27	3.87	16:49	3.59	1:42
22 J	05:03	3.86	17:27	3.56	1:16
23 V	05:41	3.79	18:05	3.5	1:54
24 S	06:21	3.68	18:49	3.4	0:04
25 D	07:09	3.52	19:41	3.29	0:50
26 L	08:07	3.33	20:47	3.19	01:46

Port de Essaouira

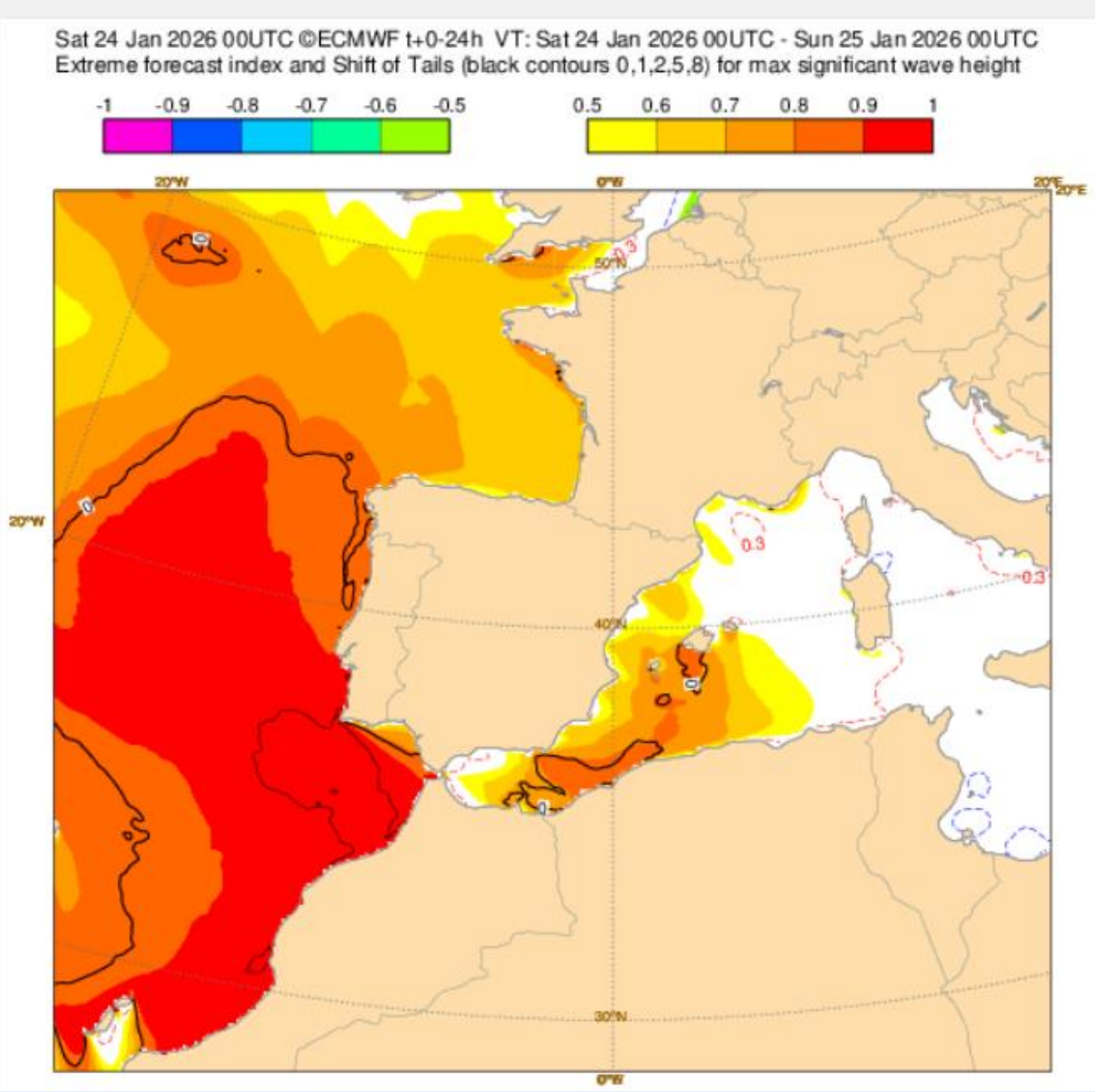
(31° 31' N , 09° 49' W)

Janvier 2026

Jour	Pleins mer				Bassee mer			
	La première		La deuxiéme		La première		La deuxiéme	
	Heure	Hauteur	Heure	Hauteur	Heure	Hauteur	Heure	Hauteur
1 J	00:38	3.33	13:10	3.3	06:52	1.12	19:14	1.12
2 V	01:34	3.51	14:04	3.4	07:48	0.94	20:04	1.01
3 S	02:24	3.67	14:56	3.47	08:40	0.81	20:52	0.93
4 D	03:14	3.76	15:44	3.49	09:28	0.74	21:38	0.9
5 L	04:00	3.79	16:30	3.45	10:14	0.75	22:22	0.93
6 M	04:46	3.74	17:14	3.37	11:00	0.83	23:06	1.02
7 M	05:30	3.62	17:58	3.25	11:44	0.97	23:50	1.15
8 J	06:16	3.45	18:42	3.1	12:28	1.14		
9 V	07:02	3.24	19:30	2.95	00:36	1.32	13:14	1.33
10 S	07:50	3.03	20:24	2.82	01:26	1.49	14:06	1.5
11 D	08:48	2.85	21:26	2.74	02:24	1.63	15:04	1.63
12 L	09:56	2.72	22:38	2.72	03:36	1.73	16:12	1.7
13 M	11:10	2.69	23:44	2.79	04:54	1.73	17:20	1.69
14 M	12:14	2.74			06:02	1.66	18:16	1.62
15 J	00:38	2.9	13:06	2.84	06:56	1.53	19:02	1.51
16 V	01:22	3.04	13:48	2.95	07:38	1.38	19:42	1.39
17 S	02:00	3.19	14:26	3.07	08:14	1.24	20:18	1.26
18 D	02:36	3.32	15:00	3.17	08:48	1.11	20:52	1.15
19 L	03:12	3.44	15:34	3.25	9:20	1.01	21:26	1.07
20 M	03:46	3.52	16:08	3.3	9:54	0.95	22:00	1.02
21 M	04:20	3.56	16:44	3.31	0:28	0.93	22:34	1.02
22 J	04:56	3.55	17:20	3.28	1:04	0.95	23:12	1.06
23 V	05:34	3.5	17:58	3.21	1:42	1.03	23:52	1.14
24 S	06:14	3.39	18:42	3.12	2:24	1.14		
25 D	07:02	3.24	19:32	3.01	0:38	1.26	13:14	1.29
26 L	08:00	3.07	20:38	2.93	1:34	1.39	14:14	1.44

NEW MOON

SPRING TIDES



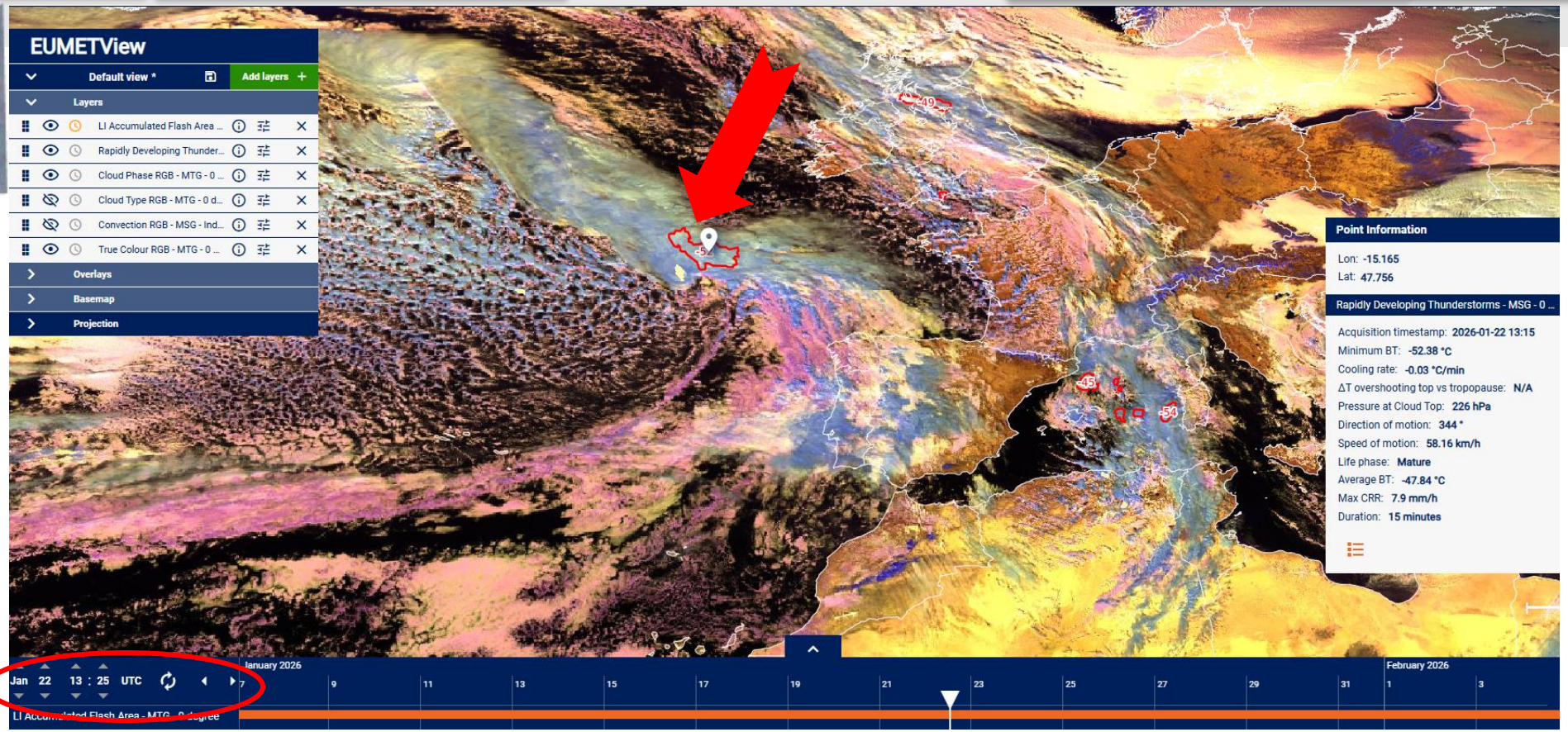
EFI

EFI for SWH value is above 0,9 highlighting unsual or extreme waves over atlantic coast and Gibraltar-strait, compared to the historical climate for january.

OBSERVATIONS

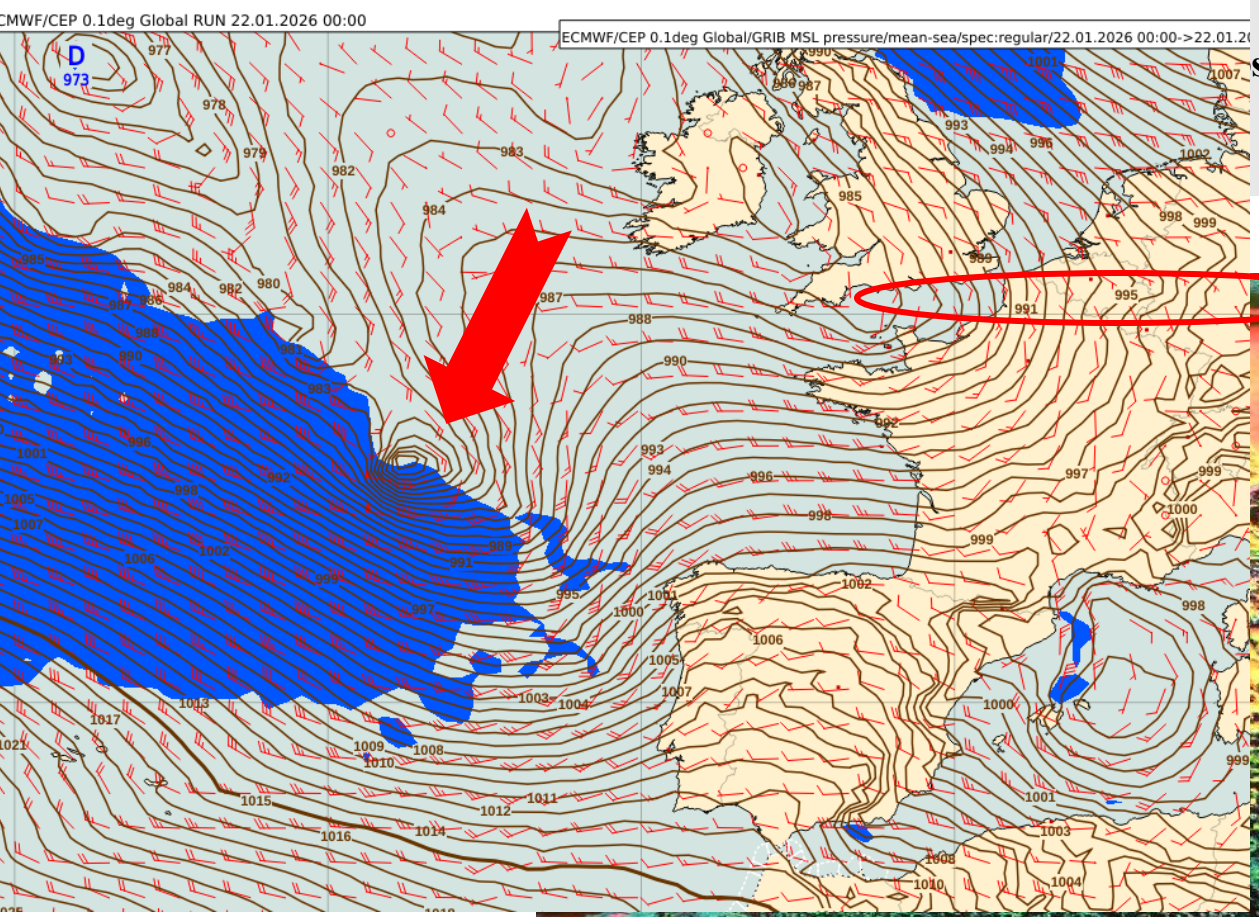


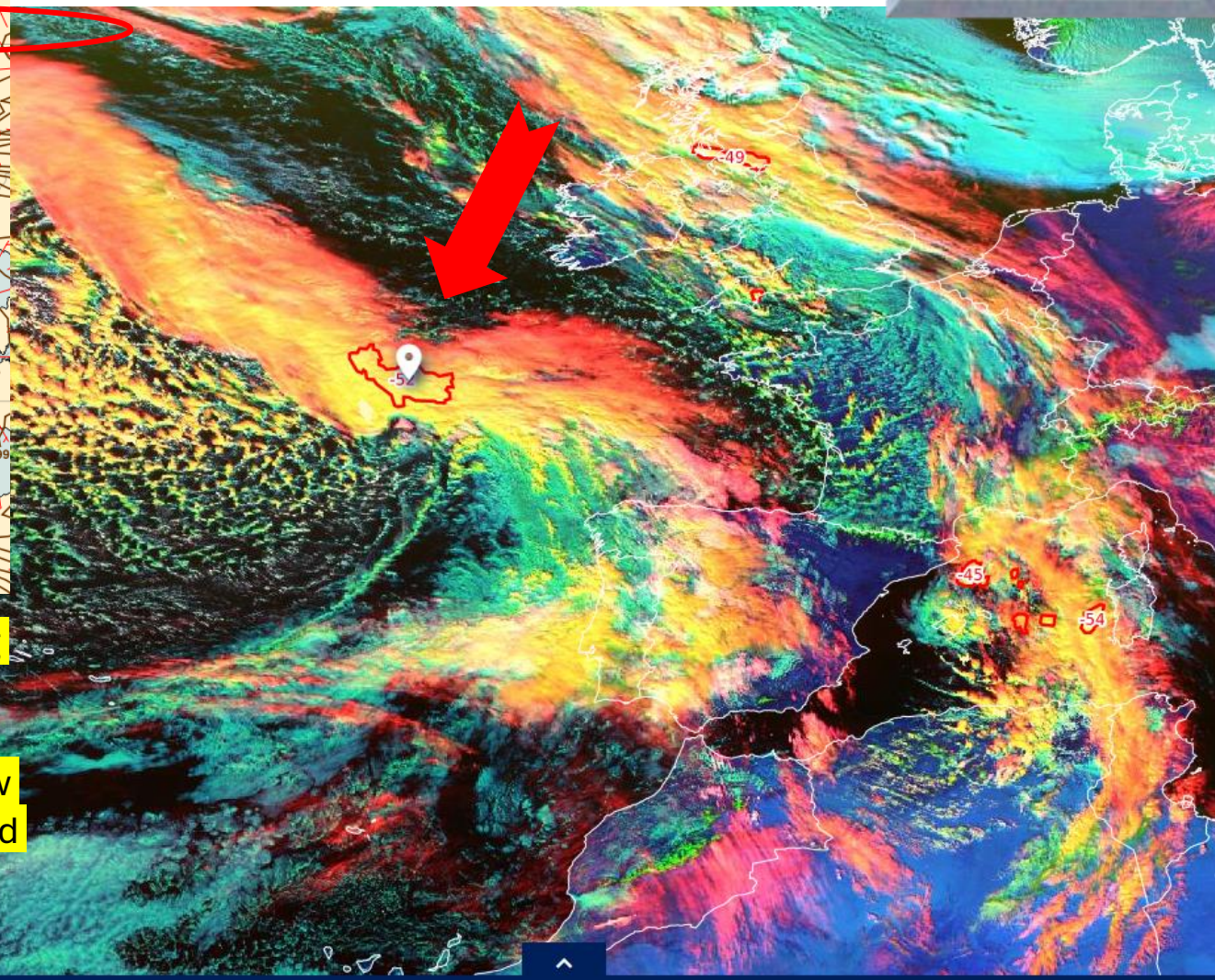
RGB
-CLOUD PHASE-
22/01/2026



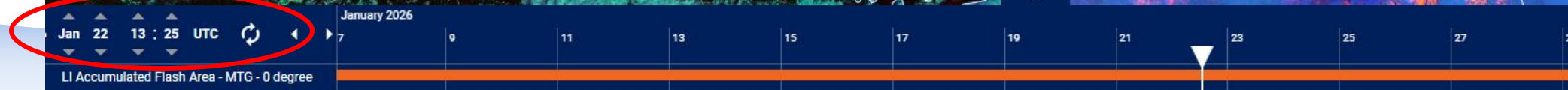
We are using satellite imagery to track the storm's movement, development and intensity, and monitor its cloud patterns. The satellite observed a convective storm: a developing thunderstorm in a maturity phase with the extent of the coldest cloud tops -52degrees celsius (which indicate the most active areas of the storm), over the location 47,7degrees lat north and 15degrees long west at 1h25pm.
RGBcould phase also is very handy to monitor this storm's convection: the imagery here shows the microphysical structure of the storm tops, thick ice clouds (the cloud top glaciation is well seen in the developing phase) with small particles (wich is an indicator of increased updraft intensity) around the strom location.
So using Cloud phase RGB is very relevant to analyse clouds microphysics- for separation of water from ice clouds and information on cloud top particle size.

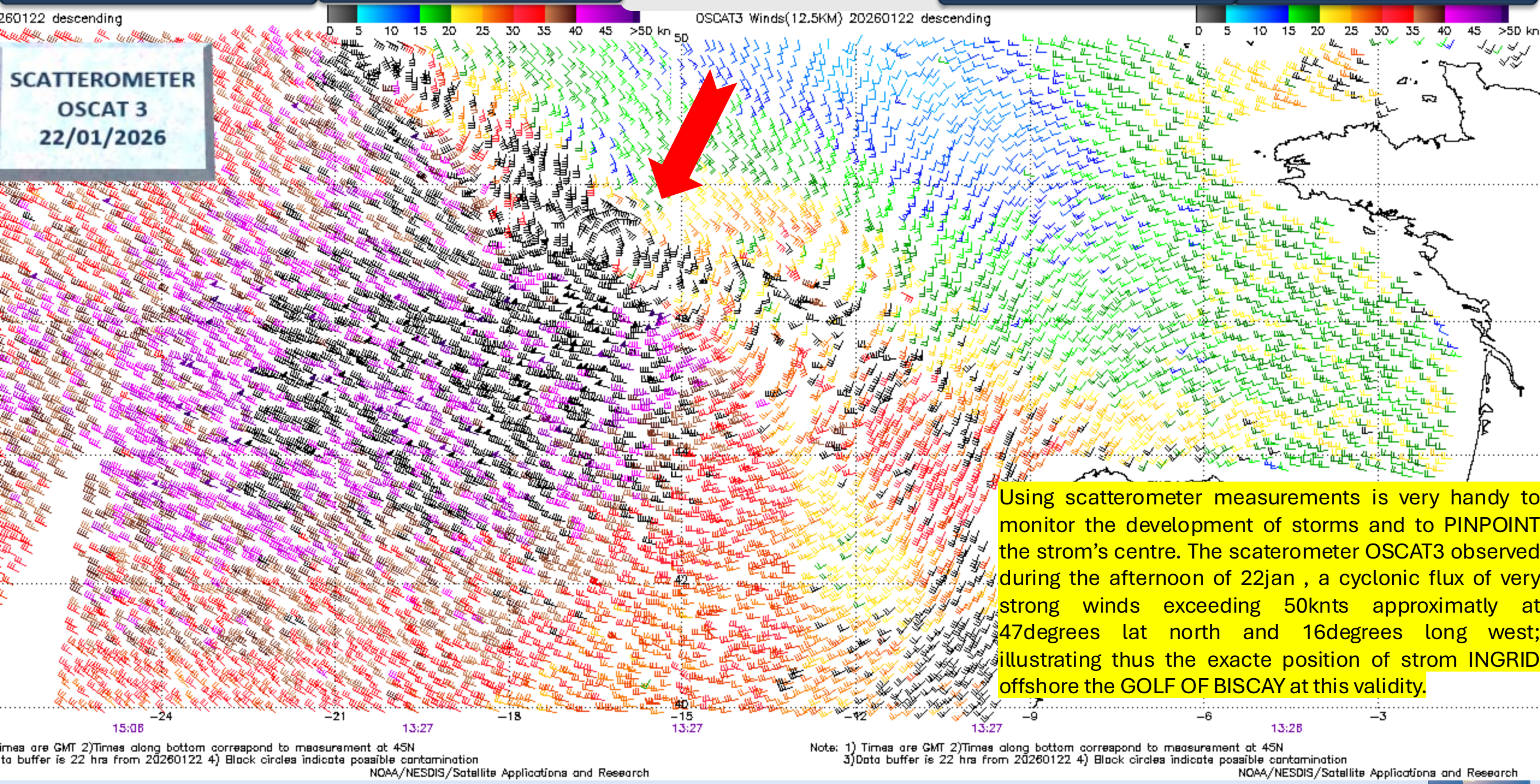
RGB
-CLOUD TYPE-
22/01/2026



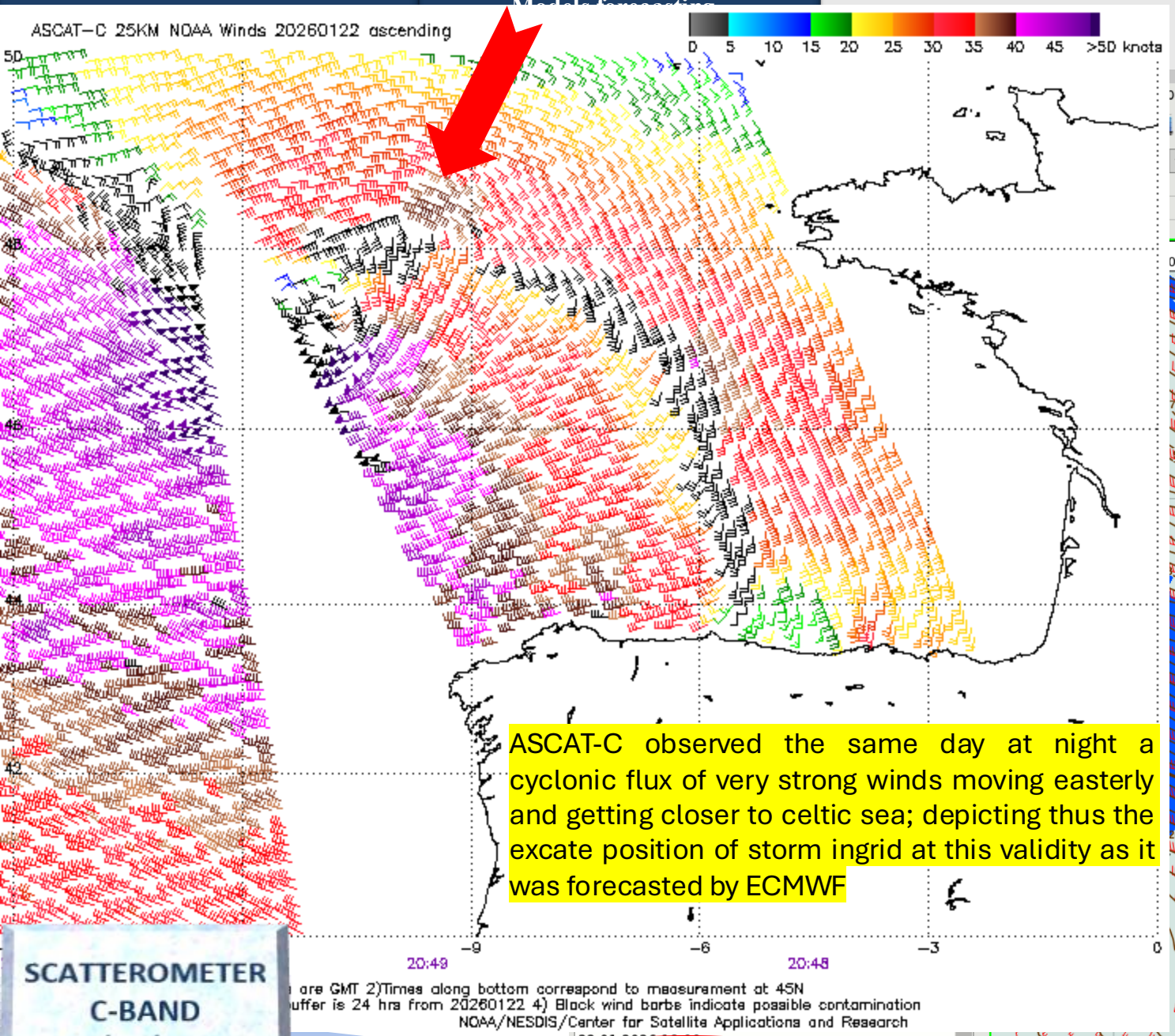


RGBcould type imagery here shows thick high ice clouds (indicating active convection and storm intensification) around the strom location during the same validity.
So we use Cloud type RGB to analyse cloud type differenciation(low and mid level clouds, thick cloud; very thin high clouds; supercooled water clouds).



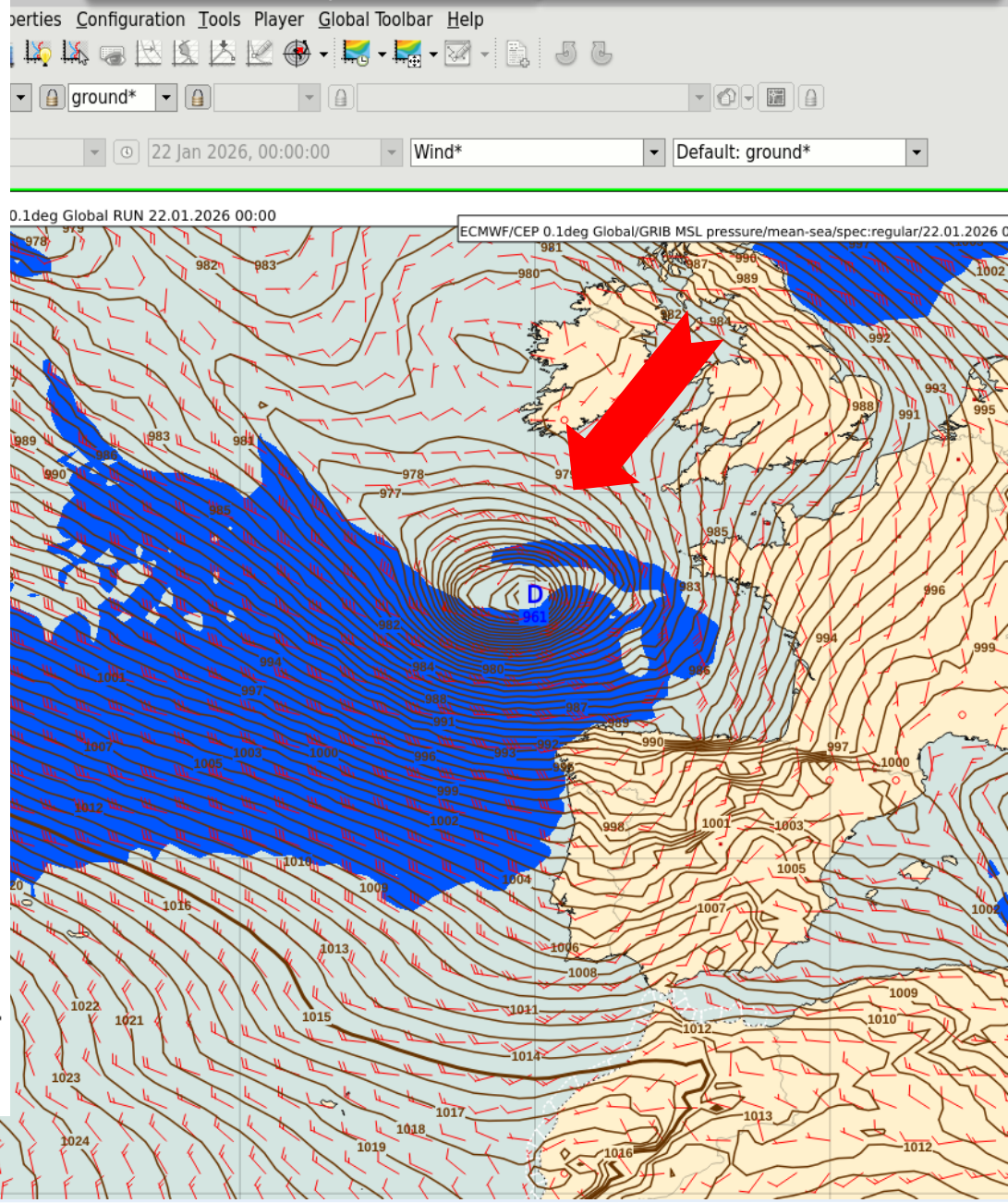


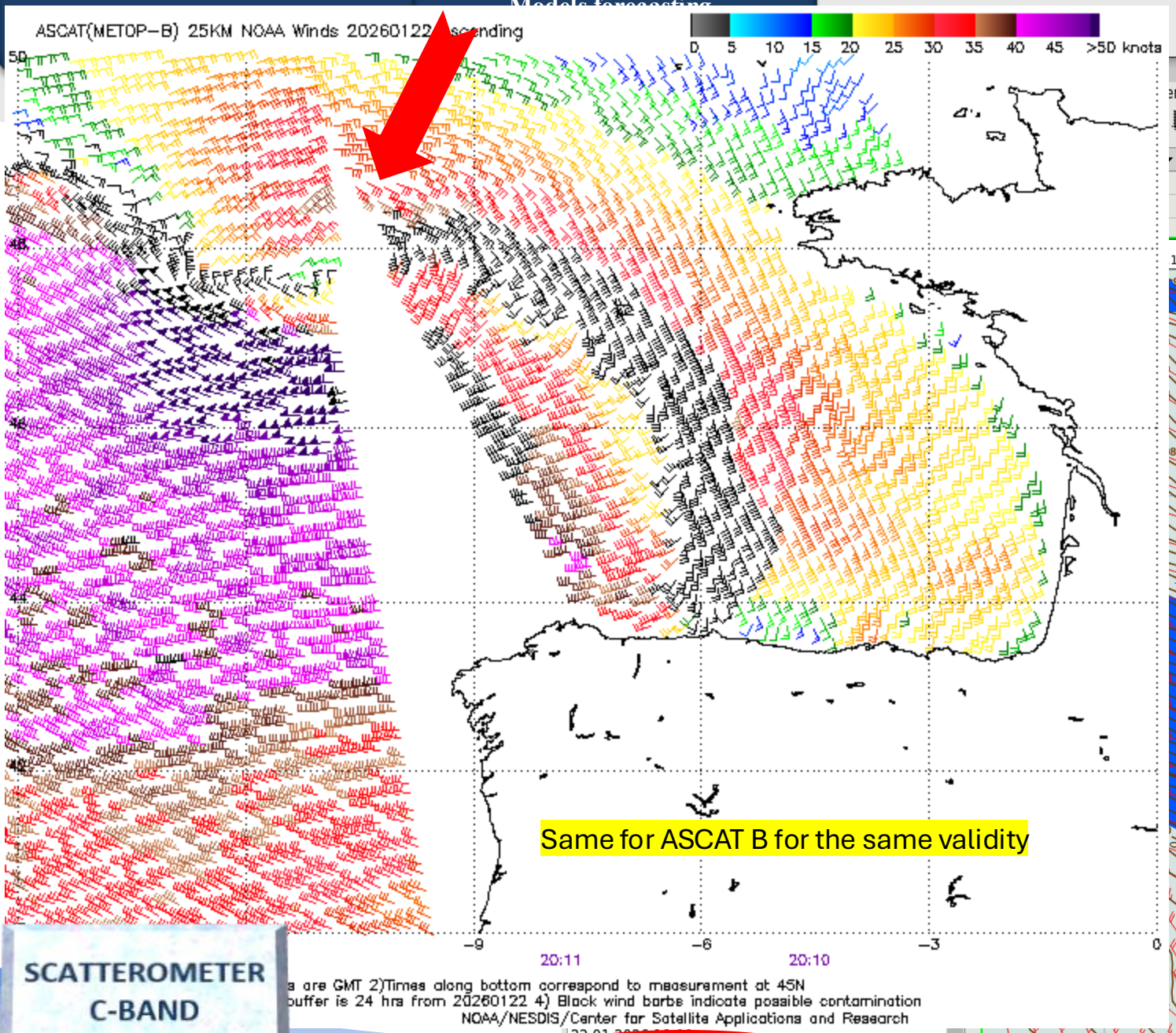
Using scatterometer measurements is very handy to monitor the development of storms and to PINPOINT the strom's centre. The scaterometer OSCAT3 observed during the afternoon of 22jan , a cyclonic flux of very strong winds exceeding 50knts approximatly at 47degrees lat north and 16degrees long west; illustrating thus the exacte position of strom INGRID offshore the GOLF OF BISCAY at this validity.



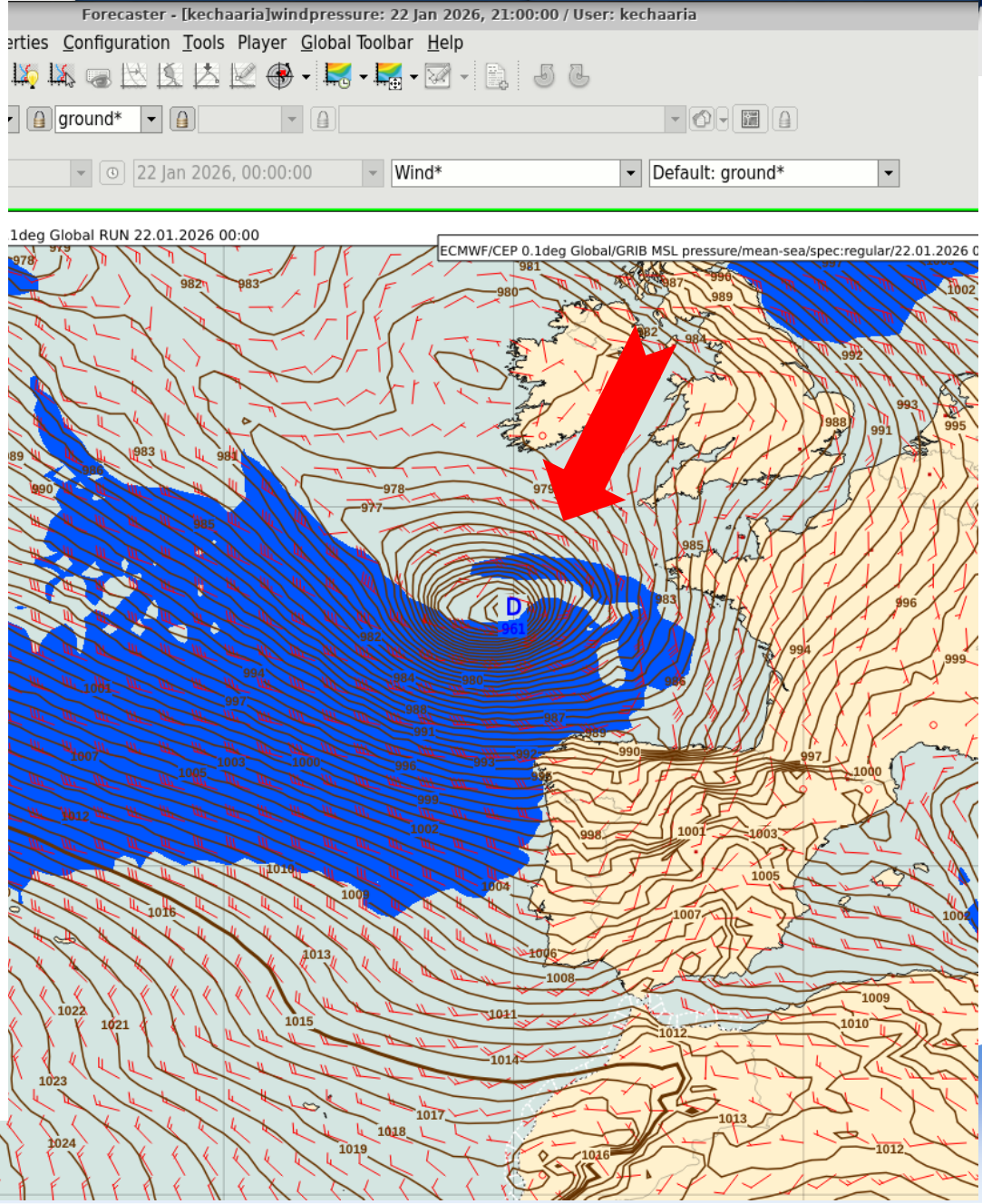
ASCAT-C observed the same day at night a cyclonic flux of very strong winds moving easterly and getting closer to celtic sea; depicting thus the excate position of storm ingrid at this validity as it was forecasted by ECMWF

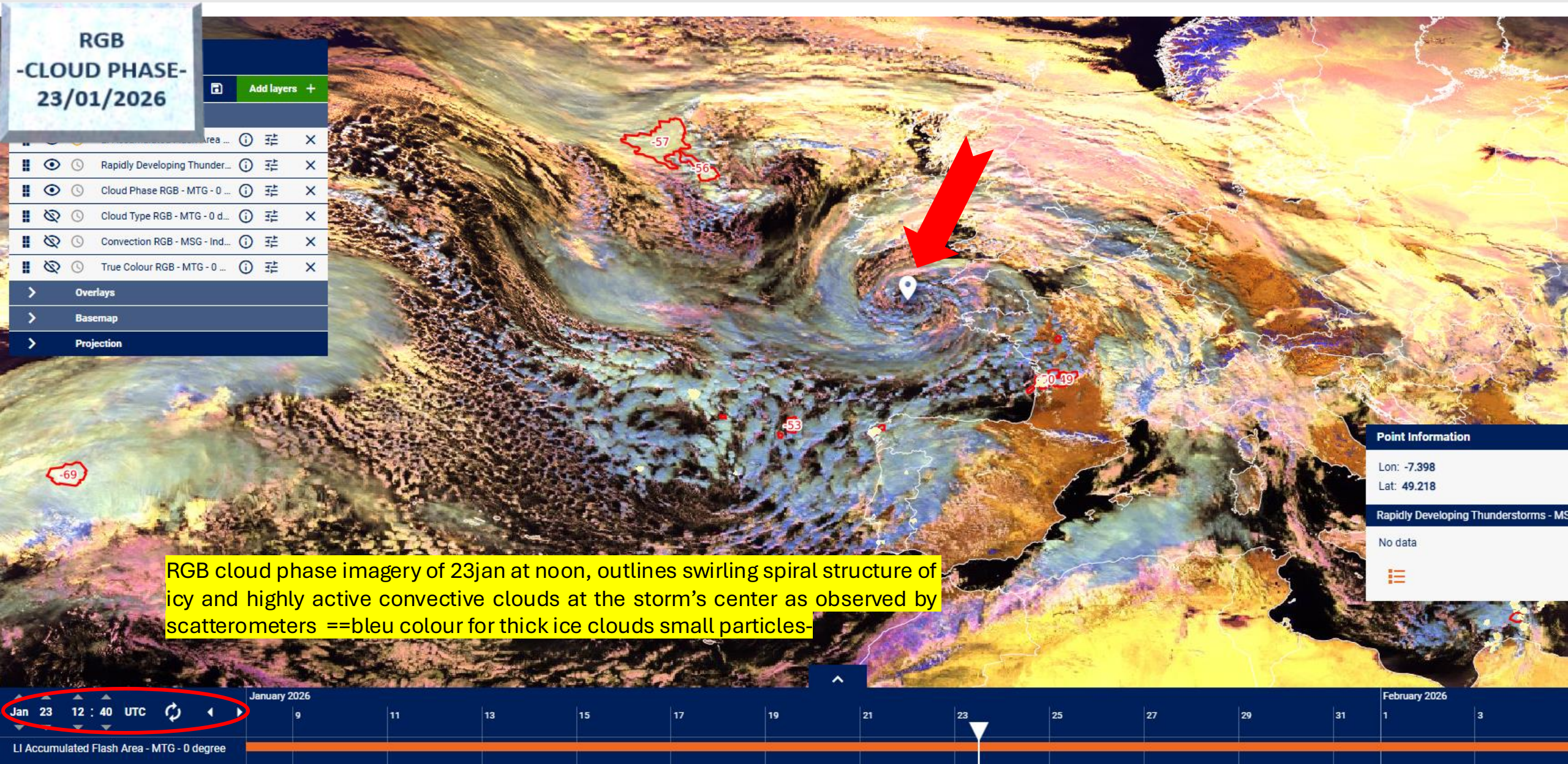
SCATTEROMETER
C-BAND
22/01/2026



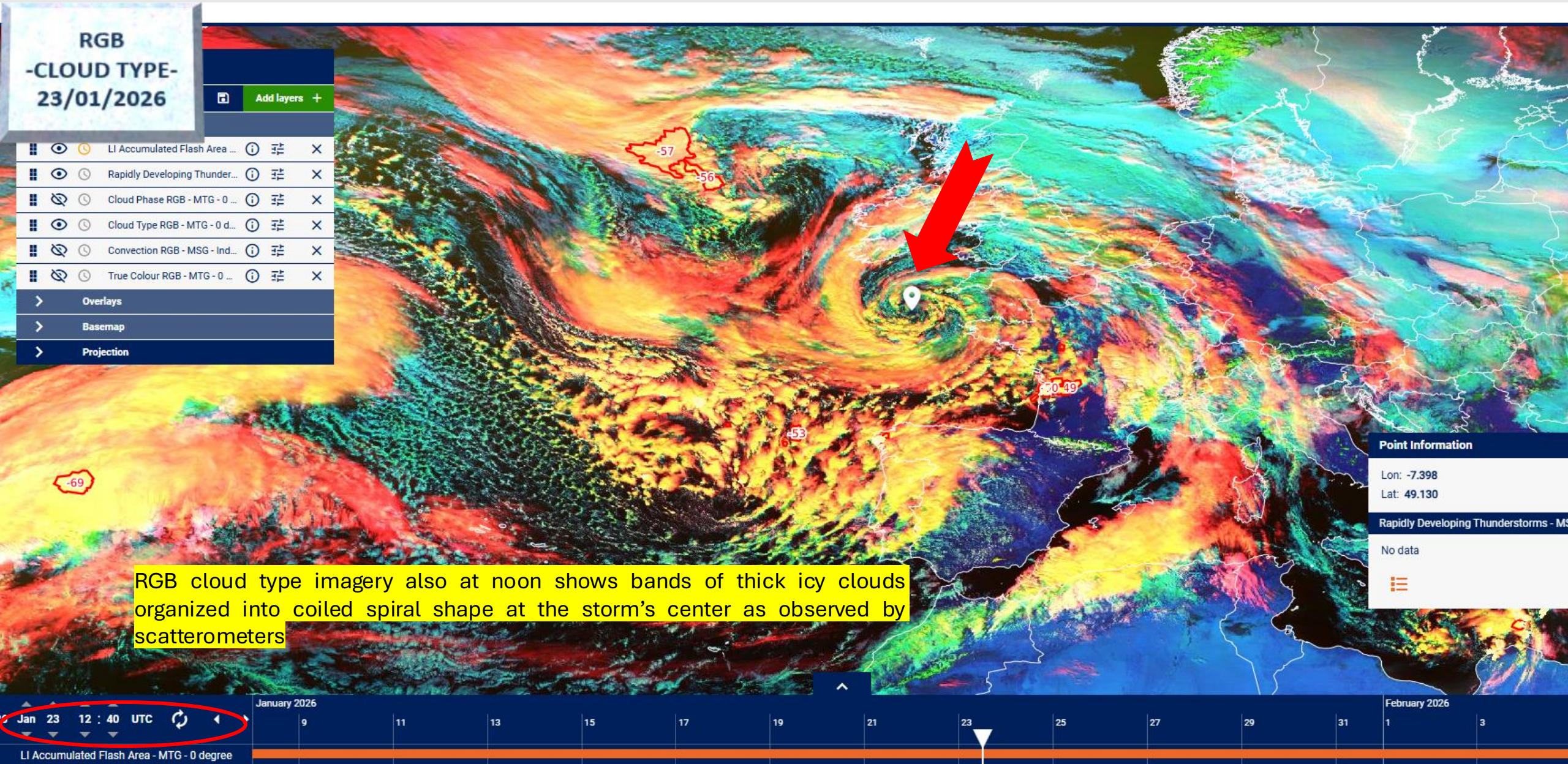


SCATTEROMETER
C-BAND
22/01/2026

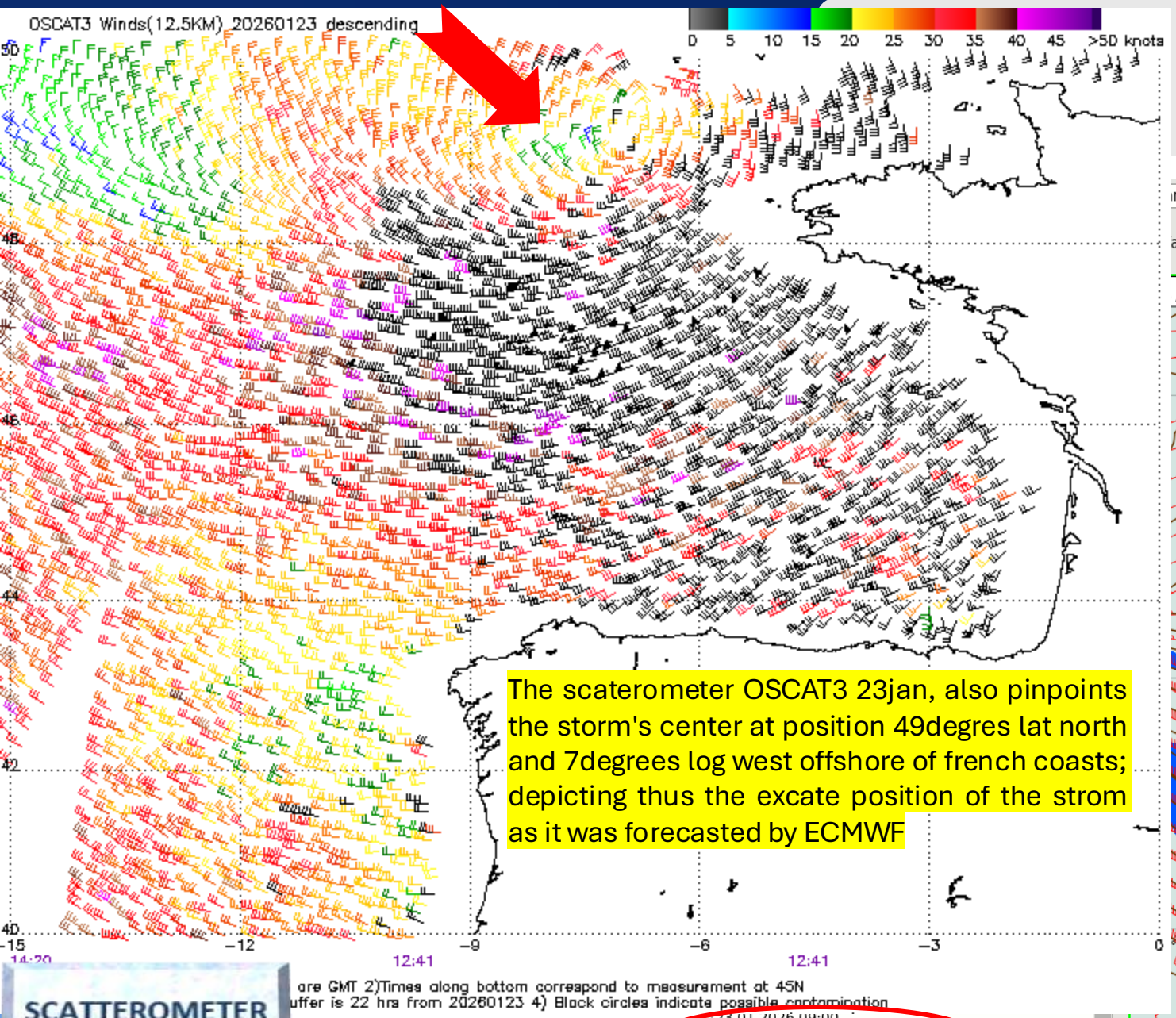




RGB cloud phase imagery of 23jan at noon, outlines swirling spiral structure of icy and highly active convective clouds at the storm's center as observed by scatterometers ==bleu colour for thick ice clouds small particles-



RGB cloud type imagery also at noon shows bands of thick icy clouds organized into coiled spiral shape at the storm's center as observed by scatterometers

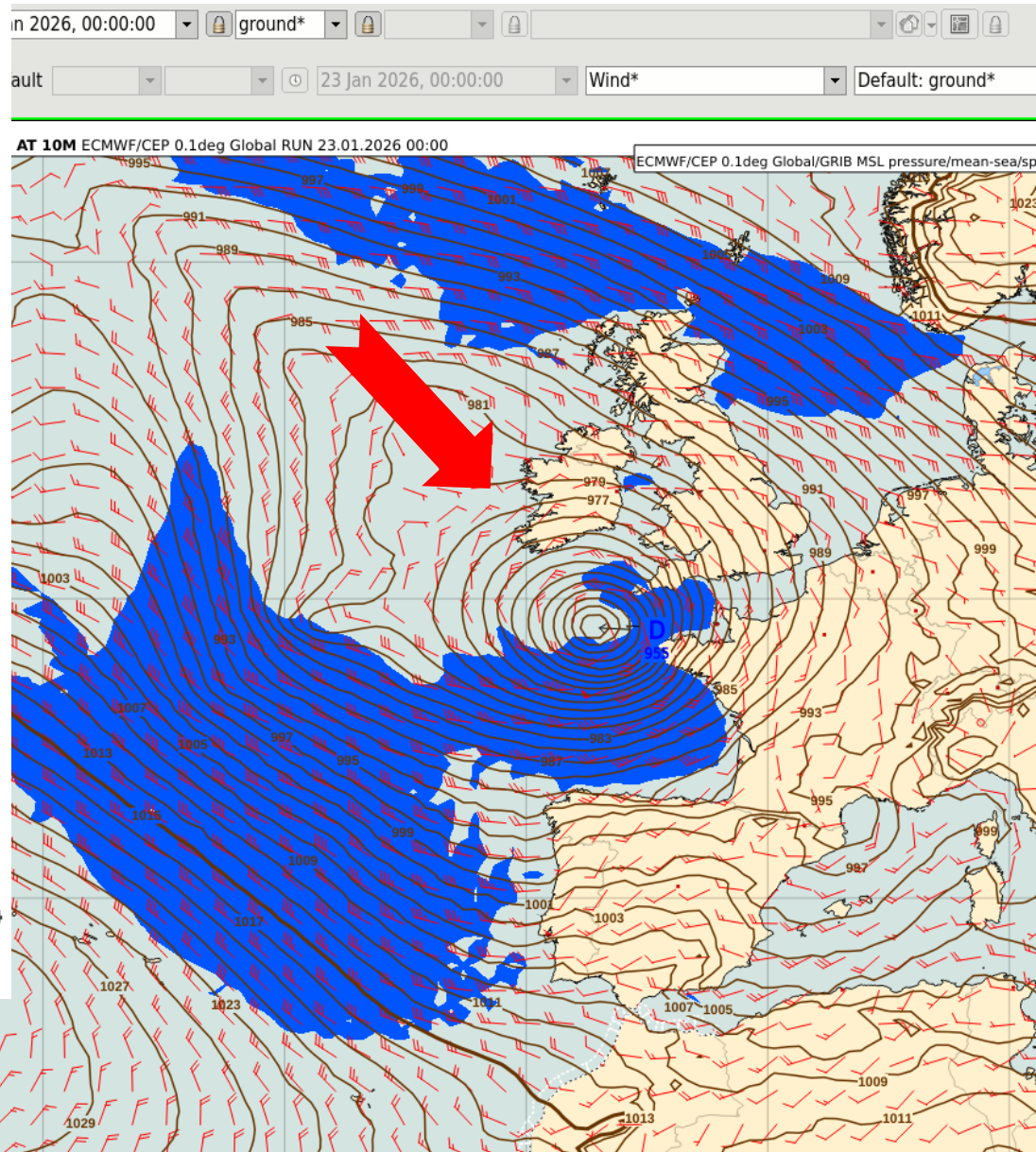


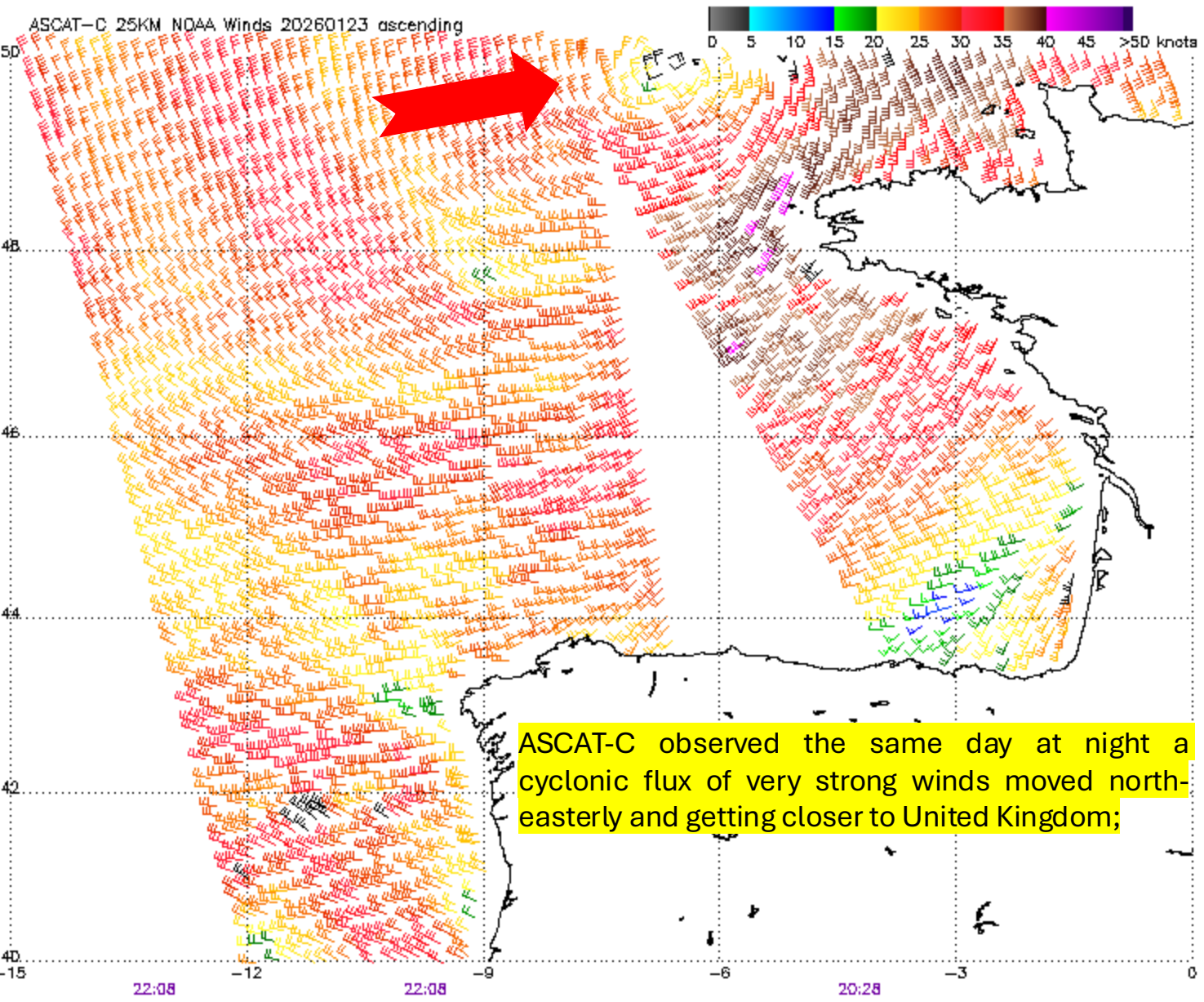
The scaterometer OSCAT3 23jan, also pinpoints the storm's center at position 49degres lat north and 7degrees log west offshore of french coasts; depicting thus the excate position of the strom as it was forecasted by ECMWF

SCATTEROMETER
OSCAT 3
23/01/2026

are GMT 2)Times along bottom correspond to measurement at 45N
uffer is 22 hrs from 20260123 4) Black circles indicate possible contamination

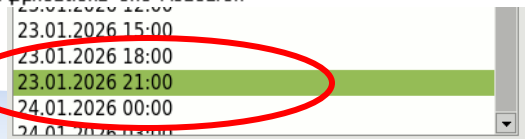
23.01.2026 09:00
23.01.2026 12:00
23.01.2026 15:00
23.01.2026 18:00
23.01.2026 21:00
24.01.2026 00:00
24.01.2026 03:00

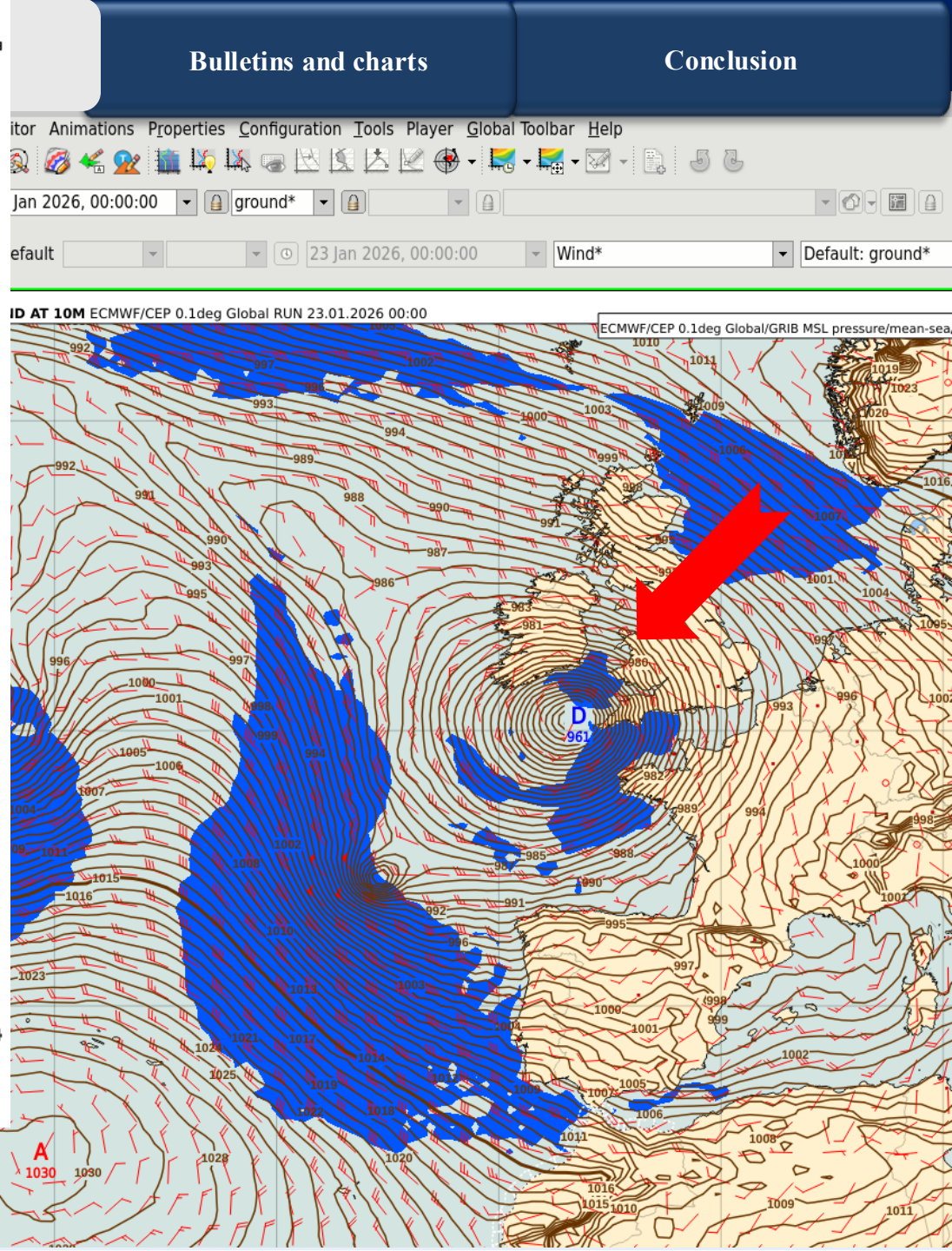


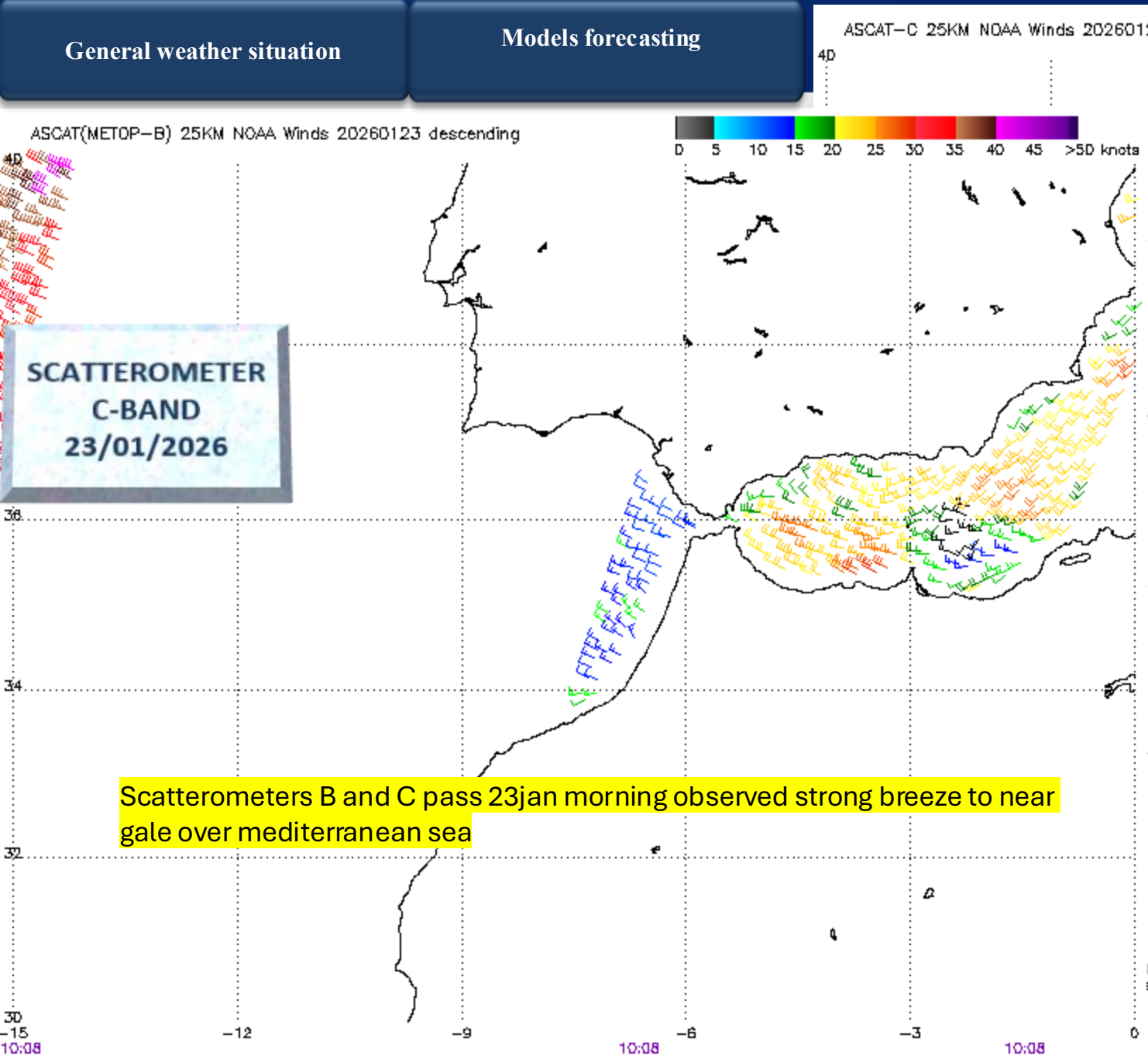


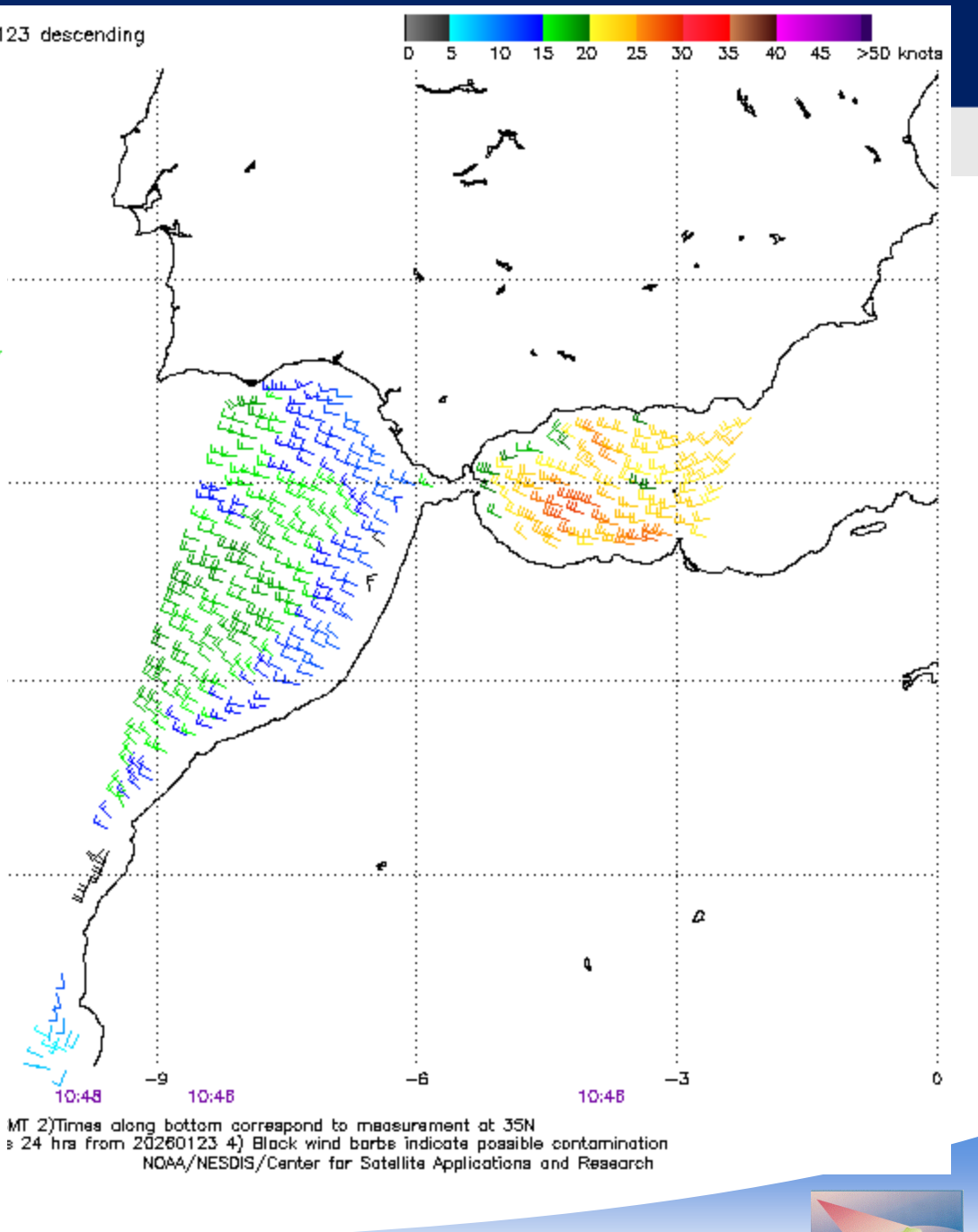
ASCAT-C observed the same day at night a cyclonic flux of very strong winds moved north-easterly and getting closer to United Kingdom;

SCATTEROMETER
C-BAND
23/01/2026

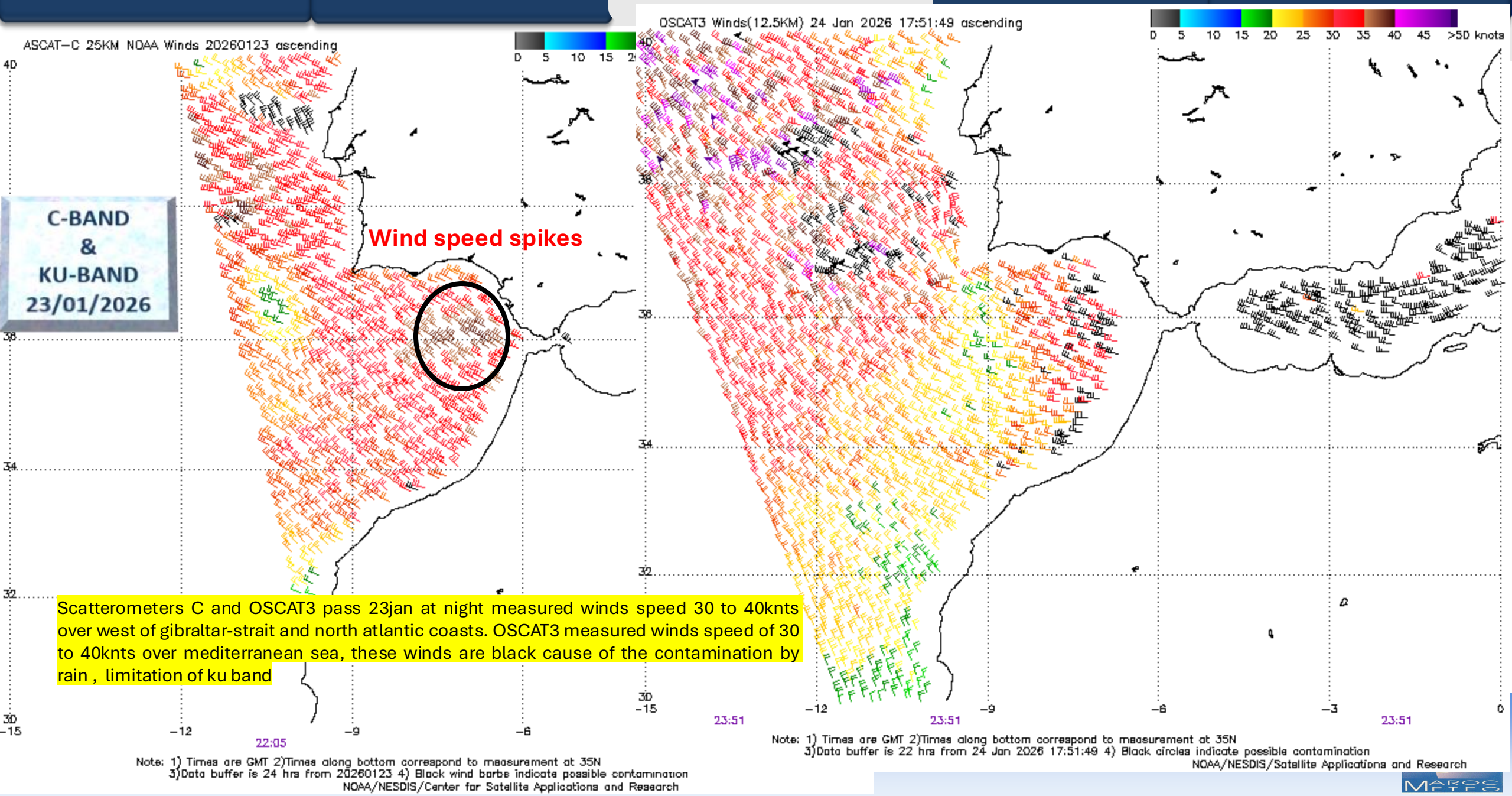




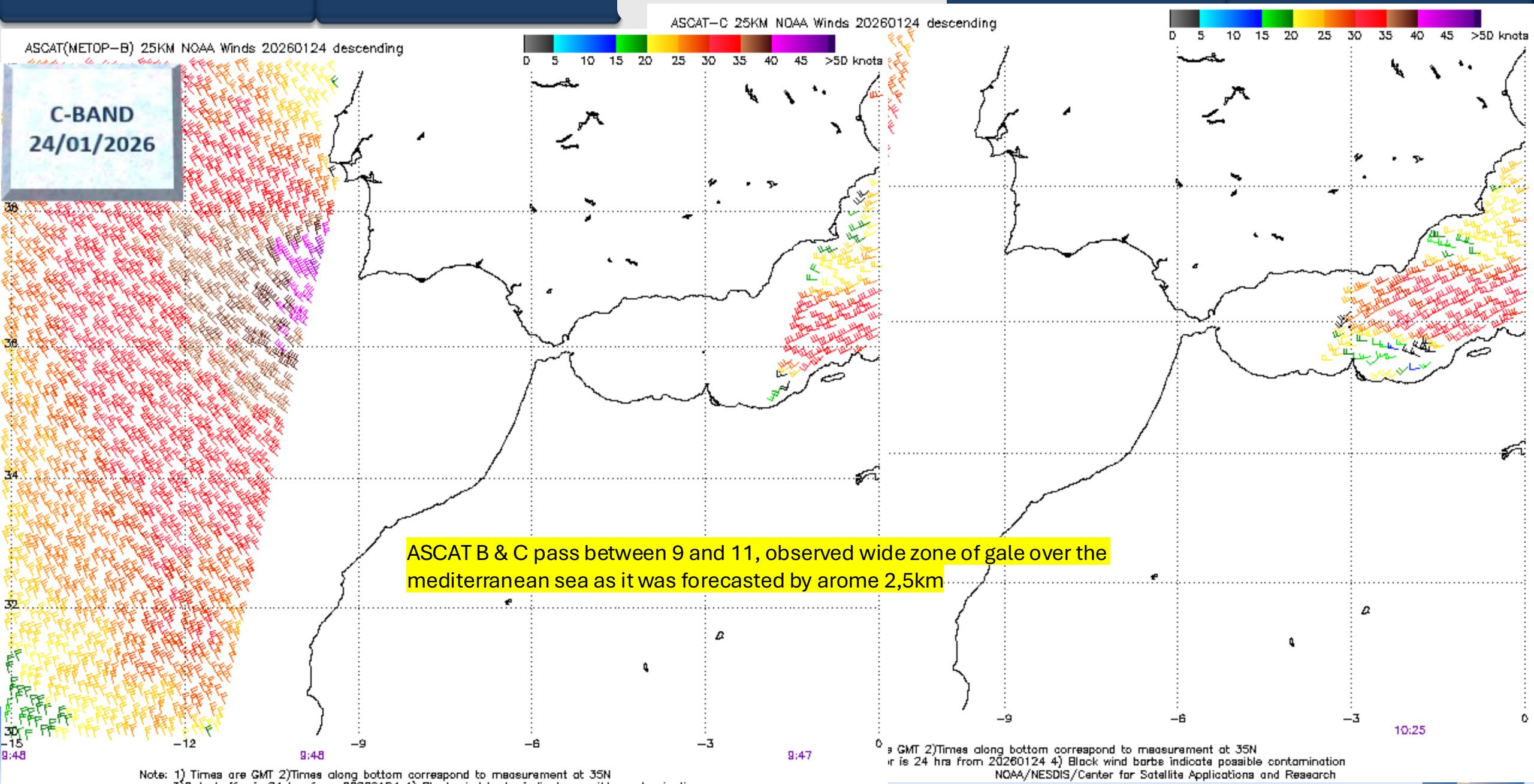




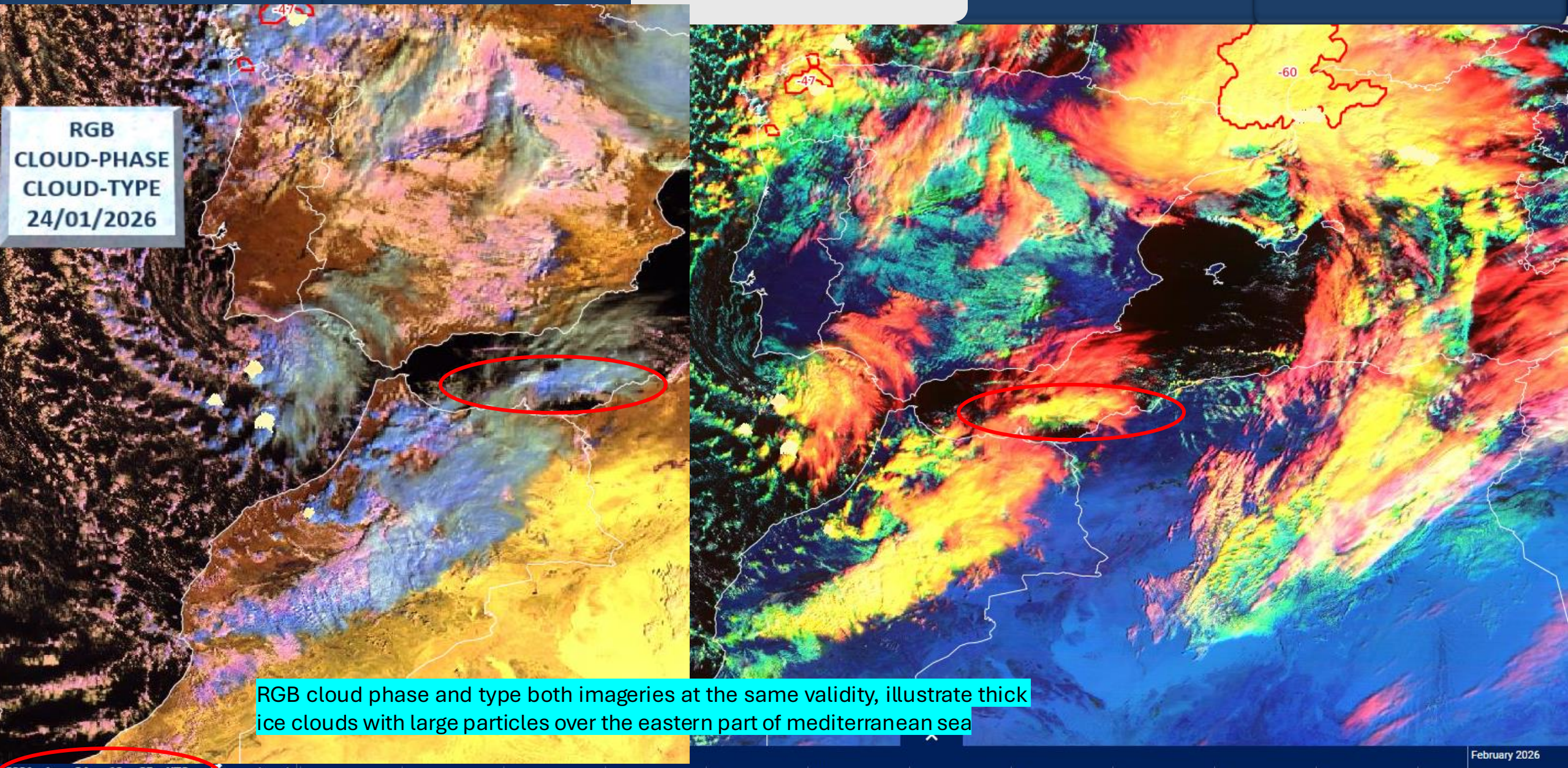
Scatterometers B and C pass 23jan morning observed strong breeze to near gale over mediterranean sea



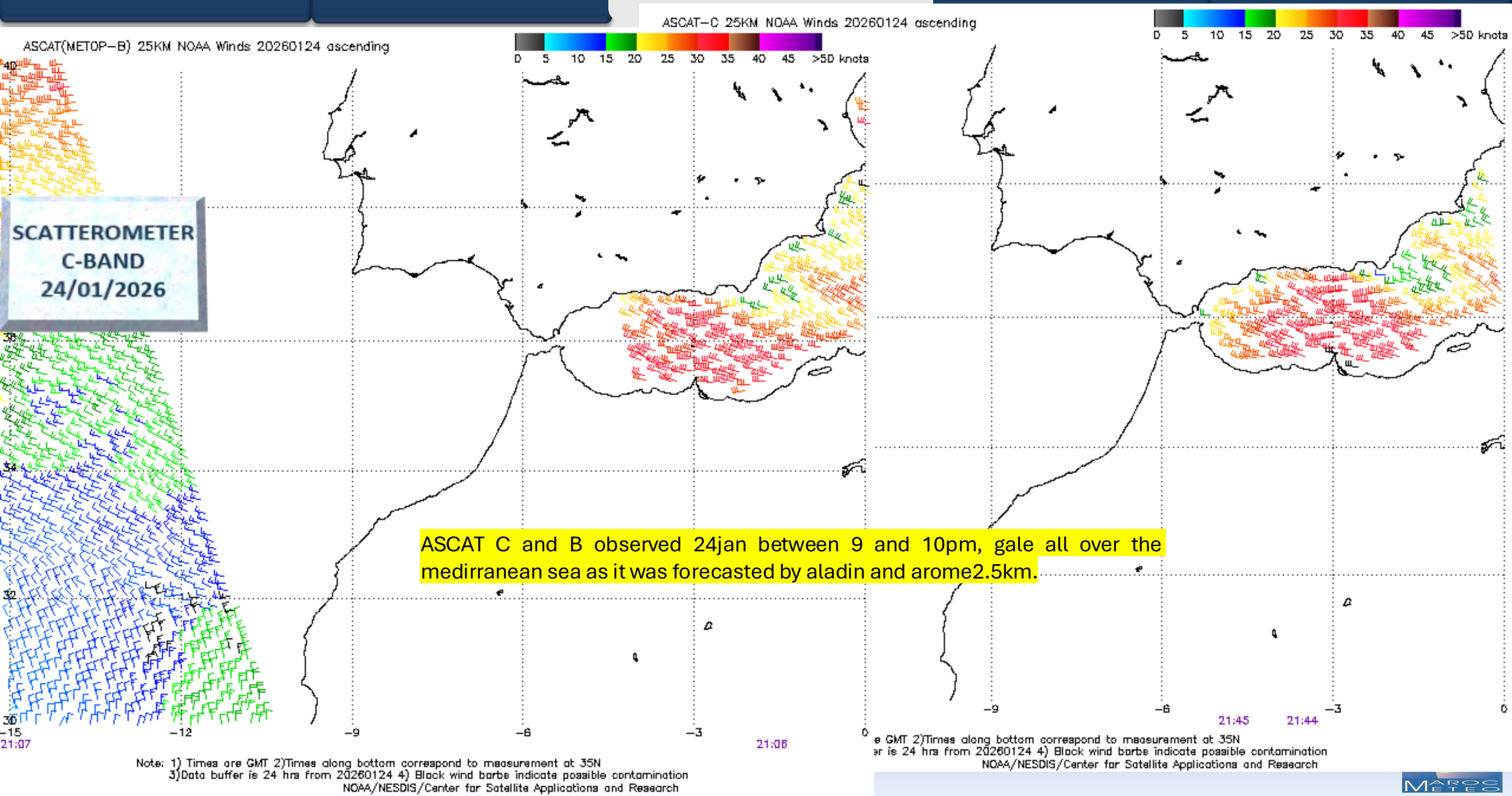
Scatterometers C and OSCAT3 pass 23jan at night measured winds speed 30 to 40knts over west of gibraltar-strait and north atlantic coasts. OSCAT3 measured winds speed of 30 to 40knts over mediterranean sea, these winds are black cause of the contamination by rain , limitation of ku band



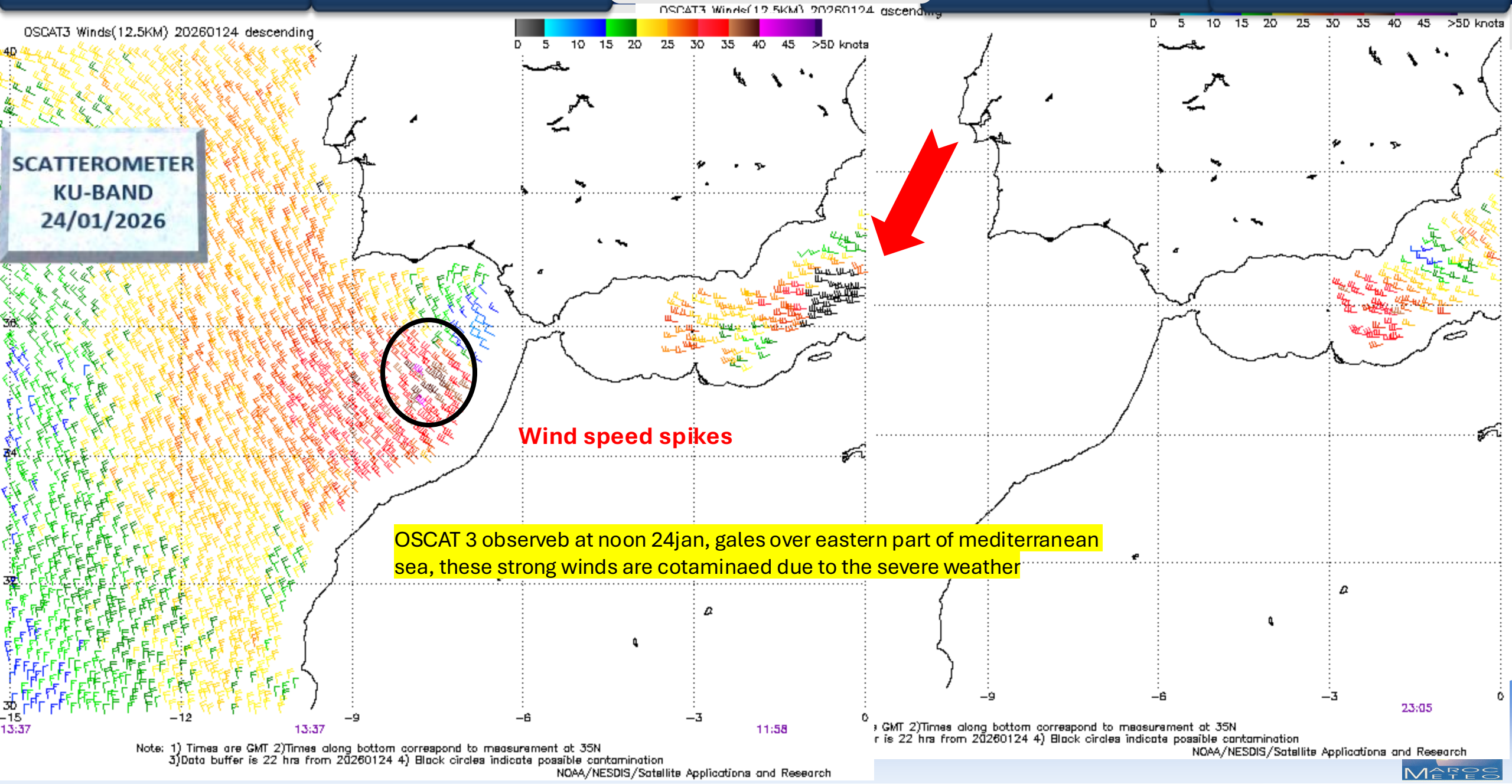
ASCAT B & C pass between 9 and 11, observed wide zone of gale over the mediterranean sea as it was forecasted by arome 2,5km

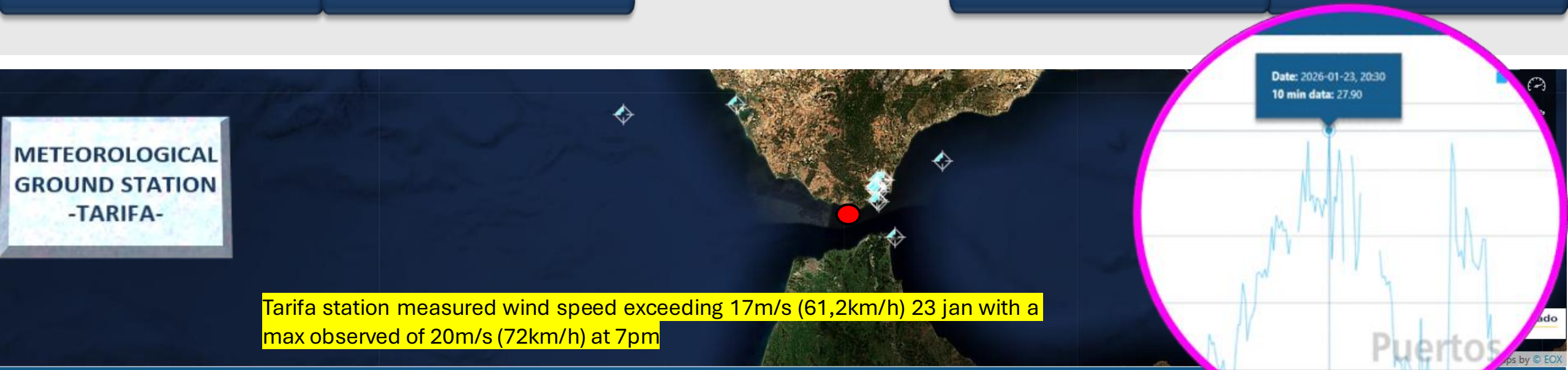


RGB cloud phase and type both imageries at the same validity, illustrate thick ice clouds with large particles over the eastern part of mediterranean sea



ASCAT C and B observed 24jan between 9 and 10pm, gale all over the medirranean sea as it was forecasted by aladin and arome2.5km.


OSCAT3 Winds(12.5KM) 20260124 descending
0 5 10 15 20 25 30 35 40 45 >50 knots
SCATTEROMETER
KU-BAND
24/01/2026
Wind speed spikes
OSCAT 3 observeb at noon 24jan, gales over eastern part of mediterranean sea, these strong winds are cotaminaed due to the severe weather
13:37
11:58
23:05
Note: 1) Times are GMT 2)Times along bottom correspond to measurement at 35N
3)Data buffer is 22 hrs from 20260124 4) Block circles indicate possible contamination
NOAA/NESDIS/Satellite Applications and Research



Tarifa station measured wind speed exceeding 17m/s (61,2km/h) 23 jan with a max observed of 20m/s (72km/h) at 7pm

Historic data for Wind | Tarifa Meteorological Station | Time Series Plots

Time Series Plots

Parameter: Wind Speed

From: 23 Jan 2026 To: 25 Jan 2026

Plot options: 10 min data

Puertos del Estado

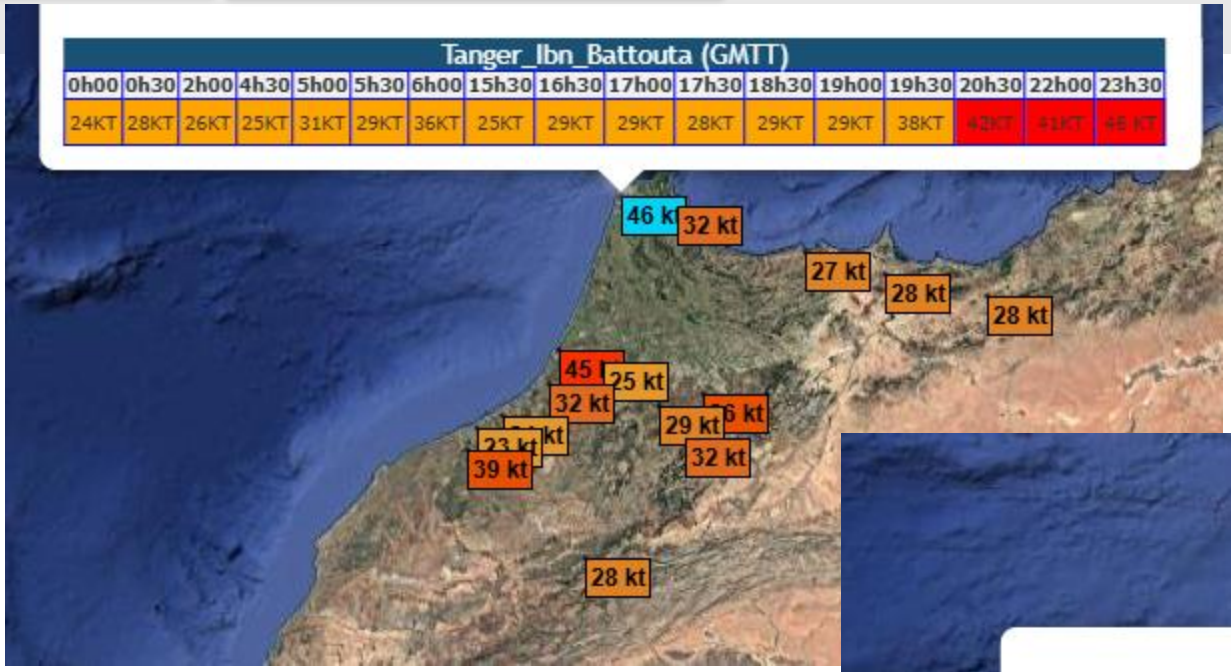
ATTENTION: These data have not undergone rigorous quality checks. Therefore, they should be used carefully

COMMENTS: Atmospheric sensors placed 15 m

CREATE GRAPHIC



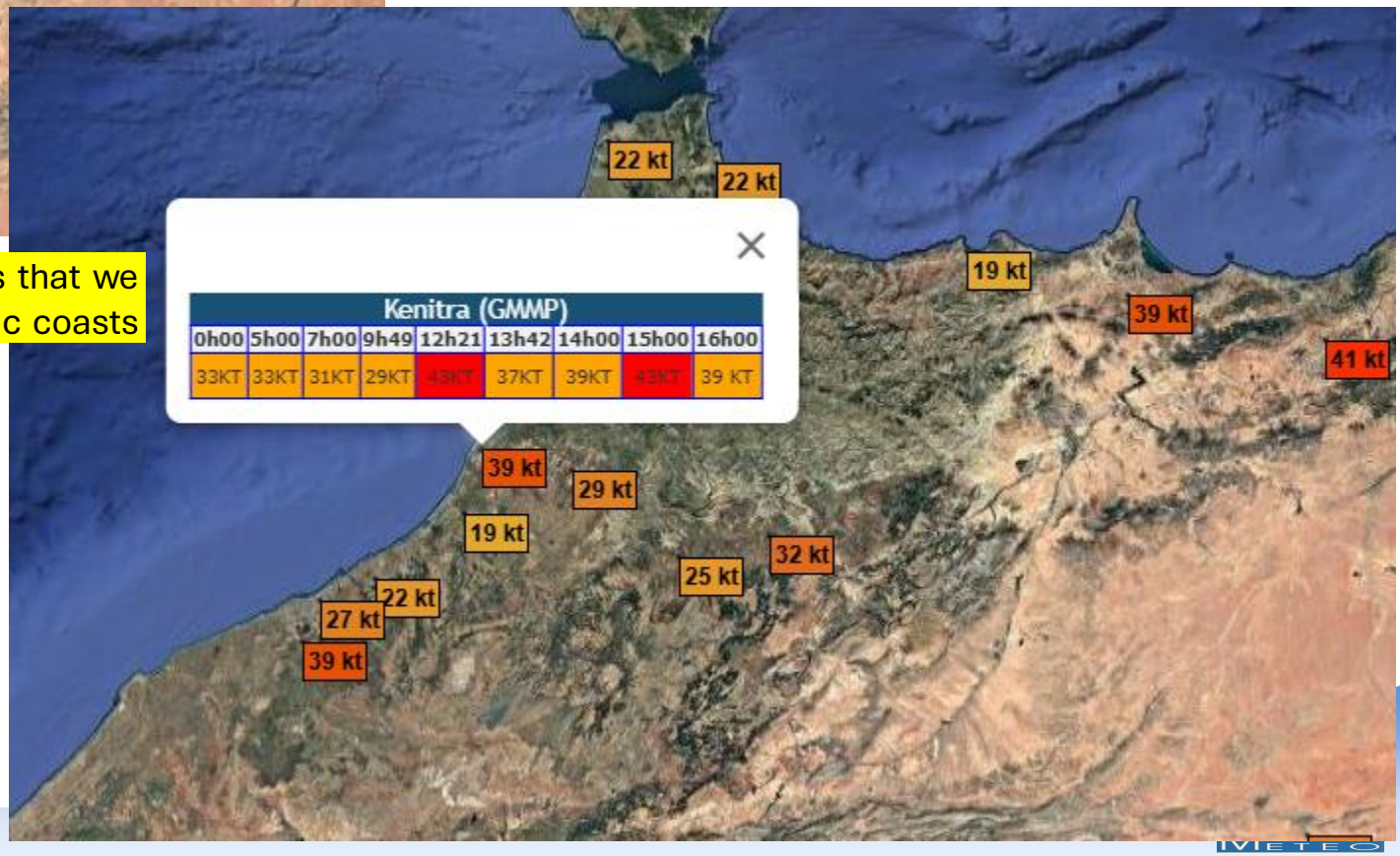
METAR: Wind Gusts

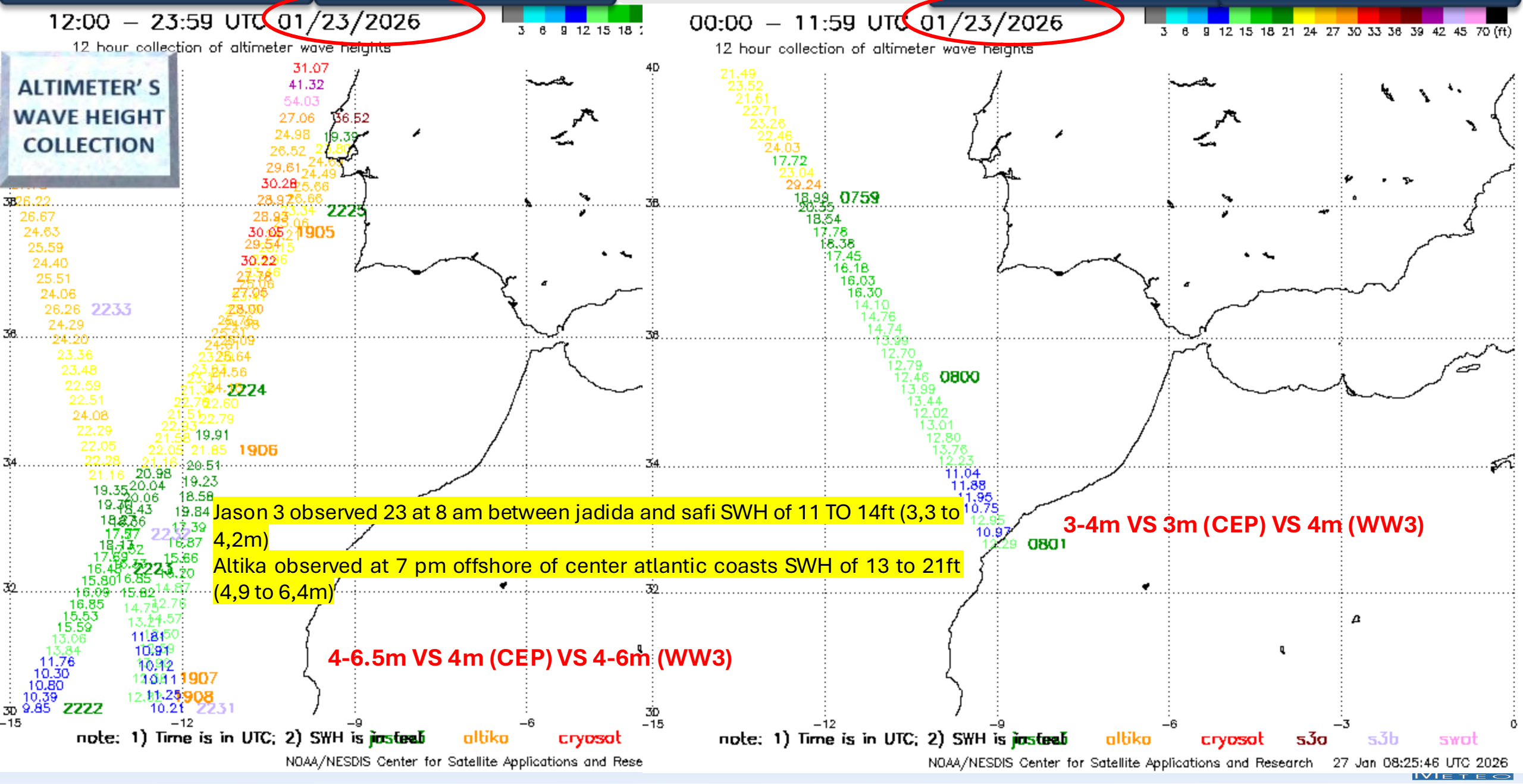


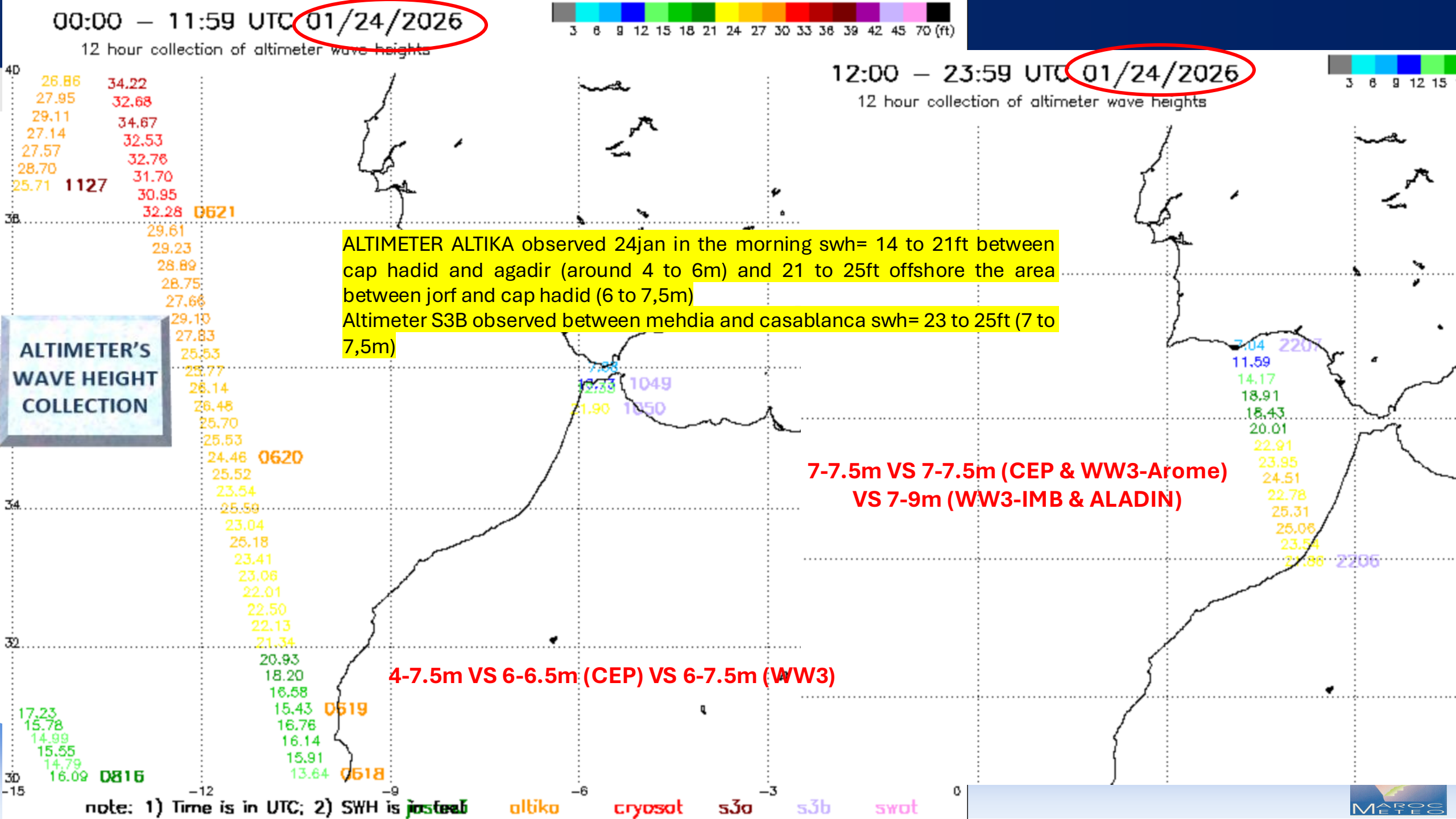
TANGER
23/01/2026

For wind gusts we have METAR observations from DGM, that shows that we had, during the day of 24 jan gusty weather over the northan Atlantic coasts with a max of 45KT in Tangier and Kenitra's stations.

KENITRA
24/01/2026

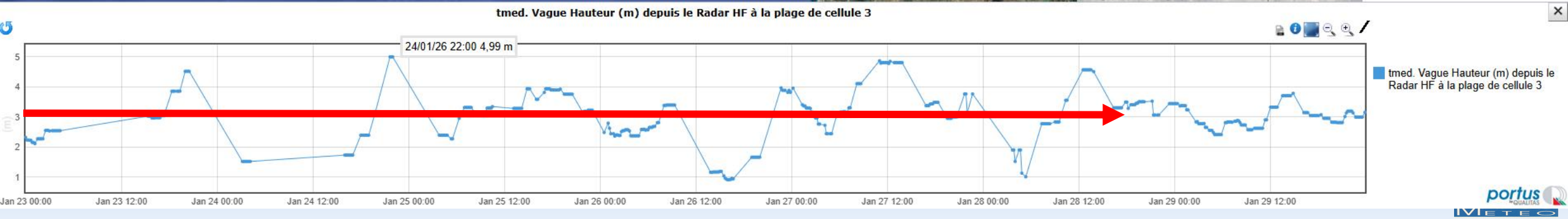


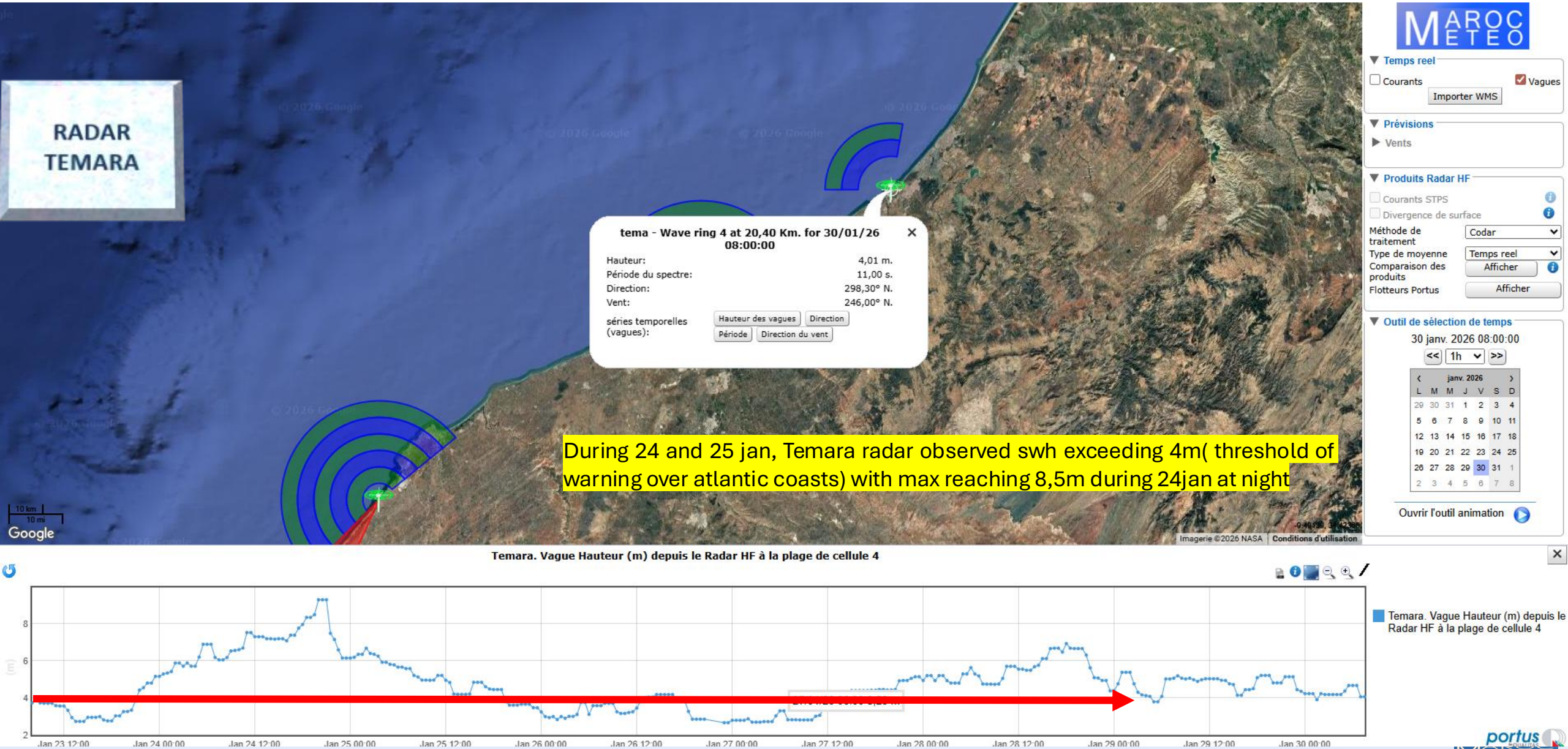

12:00 – 23:59 UTC 01/23/2026
12 hour collection of altimeter wave heights
3 6 9 12 15 18
ALTIMETER' S WAVE HEIGHT COLLECTION
00:00 – 11:59 UTC 01/23/2026
12 hour collection of altimeter wave heights
3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 70 (ft)
Jason 3 observed 23 at 8 am between jadida and safi SWH of 11 TO 14ft (3,3 to 4,2m)
Altika observed at 7 pm offshore of center atlantic coasts SWH of 13 to 21ft (4,9 to 6,4m)
4-6.5m VS 4m (CEP) VS 4-6m (WW3)
3-4m VS 3m (CEP) VS 4m (WW3)
note: 1) Time is in UTC; 2) SWH is jastech altika cryosat
note: 1) Time is in UTC; 2) SWH is jastech altika cryosat s3a s3b swot
NOAA/NESDIS Center for Satellite Applications and Rese
NOAA/NESDIS Center for Satellite Applications and Research 27 Jan 08:25:46 UTC 2026


00:00 – 11:59 UTC 01/24/2026
12 hour collection of altimeter wave heights
3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 70 (ft)
12:00 – 23:59 UTC 01/24/2026
12 hour collection of altimeter wave heights
3 6 9 12 15
ALTIMETER ALTIKA observed 24jan in the morning swh= 14 to 21ft between cap hadid and agadir (around 4 to 6m) and 21 to 25ft offshore the area between jorf and cap hadid (6 to 7,5m)
Altimeter S3B observed between mehdia and casablanca swh= 23 to 25ft (7 to 7,5m)
ALTIMETER'S WAVE HEIGHT COLLECTION
7-7.5m VS 7-7.5m (CEP & WW3-Arome)
VS 7-9m (WW3-IMB & ALADIN)
4-7.5m VS 6-6.5m (CEP) VS 6-7.5m (WW3)
note: 1) Time is in UTC; 2) SWH is
altika
cryosat
s3a
s3b
swot



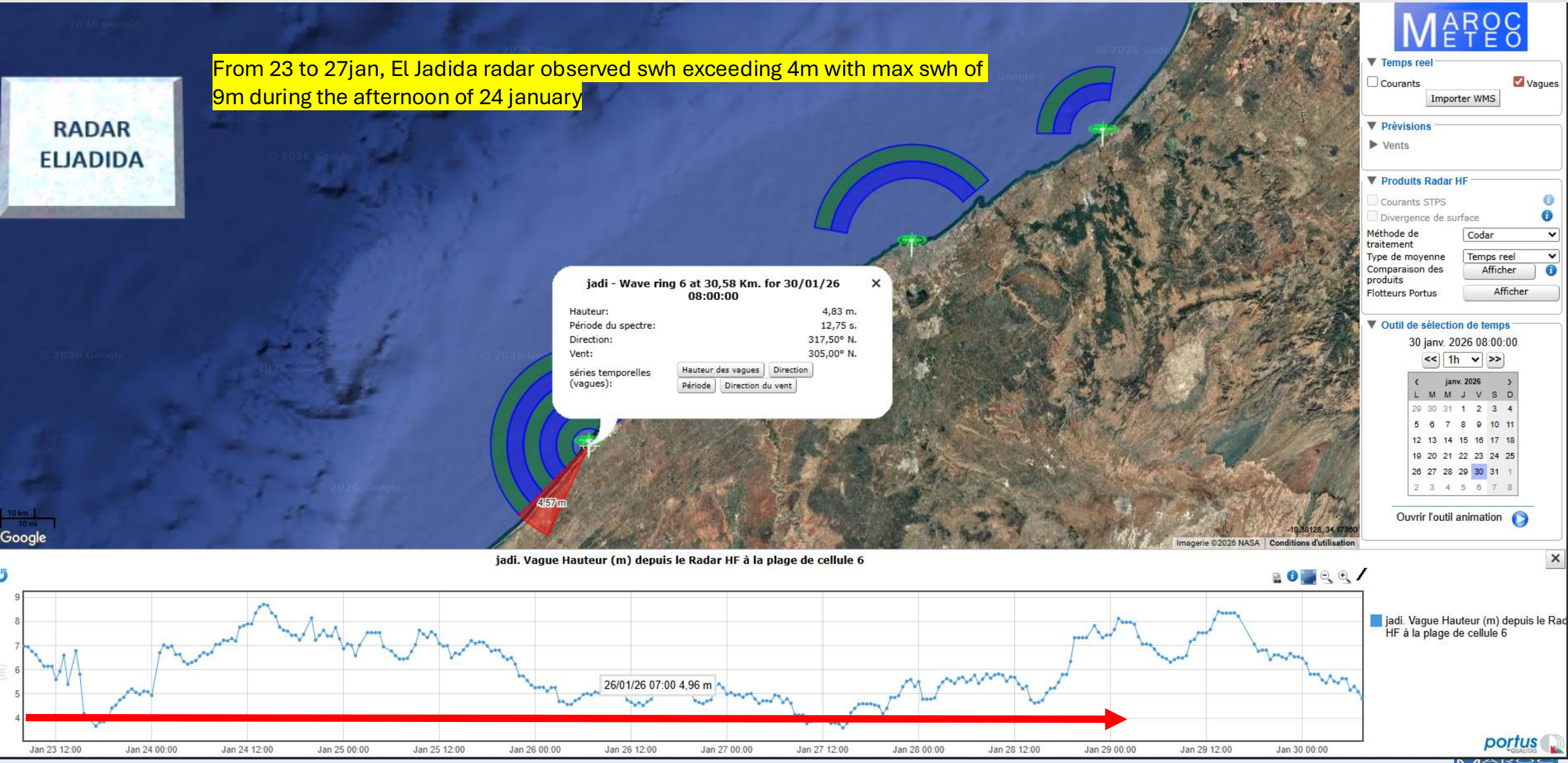
From 23 to 25 jan, Tanger-med radar measured swh exceeding 3m (threshold of warning over there) with a maxi reaching 5m




RADAR
TEMARA
tema - Wave ring 4 at 20,40 Km. for 30/01/26 08:00:00
Hauteur: 4,01 m.
Période du spectre: 11,00 s.
Direction: 298,30° N.
Vent: 246,00° N.
séries temporelles (vagues):
Hauteur des vagues
Direction
Période
Direction du vent
During 24 and 25 jan, Temara radar observed swh exceeding 4m(threshold of warning over atlantic coasts) with max reaching 8,5m during 24jan at night
MAROC METEO
Temps reel
Courants
Vagues
Importer WMS
Prévisions
Vents
Produits Radar HF
Courants STPS
Divergence de surface
Méthode de traitement
Codar
Type de moyenne
Temps reel
Comparaison des produits
Afficher
Flotteurs Portus
Afficher
Outil de sélection de temps
30 janv. 2026 08:00:00
1h
janv. 2026
Ouvrir l'outil animation
Google
Imagerie ©2026 NASA
Conditions d'utilisation

Temara. Vague Hauteur (m) depuis le Radar HF à la plage de cellule 4
Temara. Vague Hauteur (m) depuis le Radar HF à la plage de cellule 4
Jan 23 12:00
Jan 24 00:00
Jan 24 12:00
Jan 25 00:00
Jan 25 12:00
Jan 26 00:00
Jan 26 12:00
Jan 27 00:00
Jan 27 12:00
Jan 28 00:00
Jan 28 12:00
Jan 29 00:00
Jan 29 12:00
Jan 30 00:00

From 23 to 27jan, El Jadida radar observed swh exceeding 4m with max swh of 9m during the afternoon of 24 january



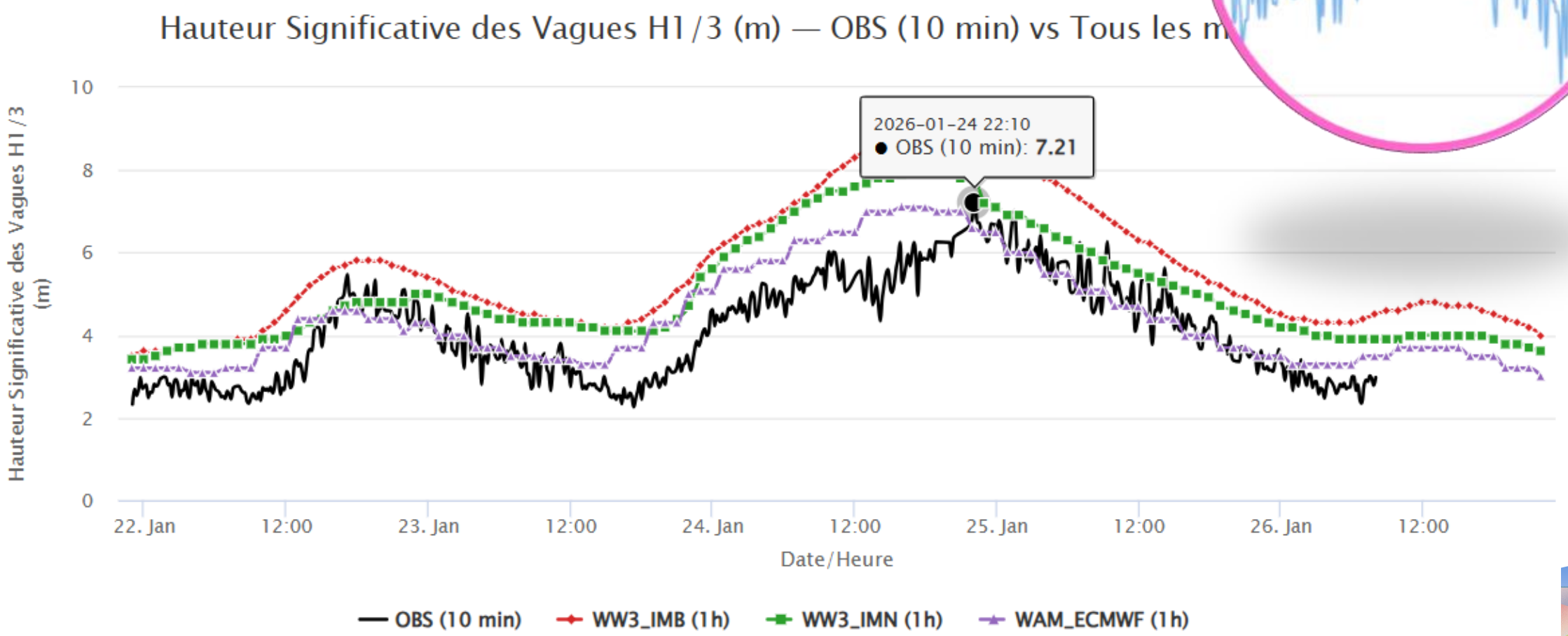
BUOY

Tous les modèles | Casablanca | Hauteur Significative des Vagues H1/3 | De : 22-01-2026 | A : 26-01 | Visualiser

Comparaison OBS (10 min) / Tous les modèles (1h) pour Hauteur Significati
des Vagues H1/3 (m) au port **Casablanca**
entre 22-01-2026 et 26-01-2026

Casablanca buoy observed during 24 and 25 jan swh beteween 4 and 7m, the maximum wave height recorded is 12m



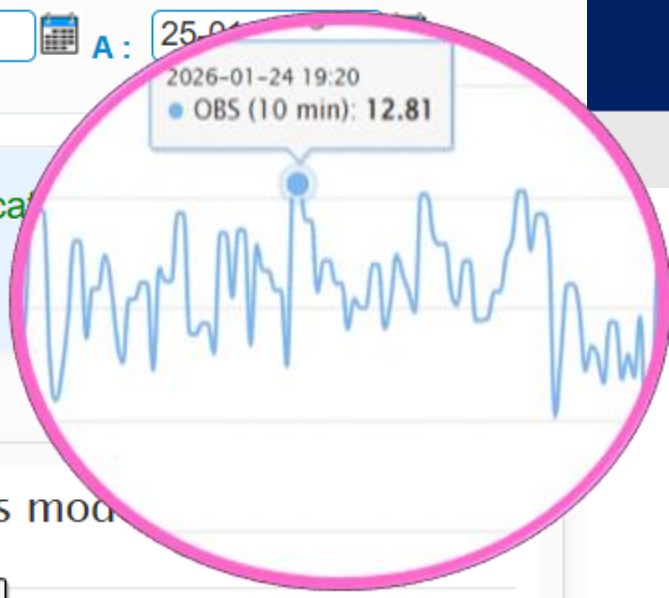


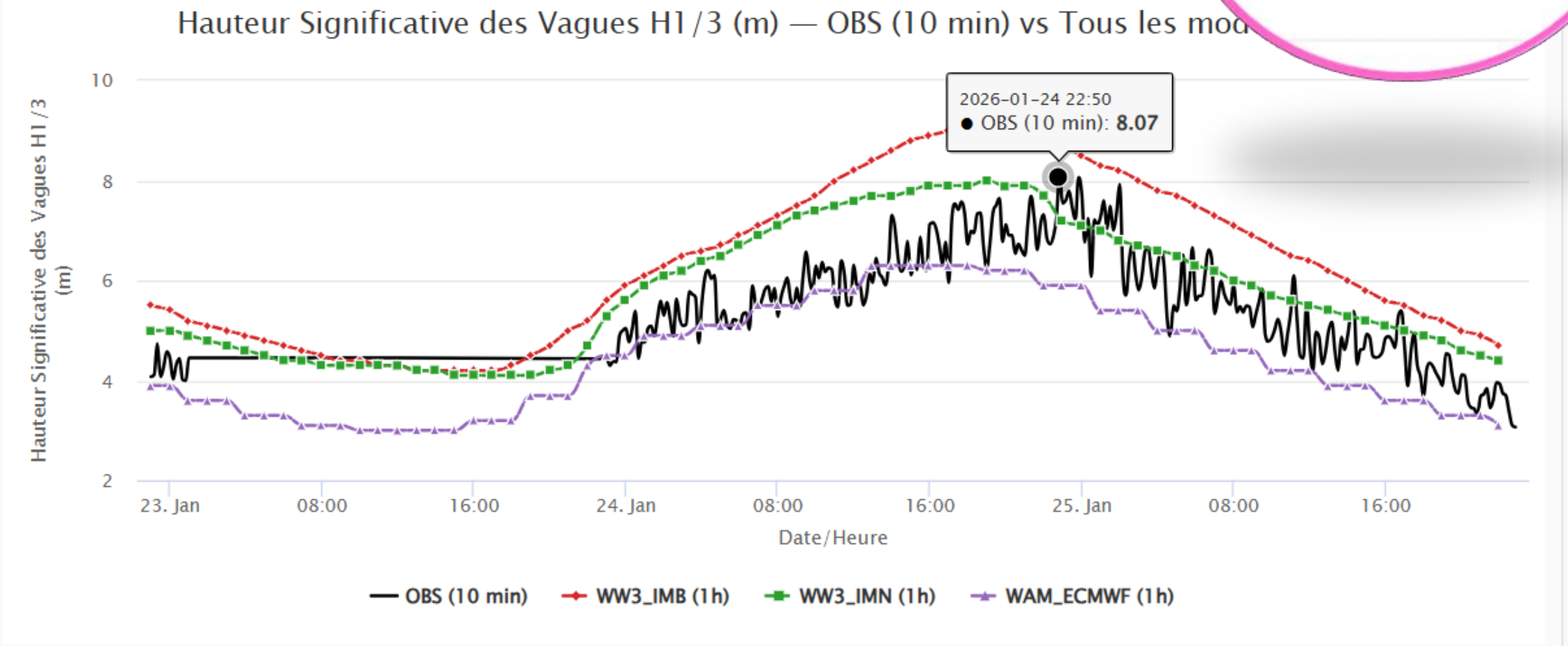
BUOY

mohammedia buoy observed during 24 and 25 jan swh beteween 4 and 8m, the maximum wave height recorded is 13m

Tous les modèles | Mohammedia | Hauteur Significative des Vagues H1/3 | De : 23-01-2026 | A : 25-01-2026 | Visualiser

Comparaison OBS (10 min) / Tous les modèles (1h) pour Hauteur Significative des Vagues H1/3 (m) au port **Mohammedia**
entre 23-01-2026 et 25-01-2026



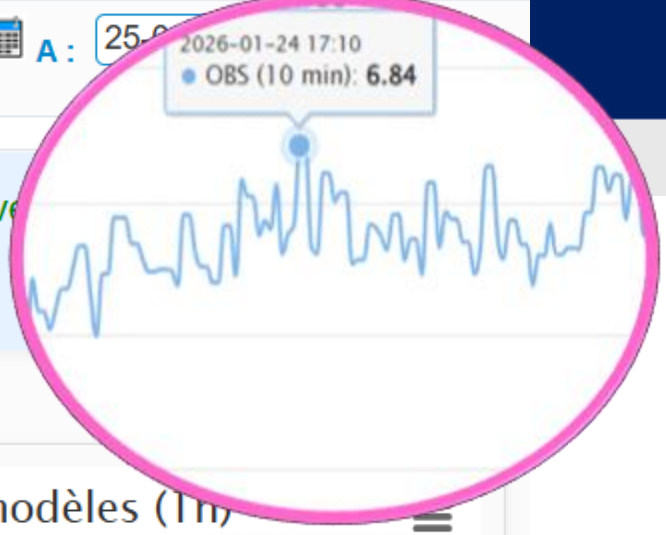


BUOY

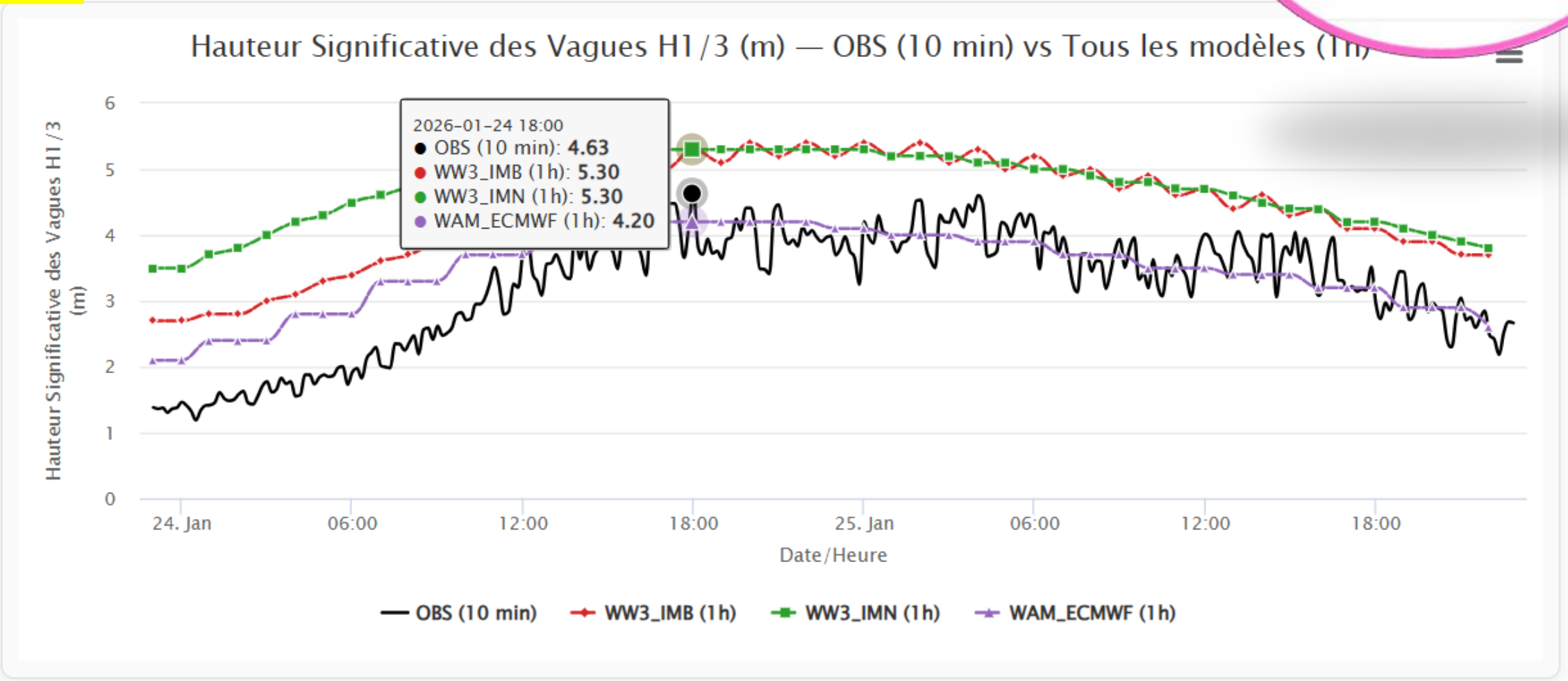
Tous les modèles | Agadir | Hauteur Significative des Vagues H1/3 | De : 24-01-2026 | A : 25-0

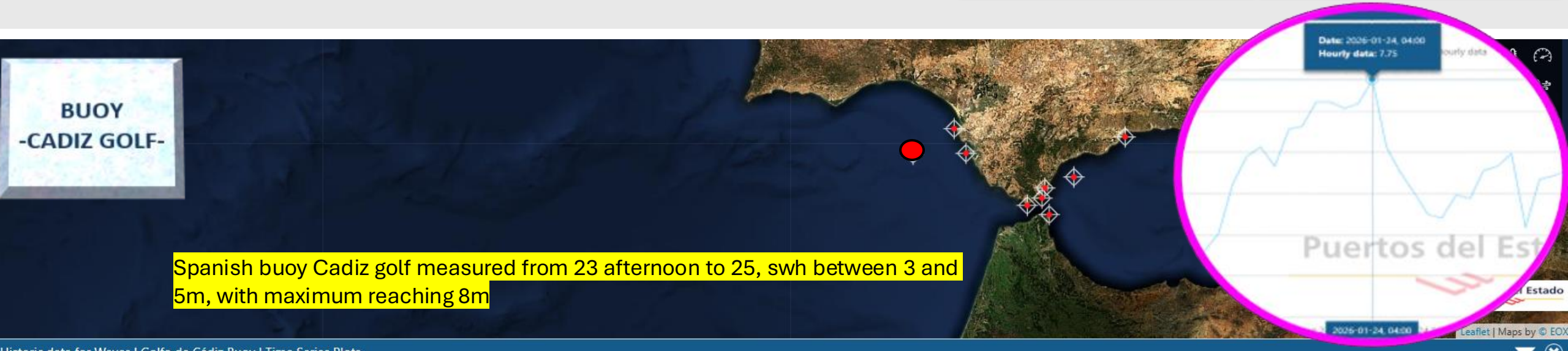
Visualiser

Comparaison OBS (10 min) / Tous les modèles (1h) pour Hauteur Significative des Vagues H1/3 (m) au port **Agadir**
entre 24-01-2026 et 25-01-2026



Agadir buoy observed during 24 and 25 jan swh beteween 4 and 5m, the maximum wave height recorded is 7m





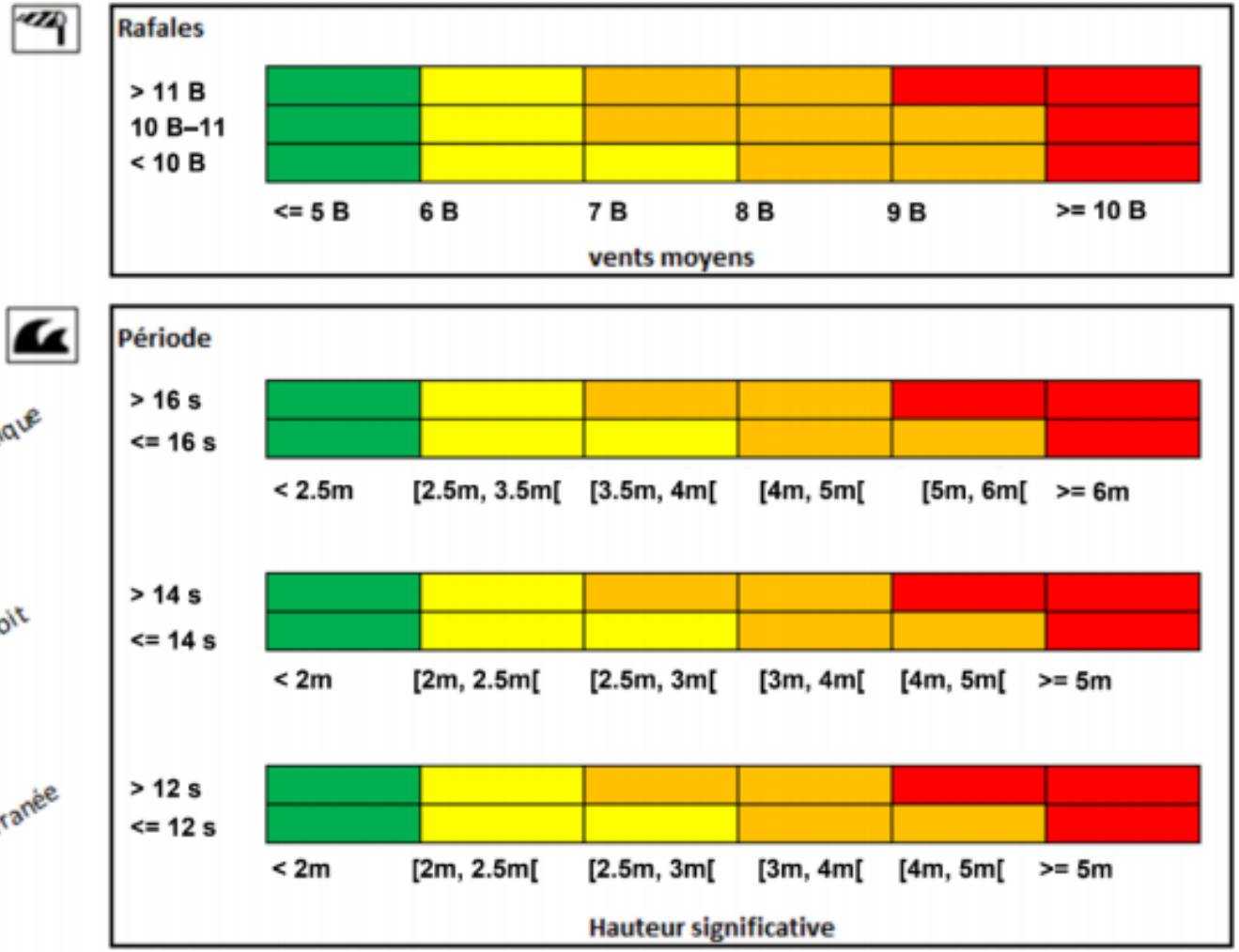
Spanish buoy Cadiz golf measured from 23 afternoon to 25, swh between 3 and 5m, with maximum reaching 8m



WEATHER WARNINGS: BULLETINS & CHARTS



MARINE WARNING THRESHOLDS



Marine warning thresholds represented here by orange and red color on the vigilance charts:

ORANGE: For wind, we issue warning if wind speed reach 8b, or (wind speed 7b with gust reach 10B)

RED: for wind, warning essued if wind speed reach 10b, or (wind speed 9b with gust reach 12B)

For waves depends on where it will hit,

On atlantic coasts we issue orange warning if swh reach 4m or (swh reach 3,5m with periods reaching 16s) and for red warning (swh=6m or 5m with periods reaching 17s)

On gibraltar-strait and mediterranean sea, we issue warning if swh reach 3m or (swh reach 2,5 with periods reaching 14s on Giblraltar strait and 12s on mediterranean sea)

oyaume du Maroc

Ministère de
Équipement et de l'Eau

وزارة التجهيز و الماء

MEDUIM-RANGE WEATHER FORECATING

EN-R-05-00-2A3

PREVISION METEOROLOGIQUE MOYENNE ECHEANCE MARITIMES.
ETABLIE LE DIMANCHE 18 JANVIER 2026

N.B : *Vitesse du vent moyen en échelle Beaufort. Etat de la mer en hauteur significative totale Hs. HS est la moyenne du tiers des vagues les plus hautes, la hauteur maximale peut atteindre le double de Hs.*

BMS N°10.

DU LUNDI AU JEUDI : VENTS ASSEZ FORTS A FORTS ET VAGUES DANGEREUSES SUR LA MEDITERRANEE, LES COTES ATLANTIQUES NORD ET CENTRES.

FLUX DE SECTEUR OUEST MODERE A ASSEZ FORT PARFOIS FORT SUR LA MEDITERRANEE ET SUR LE DETROIT. DE SECTEUR NORD A NORD-OUEST FAIBLE A MODERE SUR LES COTES ATLANTIQUES AU NORD DE SAFI, DEVENANT MODERE A ASSEZ FORT PARFOIS FORT MARDI. DE SECTEUR NORD A NORD-EST MODERE A ASSEZ FORT AU SUD DE SAFI, DEVENANT DE SUD-OUEST A NORD-OUEST FAIBLE A MODERE MERCREDI AU NORD DE TARFAYA.

MER BELLE A PEU AGITEE SUR LA MEDITERRANEE, DEVENANT PEU AGITEE A AGITEE LOCALEMENT FORTE LUNDI APRES-MIDI. PEU AGITEE A AGITEE SUR LE DETROIT. AGITEE A FORTE SUR LES COTES ATLANTIQUES AU NORD DE TARFAYA PARFOIS LOCALEMENT FORTE A TRES FORTE EN DEBUT ET FIN DE VALIDITE. AGITEE A FORTE DEVENANT PEU AGITEE A AGITEE MERCREDI AU SUD.

VISIBILITE REDUITE SOUS PLUIES SUR LES COTES MAROCAINES ENTRE SAIDIA ET CAP GHIR.

DU VENDREDI AU DIMANCHE : VENTS ASSEZ FORTS A FORTS ET VAGUES DANGEREUSES SUR LA MEDITERRANEE ET LES COTES ATLANTIQUES NORD ET CENTRES.

FLUX DE SECTEUR OUEST MODERE A ASSEZ FORT DEVENANT ASSEZ FORT A FORT SAMEDI SUR LA MEDITERRANEE ET SUR LE DETROIT. DE SECTEUR SUD-OUEST A NORD-OUEST ASSEZ FORT A FORT SUR LES COTES ATLANTIQUES NORD ET CENTRES. DE SECTEUR NORD-OUEST A NORD-EST FAIBLE A MODERE PARFOIS ASSEZ FORT SUR LES COTES SUD.

MER PEU AGITEE A AGITEE DEVENANT AGITEE A FORTE PARFOIS TRES FORTE SAMEDI SUR LA MEDITERRANEE ET SUR LE DETROIT. FORTE A TRES FORTE PARFOIS GROSSE SUR LES COTES ATLANTIQUES AU NORD DE TARFAYA. PEU AGITEE A AGITEE DEVENANT AGITEE A FORTE DIMANCHE AU SUD.

VISIBILITE REDUITE SOUS PLUIES SUR LES COTES MAROCAINES ENTRE SAIDIA ET CAP GHIR.

For the meduim range weather forecasting 5 days before the event, We announced in the bulletin, strong winds and dangerous waves will hit Gibraltar's Strait, mediterranean sea and north and center atlantic coasts.

MARINE WEATHER ALERTS

COMMUNIQUE METEOROLOGIE MARITIME N°1

LE MERCREDI 21/01/2026 A 10H45TU

VAGUES DANGEREUSES DE 6M A 8M SUR LES COTES ATLANTIQUES NORD ET CENTRE, 4M A 6M SUR LE DETROIT ET 3M A 5M SUR L'EST DE LA MEDITERRANEE

ATTENTION : *La vitesse moyenne du vent est donnée en échelle Beaufort. Les rafales peuvent dépasser le vent moyen de 40%. L'état de la mer est donné en hauteur significative totale, elle correspond à la moyenne du tiers des vagues les plus hautes. La hauteur maximale des vagues individuelles peut aller jusqu'au double de la hauteur significative.*

A PARTIR DE L'APRES-MIDI DU VENDREDI 23 JANVIER 2026, DES VAGUES DANGEREUSES DE DIRECTION OUEST A NORD-OUEST INTERESSERONT LES COTES ATLANTIQUES ENTRE TANGER ET AGADIR AVEC DES HAUTEURS SIGNIFICATIVES DE 6.0M A 8.0M ET DES PERIODES DE 12 A 14 SECONDES, LE DETROIT AVEC DES HAUTEURS SIGNIFIVATIVES DE 4.0M A 6.0M, ET LES COTES MEDITERANEENNES ENTRE ELJEBHA ET SAIDIA AVEC DES HAUTEURS SIGNIFICATIVES DE 3.0M A 5.0M. LES HAUTEURS LES PLUS ELEVEES SONT PREVUES LA JOURNEE DU SAMEDI 24 JANVIER 2026.

IL EST A SIGNALER QUE LES MAREES HAUTES SUR LES COTES ATLANTIQUES OSCILLERONT ENTRE 3.00M ET 3.80M LE VENDREDI 23 JANVIER 2026 ET LE SAMEDI 24 JANVIER 2026 ENTRE 04H30 ET 05H30 TOT LE MATIN ET ENTRE 17H00 ET 18H00 L'APRES-MIDI.

DES COUPS DE VENTS A FORTS COUPS DE VENTS DE DIRECTION OUEST SOUFFLERONT AUSSI A PARTIR DE L'APRES-MIDI DU VENDREDI 23 JANVIER 2026 SUR LES COTES ATLANTIQUES ENTRE TANGER ET SAFI, LE DETROIT ET LES COTES MEDITERRANEENNES.

L'AMELIORATION EST PREVUE A PARTIR DE L'APRES-MIDI DU DIMANCHE 25 JANVIER 2026.

DES DETAILS SUPPLEMENTAIRES FERONT L'OBJET DES PROCHAINS BULLETINS METEOROLOGIQUES D'ALERTES.

3 days before the upcoming storm, we issued this weather warning report « Communiqué » –in case of red warning, to alert the general public via the media, and also allow authorities to have time to prepare for the extreme upcoming event.

SPECIAL WEATHER STATEMENT « BMS»

Royaume du Maroc
Ministère de l'Équipement et de l'Eau

المملكة المغربية
وزارة التجهيز و الماء

EN-R-05-00-01

BULLETIN D'ALERTE METEOROLOGIQUE MARINE N°16/2026
ANNULE ET REMPLACE L'ALERTE N°15/2026

ETABLI LE VENDREDI 23 JANVIER 2026 A 11H40 GMT

ATTENTION : *LA VITESSE MOYENNE DU VENT EST DONNEE EN ECHELLE BEAUFORT. LES RAFALES PEUVENT DEPASSER LE VENT MOYEN DE 40%. L'ETAT DE LA MER EST DONNE EN HAUTEUR SIGNIFICATIVE TOTALE, ELLE CORRESPOND A LA MOYENNE DU TIERS DES VAGUES LES PLUS HAUTES. LA HAUTEUR MAXIMALE DES VAGUES INDIVIDUELLES PEUT ALLER JUSQU'AU DOUBLE DE LA HAUTEUR SIGNIFICATIVE.*

I- Type de phénomène : Vagues dangereuses, de nord-ouest à ouest

Niveau de vigilance : rouge sur les côtes atlantiques : dépassant 6M.

***Zones concernées : ENTRE CAP SPARTEL (TANGER) ET CAP GHIR (AGADIR)**

-Début et fin du phénomène : Du vendredi 23/01/2026 à 22h jusqu'au dimanche 25/01/2026 à 09h au moins.

***Zones concernées : ENTRE CAP GHIR (AGADIR) ET TANTAN**

-Début et fin du phénomène : Du samedi 24/01/2026 à 07h jusqu'au dimanche 25/01/2026 à 09h au moins.

Niveau de vigilance : rouge sur le détroit : dépassant 5M.

*** Zones concernées : ENTRE TANGER-MED ET CAP SPARTEL (TANGER)**

-Début et fin du phénomène : Du samedi 24/01/2026 à 12h jusqu'au dimanche 25/01/2026 à 09h au

Red alert of high sea over Gibraltar's Strait, and over Atlantic coasts –North & Center-

Then we started to issue more timely warnings by respecting the general rules of marine warnings, like elaborating it 24hours before the start of the phenomenon + it have to last 48h from the date of essuing it + it has to be divide on sections deponding of the level of alert

Red alert concerning the high sea over Gibraltar's Strait and over noth and center morrocan atalntic coasts

Royaume du Maroc

Ministère de l'Équipement et de l'Eau

المملكة المغربية

وزارة التجهيز و الماء

Royaume du Maroc

Ministère de

المملكة المغربية

وزارة التجهيز و الماء

SPECIAL WEATHER STATEMENT « BMS»

ORANGE ALERT

Orange alert of rough to very rough sea over mediterranean and southern atlantic coasts , and of windy weather over the mediterranean sea, Gibrlatar's strait and north and center atlantic coasts

Type de phénomène : Vents forts

Niveau de vigilance : Orange

*Zones concernées : ENTRE SAIDIA ET CALA IRIS (EST D'ELJEBHA)

D'OUEST A NORD-OUEST, 8 à 9 BEAUFORT, rafale 10 BEAUFORT

-Début et fin du phénomène : Du vendredi 23/01/2026 à 23h jusqu'au samedi 24/01/2026 à 08h. Reprise le samedi 24/01/2026 à 16h jusqu'au dimanche 25/01/2026 à 09h au moins.

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*Zones concernées : ENTRE CALA IRIS (EST D'ELJEBHA) ET SEBTA

DE SECTEUR OUEST, 8 BEAUFORT

-Début et fin du phénomène : Du vendredi 23/01/2026 à 20h jusqu'au samedi 24/01/2026 à 03h. Reprise le samedi 24/01/2026 à 15h jusqu'au samedi 24/01/2026 à 20h.

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*Zones concernées : ENTRE SEBTA ET MOHAMMEDIA

DE NORD-OUEST à SUD-OUEST, 8 à 9 BEAUFORT, rafale 10 BEAUFORT

-Début et fin du phénomène : Du vendredi 23/01/2026 à 17h jusqu'au samedi 24/01/2026 à 02h. Reprise le samedi 24/01/2026 à 10h jusqu'au samedi 24/01/2026 à 19h.

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*Zones concernées : ENTRE MOHAMMEDIA ET JORF

DE SUD-OUEST à NORD-OUEST, 8 à 9 BEAUFORT, rafale 10 BEAUFORT

-Début et fin du phénomène : Du vendredi 23/01/2026 à 20h jusqu'au samedi 24/01/2026 à 11h.

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*Zones concernées : ENTRE JORF ET CAP CANTIN (SAFI)

DE NORD-OUEST, 8 BEAUFORT

-Début et fin du phénomène : Du samedi 24/01/2026 à 07h jusqu'au samedi 24/01/2026 à 11h.

Niveau de vigilance : Orange

*Zones concernées : ENTRE SAIDIA ET CALA IRIS (EST D'ELJEBHA)

D'OUEST A NORD-OUEST, 3.0M A 3.5M

-Début et fin du phénomène : Du vendredi 23/01/2026 à 23h jusqu'au samedi 24/01/2026 à 11h. Reprise le samedi 24/01/2026 à 20h jusqu'au dimanche 25/01/2026 à 09h au moins.

---

*Zones concernées : ENTRE SEBTA ET TANGER-MED

D'OUEST, 3.0M

-Début et fin du phénomène : Du vendredi 23/01/2026 à 20h jusqu'au dimanche 25/01/2026 à 09h au moins.

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* Zones concernées : ENTRE TANGER-MED ET CAP SPARTEL (TANGER)

D'OUEST, 3.0M à 4.5M

-Début et fin du phénomène : Du vendredi 23/01/2026 à 17h jusqu'au samedi 24/01/2026 à 12h.

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*Zones concernées : ENTRE CAP SPARTEL (TANGER) ET CAP GHIR (AGADIR)

DE NORD-OUEST, 4.0M A 5.5M

-Début et fin du phénomène : En cours jusqu'au vendredi 23/01/2026 à 22h.

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*Zones concernées : ENTRE CAP GHIR (AGADIR) ET TANTAN

DE NORD-OUEST, 4.0M A 5.5M

-Début et fin du phénomène : En cours jusqu'au samedi 24/01/2026 à 07h.

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*Zones concernées : ENTRE TANTAN ET TARFAYA

DE NORD-OUEST, 4.0M à 5.5M

-Début et fin du phénomène : Du samedi 24/01/2026 à 02h jusqu'au dimanche 25/01/2026 à 09h au moins.

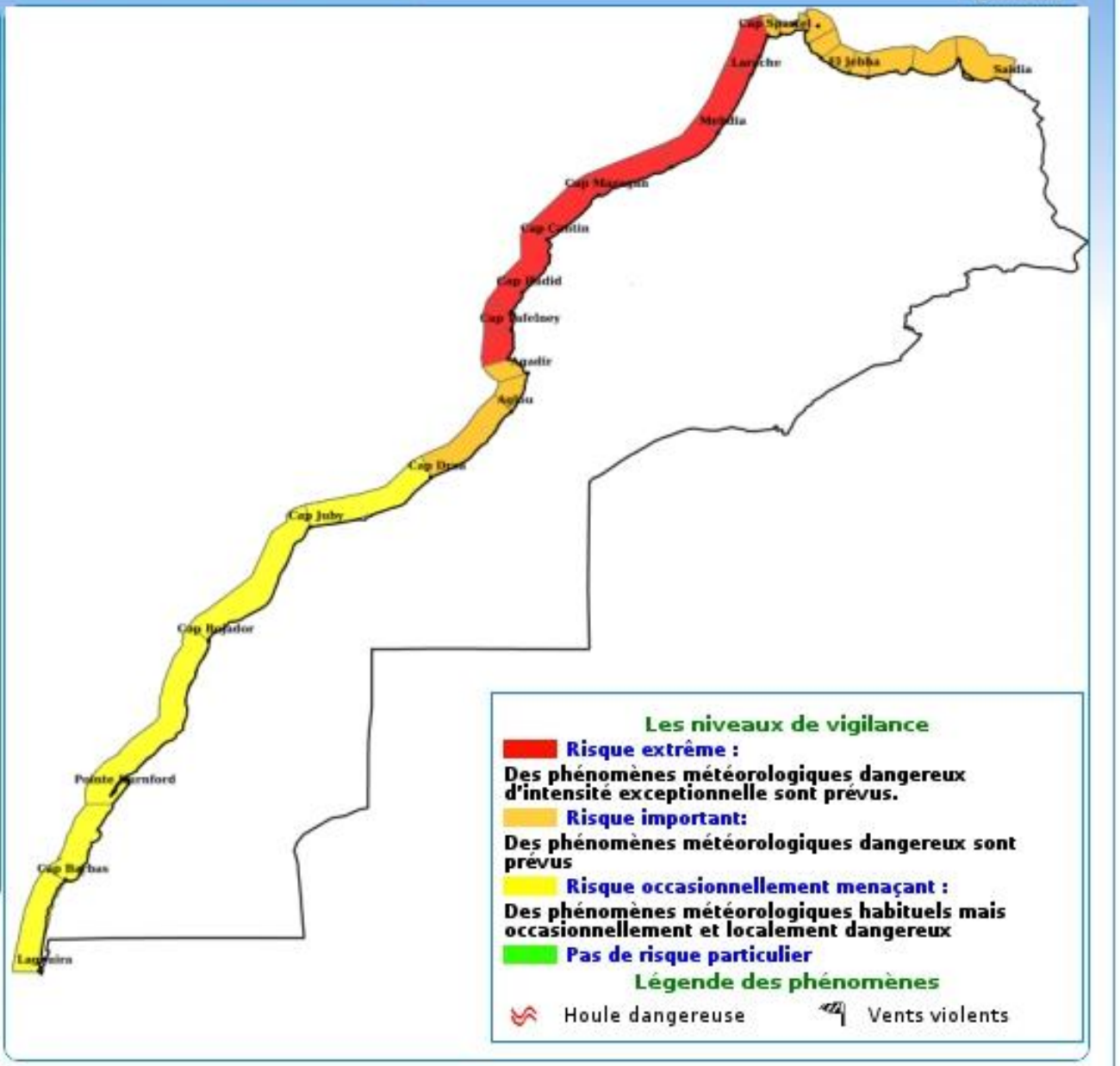
Direction Générale de la Météorologie

Vigilance Marine

Heure d'élaboration : Le Ven. 23-janv. 2026 à 12:56 (GMT)

Ministère de l'Equipement et de l'Eau

Vents-Forts	Validité : Le Ven. 23-janv. 2026 de 12h à 24h (GMT)
saidia-cap des trois fourches, cap des trois fourches-cap quilates, cap quilates-cala iris, cala iris-el jebha, el jebha-oued laou, oued laou-cabo negro, cabo negro -sebta, sebta -cap malabata, cap malabata-cap spartel, cap spartel-asilah, asilah-larache, larache-mehdia, mehdia-mohammedia, mohammedia-cap mazagan	
cap mazagan-cap cantin, cap cantin-cap hadid, cap hadid-cap sim, cap sim- cap tafelney, cap tafelney-cap ghir , cap ghir-agadir, agadir-aglou, aglou-cap draa, cap draa-cap juby, cap juby-cap bojador, cap bojador-pointe durnford, pointe durnford-cap barbas, cap barbas-lagouira	
Houle-Dangereuse	**Validité : Le Ven. 23-janv. 2026 de 12h à 24h (GMT)**
cala iris-el jebha, el jebha-oued laou, oued laou-cabo negro, cabo negro -sebta, cap draa-cap juby	
saidia-cap des trois fourches, cap des trois fourches-cap quilates, cap quilates-cala iris, sebta -cap malabata, cap malabata-cap spartel, cap ghir-agadir, agadir-aglou, aglou-cap draa	
cap spartel-asilah, asilah-larache, larache-mehdia, mehdia-mohammedia, mohammedia-cap mazagan, cap mazagan-cap cantin, cap cantin-cap hadid, cap hadid-cap sim, cap sim- cap tafelney, cap tafelney-cap ghir	



NB: La carte vigilance est actualisée au moins deux foix par jour à 06H00 et 16H00.

MARINE VIGILANCE CHART

Red vigilance annoncing dangerous and exceptional waves will hit north and center atlantic coasts

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Direction Générale de la Météorologie

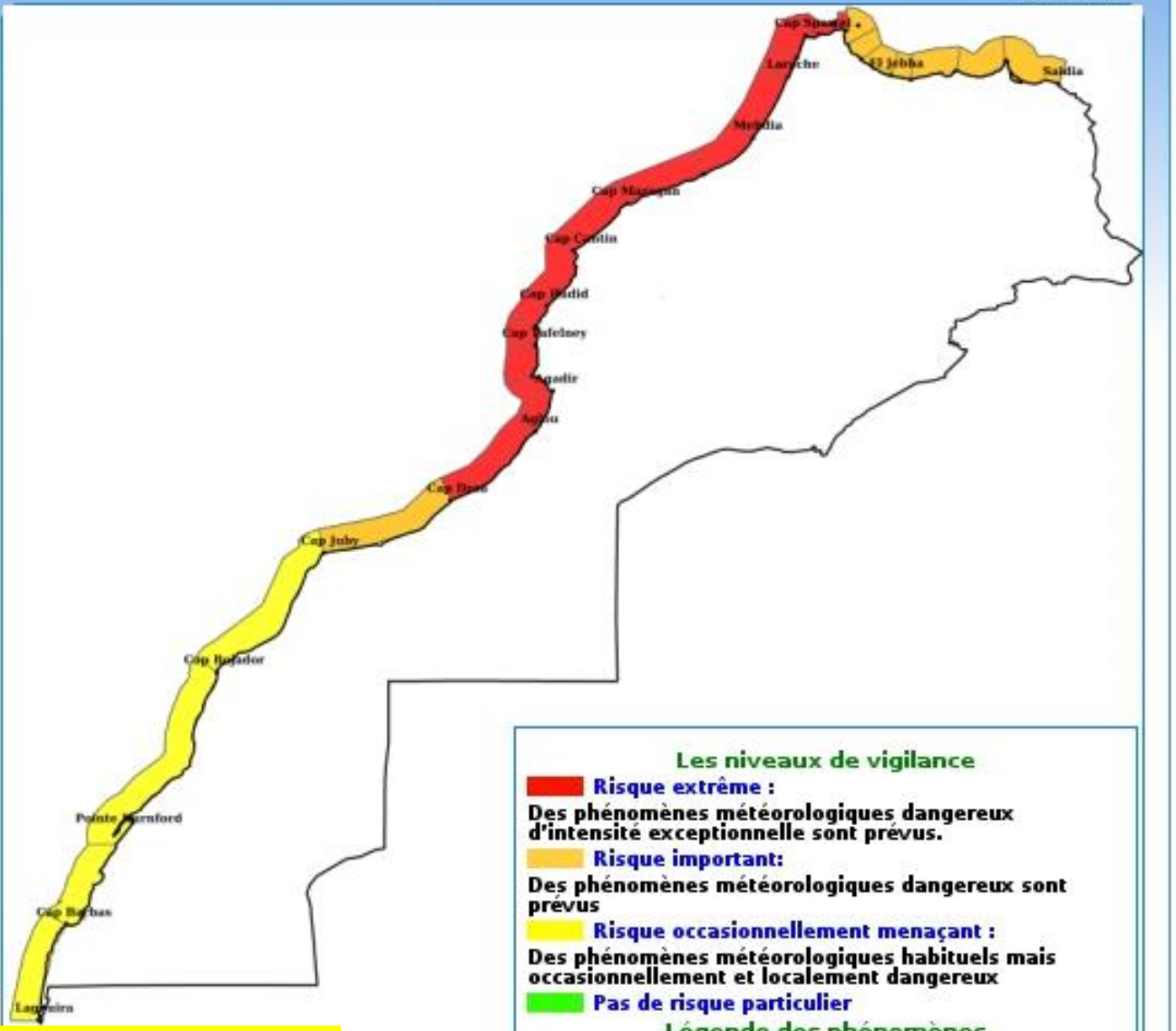
Vigilance Marine

Heure d'élaboration : Le Ven. 23-janv. 2026 à 13:21 (GMT)

Ministère de l'Equipement et de l'Eau

Houle-Dangereuse	Validité : Le Sam. 24-janv. 2026 de 0h à 24h (GMT)
cala iris-el jebha, el jebha-oued laou, oued laou-cabo negro, cabo negro -sebta, cap juby-cap bojador, cap bojador-pointe durnford, pointe durnford-cap barbas, cap barbas-lagouira	
sebta -cap malabata, cap malabata-cap spartel, cap spartel-asilah, asilah-larache, larache-mehdia, mehdia-mohammedia, mohammedia-cap mazagan, cap mazagan-cap cantin, cap cantin-cap hadid, cap hadid-cap sim, cap sim- cap tafelney, cap tafelney-cap ghir , cap ghir-agadir, agadir-aglou, aglou-cap draa	
saidia-cap des trois fourches, cap des trois fourches-cap quilates, cap quilates-cala iris, cap draa-cap juby	

Vents-Forts	Validité : Le Sam. 24-janv. 2026 de 0h à 24h (GMT)
saidia-cap des trois fourches, cap des trois fourches-cap quilates, cap quilates-cala iris, cala iris-el jebha, el jebha-oued laou, oued laou-cabo negro, cabo negro -sebta, sebta -cap malabata, cap malabata-cap spartel, cap spartel-asilah, asilah-larache, larache-mehdia, mehdia-mohammedia, mohammedia-cap mazagan, cap mazagan-cap cantin	
cap cantin-cap hadid, cap hadid-cap sim, cap sim- cap tafelney , cap tafelney-cap ghir, cap ghir-agadir, agadir-aglou, aglou-cap draa, cap draa-cap juby, cap juby-cap bojador, cap bojador-pointe durnford, pointe durnford-cap barbas, cap barbas-lagouira	



MARINE VIGILANCE CHART

Red vigilance annoncing dangerous and exceptional waves will hit atlantic coasts north and center **plus gibraltar-strait**

NB: La carte vigilance est actualisée au moins deux foix par jour à 06H00 et 16H00.

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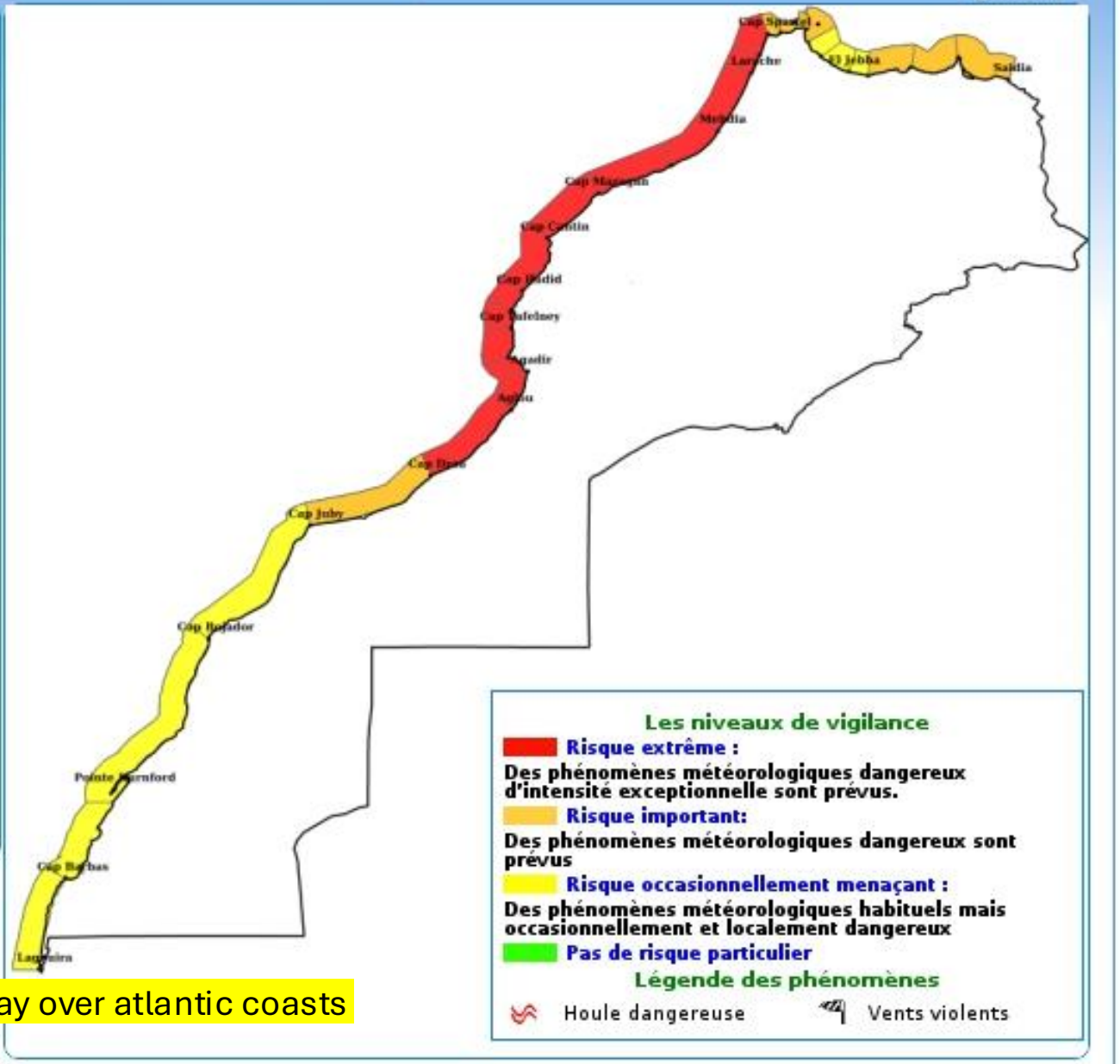
Vigilance Marine

Heure d'élaboration : Le Ven. 23-janv. 2026 à 13:21 (GMT)

Ministère de l'Equipement et de l'Eau

Houle-Dangereuse	Validité : Le Dim. 25-janv. 2026 de 0h à 24h (GMT)
cap spartel-asilah, asilah-larache, larache-mehdia, mehdia-mohammedia, mohammedia-cap mazagan, cap mazagan-cap cantin, cap cantin-cap hadid, cap hadid-cap sim, cap sim- cap tafelney, cap tafelney-cap ghir , cap ghir-agadir, agadir-aglou, aglou-cap draa	
saidia-cap des trois fourches, cap des trois fourches-cap quilates, cap quilates-cala iris, sebta -cap malabata, cap malabata-cap spartel, cap draa-cap juby	
cala iris-el jebha, el jebha-oued laou, oued laou-cabo negro, cabo negro -sebta, cap juby-cap bojador, cap bojador-pointe durnford, pointe durnford-cap barbas, cap barbas-lagouira	

Vents-Forts	Validité : Le Dim. 25-janv. 2026 de 0h à 24h (GMT)
cala iris-el jebha, el jebha-oued laou, oued laou-cabo negro, mehdia-mohammedia, mohammedia-cap mazagan, cap mazagan-cap cantin, cap bojador-pointe durnford, pointe durnford-cap barbas, cap barbas-lagouira	
saidia-cap des trois fourches, cap des trois fourches-cap quilates, cap quilates-cala iris, cabo negro -sebta, sebta -cap malabata, cap malabata-cap spartel, cap spartel-asilah, asilah-larache, larache-mehdia	



MARINE VIGILANCE CHART

Persistence of the red vigilance for the third day over atlantic coasts north and center

NB: La carte vigilance est actualisée au moins deux foix par jour à 06H00 et 16H00.

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Impacts

- The succession of several dangerous situations during last winter caused disruption to maritime traffic
- Port locking
- Coastal flooding
- risks of shortages of several raw materials
- However, the meticulous monitoring of these marine situations by forecasters and close collaboration with port authorities has alloweded the success of forecast and warning bulletins
- And made it possible to identify short windows of improved weather, which allowed to resume port operations and reduce the impacts of the closure of critical ports.



Conclusion

To summarize: forecasting this type of systems is challenging, but storm Ingrid was accurateluy anticipated and was closely tracked across the Atlantic by global atmospheric and wind models, triggering timely warnings that successfully mitigated widespread impacts.

Sea state was successfully forecasted by WW3 model, specially the one coupled with High resolution wind model Arome, while ECMWF was underestimating the wave hights (we can make a point of the benefit of regional High resolution models).

And most of all this situation highlighted the importance of observations specially satellite imagery, scatterometers and altimeters to monitor this type of weather systems and to help forecasters choose the most accurate scenario of forecasting regarding the available observation data.



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Focal point on Capacity Developpement

Vice chair of SC-MMO at WMO

Thank you for your attention ☺!