MARS 2026 — WEATHER AND MARINE ANALYSIS — KORSO MARITIME

MARS

Module M1 v2.17.1 — Numerical modelling & retrospective weather-marine reconstruction for Algerian commercial ports
Multiscale analysis — from the Mediterranean context to port infrastructure

Oran

2026-09-16 12:00 UTC / 2026-09-16 13:00 LT

OPEN-METEO · ERA5 | Window H-12/H+12 | 5 analysis times | ERA5 API | SHA-256 · 5f9e2e8927d16454… | CFG 1.1.0 · PORTCFG 1.1.0 | RELEASE · 691c85b2c3ac1ee1…

Generated on 23/09/2026 8:08:05 AM

MARS 2026 — MODULE M1 V2.17.1 — NUMERICAL MODELLING & RETROSPECTIVE WEATHER-MARINE RECONSTRUCTION FOR ALGERIAN COMMERCIAL PORTS

Multiscale analysis — from the Mediterranean context to port infrastructure

Weather & Marine Analysis
Oran — 2026-09-16 12:00 UTC / 2026-09-16 13:00 Local time (GMT+1)

REANALYSIS VIA OPEN-METEO | ORAN | H-12/H+12 | ENVIRONMENTAL CLASS E0 | BFT 1 | WMO 2 | WX WMO 0 | FLUX ENE — 5.7 KT | MESO MESO LEVEL N0 | ERA5 API | CFG 1.1.0 · PORTCFG 1.1.0 | GMT+1 / HL

01 PURPOSE AND SCOPE OF THE ANALYSIS

This report records weather and marine data, their sources and the calculations performed around H0, from the Mediterranean context to the port grid cell.

TEMPORAL ANCHORING

Incident	2026-09-16 12:00 UTC — 2026-09-16 13:00 Local time (GMT+1)
Window	2026-09-16T00:00:00.000Z → 2026-09-17T00:00:00.000Z
Analysis times	2026-09-16 00Z / 2026-09-16 06Z / 2026-09-16 12Z / 2026-09-16 18Z / 2026-09-17 00Z

02 SOURCES, ACQUISITION AND PROVENANCE

Acquisition points	9 pts / 5 analysis times
Max Hs offshore	0.26 m
Max wind 10m	4.0 kt
Acquisition time	6056 ms

03 METHOD AND INTERPRETATIVE SCOPE

SCOPE AND INTERPRETATION LIMITS

M1 performs multiscale numerical modelling and weather-marine reconstruction from reanalysis fields. When the source marine height is absent, the MARS fallback can produce a reconstructed value using the SPM 1984 relations. Results are traceable calculation outputs, not direct measurements.

> Historical Forecast visibility is an hourly model field. It documents the supplied grid cell and time step without representing unresolved local or sub-hourly variation. Without a distance, ERA5 indicators produce only class V0, V1, V2 or unclassified; logbooks, VTS, METAR/SPECI, cameras and witness accounts are separate sources.

> Reanalysis resolution and coastline representation limit very-small-scale interpretation. Entrance and berth values are calculated from the configured depths and coefficients.

DESCRIPTIVE ENVIRONMENTAL CLASS FRAMEWORK E0 TO E3

Classes E0 to E3 are an internal MARS descriptive nomenclature. They summarise the general environment from 10 m mean wind, offshore sea state, present weather and, when available, modelled visibility. They are neither an international scale, nor a navigation or port-operation decision, nor a causal attribution.

> For each time step, M1 assigns a rank to each usable component and publishes the highest numerical rank. The applied policy is KORSO_M1_ENVIRONMENTAL_SYNTHESIS_V1_2 (version 1.2.0).

> Nomenclature: G0–G4 denotes inter-basin gradient classes; N0–N3 meso synthesis levels; E0–E3 internal environmental classes; M1 exclusively denotes the module.

Internal class	10 m mean wind	Offshore sea state	WMO present-weather codes
E0	Beaufort 0–4; U10 < 17 kt	WMO 3700: 0–3; Hs ≤ 1.25 m	0, 1, 2, 3, 51, 61
E1	Beaufort 5–6; 17 ≤ U10 < 28 kt	WMO 3700: 4; 1.25 < Hs ≤ 2.50 m	53, 55, 63, 71, 77, 80
E2	Beaufort 7; 28 ≤ U10 < 34 kt	WMO 3700: 5; 2.50 < Hs ≤ 4.00 m	45, 48, 56, 65, 66, 73, 81, 85
E3	Beaufort 8–12; U10 ≥ 34 kt	WMO 3700: 6–9; Hs > 4.00 m	57, 67, 75, 82, 86, 95, 96, 99

> Visibility: a modelled distance strictly below 1,000 m contributes rank E2. A distance equal to or above 1,000 m, or an unavailable distance, adds no rank.

> Incomplete data: the class remains undetermined when the highest available rank does not exceed E0. If rank E1 to E3 is established despite a missing essential component or a sea state available only as a lower bound, it is published as an established minimum.

04 EXECUTIVE SUMMARY — H0

Internal MARS environmental class at H0	ENVIRONMENTAL CLASS E0 At H0, every component used by the M1 synthesis remains at rank E0.
Mean wind at 10 m	3.0 kt — Beaufort 1 (Light air)
Offshore sea state	Hs 0.14 m — WMO 3700 2 (Smooth)
Precipitation and present weather	WMO 0 (Clear sky) — 0.0 mm
Visibility and evidence level	44.8 km — Historical Forecast model field — not an in-situ observation
Minimum visibility — hourly H-12/H+12 series	2140 m — 2026-09-16T08:00:00.000Z
Hourly occurrences of modelled visibility < 1,000 m	0/25 — no metric occurrence below 1,000 m
Coverage	complete wind + sea + present-weather coverage
Purpose of the analysis	Retrospective reconstruction of weather and marine conditions at H0 and over the H-12/H+12 window.

05 MACRO SYNOPTIC ANALYSIS

EVOLUTION OVER THE H-12/H+12 WINDOW

Trend	NO MARKED PRESSURE-RANGE TREND
Detail	No marked monotonic trend in the sampled pressure range around H0 (3.7 hPa). Window range: 3.6–5.2 hPa (variation: 1.6 hPa).
Pressure-range variation	1.6 hPa

ℹ H0 pressure range: 3.70 hPa. Window minimum: 3.60 hPa. Window maximum: 5.20 hPa. Pre-H0 difference: -1.50 hPa. Post-H0 difference: 1.30 hPa.

MSL PRESSURES — ALL ANALYSIS TIMES (HPA)

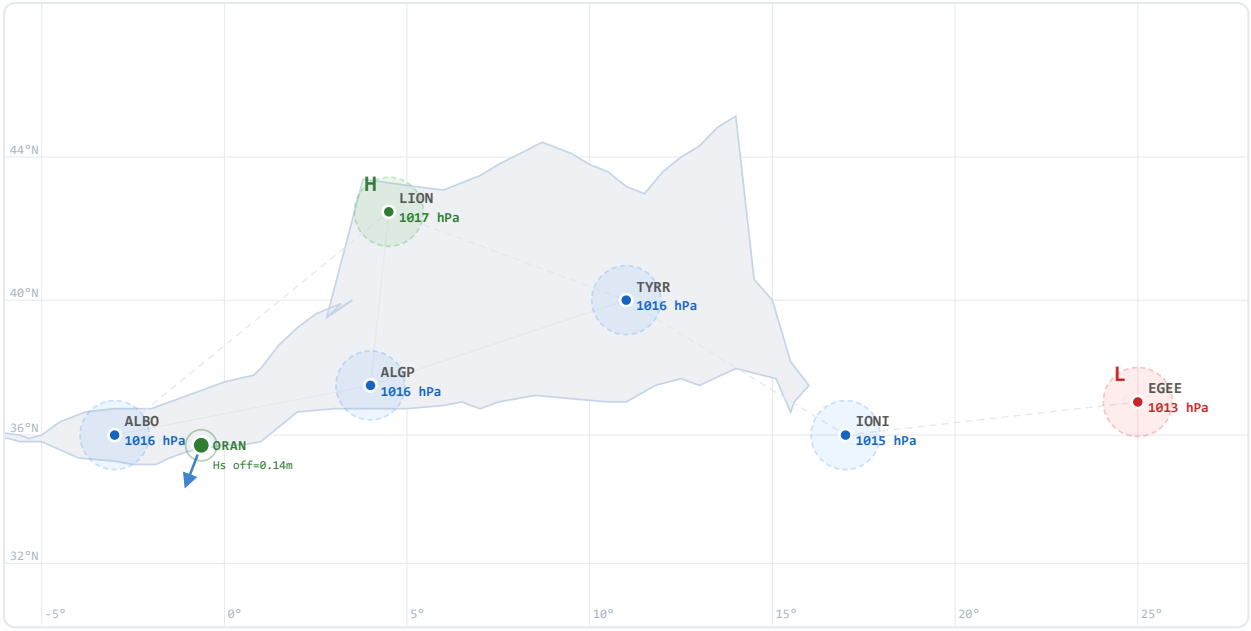
BASIN	2026-09-16 00Z	2026-09-16 06Z	**2026-09-16 12Z ★**	2026-09-16 18Z	2026-09-17 00Z
ALBO	1018.4 ▲	1016.0	1015.6	1013.3	1014.6
ALGP	1018.0	1017.0 ▲	1016.4	1014.4	1014.8
LION	1017.5	1016.8	1016.7 ▲	1015.9 ▲	1016.9 ▲
TYRR	1016.8	1016.4	1016.3	1014.8	1014.8
IONI	1014.6	1015.3	1015.4	1015.1	1016.2
EGEE	1013.2 ▼	1013.4 ▼	1013.0 ▼	1012.3 ▼	1011.9 ▼

▼ min · ▲ max · ★ H0

H0 GRADIENTS (HPA/100KM)

P	PAIR	ΔP	KM	hPa/100km	CLASS
1	Alboran ↔ Algéro-Provençal	+0.8	645	0.124	GRADIENT CLASS G0
	↳ Trigger for westerly wind events on the Algerian coast				
2	Algéro-Provençal ↔ Lion	+0.3	558	0.054	GRADIENT CLASS G0
	↳ North and North-West flow				
3	Algéro-Provençal ↔ Tyrrhénienne	-0.1	667	-0.015	GRADIENT CLASS G0
	↳ East and North-East flow				
4	Lion ↔ Tyrrhénienne	-0.4	610	-0.066	GRADIENT CLASS G0
5	Alboran ↔ Lion	+1.1	968	0.114	GRADIENT CLASS G0
6	Tyrrhénienne ↔ Ionienne	-0.9	688	-0.131	GRADIENT CLASS G0
7	Ionienne ↔ Égée	-2.4	723	-0.332	GRADIENT CLASS G0

MACRO BASIN MAP — SEA LEVEL PRESSURE AT H0 (MEDITERRANEAN SEA)



L = minimum among sampled basins · H = sampled maximum · line thickness = gradient intensity (hPa/100km) · blue arrow = local wind at H0
ORAN — selected port · Wind H0 21° · 3.0 kt · Offshore Hs H0 0.14 m

H0 DIRECTIONAL COMPARISON — THEORETICAL GEOSTROPHIC DIRECTION / ERA5 ALGP BASIN WIND

Theoretical geostrophic direction	165° SSE
ERA5 wind direction — ALGP basin	67° ENE — 5.7 kt
Absolute angular difference	98°

06 ALGERO-PROVENÇAL MESO ANALYSIS

ALGP POSITION — H0

ALGP pressure	1016.4 hPa
Rank	—
vs ALBO	+0.8 hPa — W → E flow on Algerian coast (ALGP higher than Alboran)
vs LION	-0.3 hPa — Near-zero N gradient (ALGP ≈ Lion)
vs TYRR	+0.1 hPa — Near-zero E gradient (ALGP ≈ Tyrrhenian)

The Algero-Provençal basin shows a pressure of 1016.4 hPa — rank 5 of 6 basins. The dominant gradient is Alboran/ALGP (ΔP = 0.80 hPa), forcing a easterly (ALGP → Alboran) flow on the Algerian coast. The ALGP/Lion gradient (ΔP = -0.30 hPa) and ALGP/Tyrrhenian gradient (ΔP = 0.10 hPa) are secondary.

ALGP PRIORITY GRADIENTS — H0

P	PAIR	GRADIENT	CLASS.	ACTIVE REGIME
1	ALBO ↔ ALGP	0.124 hPa/100km	GRADIENT CLASS G0	Low gradient — poorly organised flow
↳ Recorded calculation: ALGP pressure minus ALBO pressure; sign and value are published separately from ERA5 wind.				
2	ALGP ↔ LION	0.054 hPa/100km	GRADIENT CLASS G0	Low gradient — poorly organised flow
↳ Recorded calculation: LION pressure minus ALGP pressure; sign and value are published separately from ERA5 wind.				
3	ALGP ↔ TYRR	-0.015 hPa/100km	GRADIENT CLASS G0	Low gradient — poorly organised flow
↳ Recorded calculation: TYRR pressure minus ALGP pressure; sign and value are published separately from other atmospheric and marine fields.				

MESO REGIME — H0 SUMMARY

Level	MESO LEVEL N0
Gradient interval	|gradient| ≤ 0.30 hPa/100 km
ALGP flux	ENE — 5.7 kt
Absolute angular difference — theoretical direction / ERA5 ALGP wind	98°

Mesoscale pressure-gradient record: ALBO ↔ ALGP: 0.124 hPa/100km | ALGP ↔ LION: 0.054 hPa/100km | ALGP ↔ TYRR: 0.015 hPa/100km. Maximum absolute gradient: 0.124 hPa/100km. Directional screening pair: ALBO ↔ ALGP. ERA5 basin wind: ENE at 5.7 kt.

MESO REGIME EVOLUTION OVER THE WINDOW

TIME	ΔH	LEVEL	MAX GRAD.	FLUX	SPD.
2026-09-16 00Z	-12h	MESO LEVEL N0	0.180	E	5.4
2026-09-16 06Z	-6h	MESO LEVEL N0	0.155	ENE	4.5
2026-09-16 12Z ★	+0h	MESO LEVEL N0	0.124	ENE	5.7
2026-09-16 18Z	+6h	MESO LEVEL N0	0.269	ENE	9.5
2026-09-17 00Z	+12h	MESO LEVEL N1	0.377	E	12.9

07 LOCAL ANALYSIS — ORAN

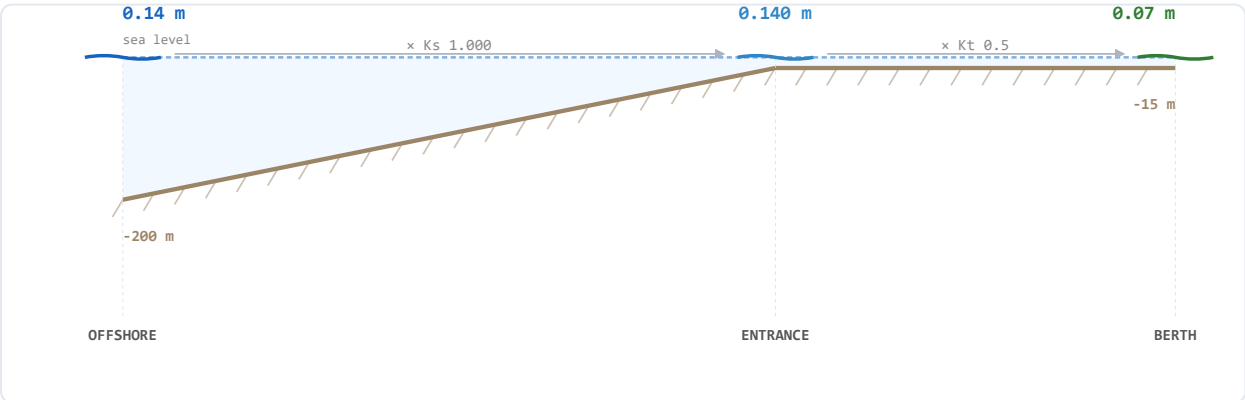
i The Algerian-current axis is contextual information; its effects are not modelled by M1–M4.

LOCAL ERA5 CONDITIONS — H0

Wind 10m	3.0 kt — 21°
Beaufort equivalent	1 — Light air (mean U10 wind, gusts excluded)
ERA5 gust at 10 m	6.8 kt gust/U10 ratio: 2.3
Local pressure	1015.5 hPa
PRECIPITATION AND VISIBILITY	
WMO present weather	0 — Clear sky
Precipitation — previous hour	0.0 mm
Liquid rain — previous hour	0.0 mm
Relative humidity at 2 m	27 %
Dew point / T–Td spread	9.3 °C · Δ 20.8 °C
Low cloud cover	0 %
Fog / visibility	44.8 km Historical Forecast model field — not an in-situ observation
Minimum visibility — hourly H−12/H+12 series	2140 m — 2026-09-16T08:00:00.000Z Hourly occurrences of modelled visibility < 1,000 m : 0/25 — no metric occurrence below 1,000 m · 0 hours with WMO fog code · 0 consistency alerts
Hs offshore	0.14 m
WMO 3700 sea state (“Douglas” usage)	2 — Smooth
Mean period (source Tm / reconstructed Tz)	2.5 s
Period used for shoaling	2.5 s — mean period supplied by the marine source · KORSO_M1_SHOALING_PERIOD_SELECTION_V1_0 v1.0.0
Wave direction	192°
Transmission coefficient Kt	0.5 (ORAN — general, configuration portuaire interne)
Ks shoaling (configured depths)	**1.000** ≈ neutral | DEEP | USACE CEM, Part II
Hs at entrance Hs offshore × Ks	**0.140 m** sea state at the port entrance
Calculated Hs at berth	**0.07 m** informative local transformation — outside M1 classification
Internal MARS environmental class	ENVIRONMENTAL CLASS E0 complete wind + sea + present-weather coverage

M1 synthesis policy v1.2.0: the highest ordinal rank among Beaufort, WMO 3700 sea state, WMO present weather and modelled visibility below 1,000 m is recorded. Rain remains an hourly accumulation; humidity parameters do not produce a visibility distance.

BATHYMETRIC PROFILE — SEA-STATE TRANSFORMATION



Ks = bathymetric shoaling (Newton-Raphson / USACE CEM, Part II; configured depths) — Kt = internal port-transmission coefficient. Schematic wave amplitudes — not to depth scale.

EFFECTIVE FETCH

Sector	N
Fetch	**110 NM**

CONTEXT INDICATORS

No context indicator active.

DIRECTIONAL COMPARISON — ALGP BASIN / PORT

Absolute angular difference	46°
Detail	Basin direction: 67°. Port direction: 21°. Absolute angular difference: 46°. Basin speed: 5.7 kt. Port speed: 3.0 kt. Difference: -2.7 kt.
Macro direction (ALGP)	67° — 5.7 kt
Local direction (port)	21° — 3.0 kt

WEATHER AND SEA EVOLUTION WITH ENVIRONMENTAL CLASS

TIME	ΔH	WIND	BFT	Hs OFF.	WMO	Hs ENTR.	Hs BERTH	ENV. CLASS	FETCH
2026-09-16 00Z	-12h	2.4 kt	1	0.14 m	2	0.140 m	0.07 m	ENVIRONMENTAL CLASS E0	180 NM
2026-09-16 06Z	-6h	3.7 kt	1	0.16 m	2	0.160 m	0.08 m	ENVIRONMENTAL CLASS E0	180 NM
2026-09-16 12Z ★	+0h	3.0 kt	1	0.14 m	2	0.140 m	0.07 m	ENVIRONMENTAL CLASS E0	110 NM
2026-09-16 18Z	+6h	4.0 kt	2	0.20 m	2	0.200 m	0.10 m	ENVIRONMENTAL CLASS E0	220 NM
2026-09-17 00Z	+12h	2.6 kt	1	0.26 m	2	0.260 m	0.13 m	ENVIRONMENTAL CLASS E0	180 NM

M1 ENVIRONMENTAL SYNTHESIS

Event reference: 2026-09-16 12:00 UTC; port: Oran (ORAN). ERA5 basin pressure range at H0: 3.70 hPa. Maximum mesoscale gradient: 0.124 hPa/100 km (Meso level N0).

Port atmospheric field at H0: mean wind 3.0 kt from 21 °; native ERA5 gust 6.8 kt; MSL pressure 1015.5 hPa; air temperature 30.1 °C; previous-hour precipitation 0.0 mm; WMO code 0 (Clear sky).

Marine field at H0: offshore Hs 0.14 m; mean period 2.5 s; direction 192 °; source code API_DIRECT; entrance Hs 0.140 m with Ks=1.000; berth Hs 0.07 m with Kt=0.500. Shoaling period: 2.5 s (MEAN_WAVE_PERIOD_OPEN_METEO_SOURCE; KORSO_M1_SHOALING_PERIOD_SELECTION_V1_0 v1.0.0).

Basin direction: 67°. Port direction: 21°. Absolute angular difference: 46°. Basin speed: 5.7 kt. Port speed: 3.0 kt. Difference: -2.7 kt. Configured fetch: 110.0 NM in sector N.

Modelled visibility at H0: 44840 m; source status: MODELLED_HISTORICAL_FORECAST. Environmental descriptor: Environmental class E0; Beaufort 1; WMO 3700/Douglas state 2; WMO present-weather code 0.

08 QUALITY, COVERAGE AND LIMITS

Macro pressure coverage	30/30
Port atmospheric coverage	5/5
Metric visibility coverage	5/5 — model field, not an observation
MARS modelling chain	executed over the H-12/H+12 window — multiscale analyses and harbour transformations included
Origin of offshore Hs values	5 direct ERA5-Ocean values · 0 Hs values numerically reconstructed by the MARS fallback · 0 swell-only lower bounds · 0 missing values
Environmental completeness at H0	complete wind + sea + present-weather coverage
Nominal 6 h duration fallbacks	0/5

SOURCE LIMITATION

Reanalysis resolution and coastline representation limit very-small-scale interpretation. Entrance and berth values are calculated from the configured depths and coefficients.

A

APPENDIX A — GRAPHICAL ANALYSIS

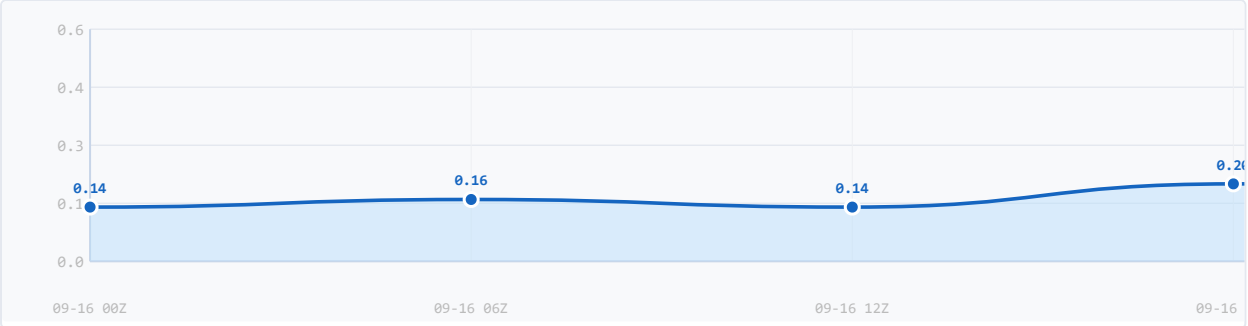
PORT	H0	HS MAX	TM MAX	P MIN	MAX WIND
Oran (ORAN)	2026-09-16 12:00 UTC	0.26 m	3.8 s	1013.6 hPa	4.0 kt

Time evolution of weather and marine parameters over the H-12/H+12 window. Red dashed line on chart B = internal MARS L2 numeric threshold, Tm 8.0 s.

A HS PROFILE — SIGNIFICANT WAVE HEIGHT

ERA5 API

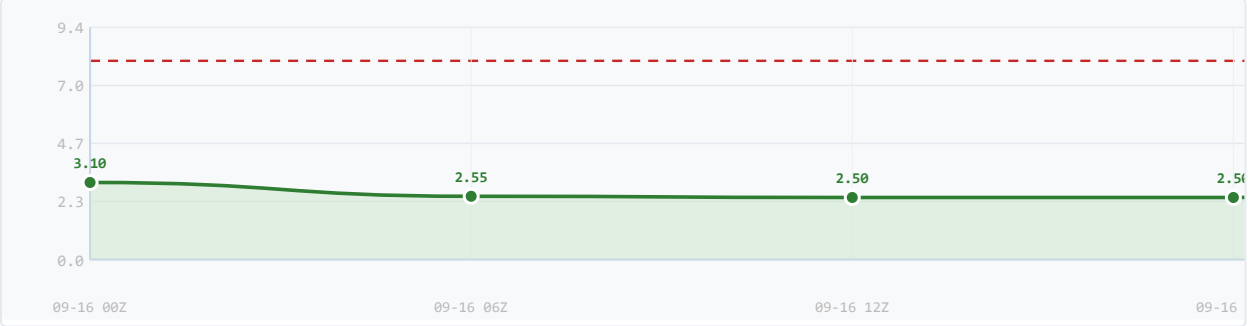
Offshore significant wave height (m). Solid and hollow orange markers distinguish numerical reconstructions from lower bounds.



B MEAN WAVE PERIOD TM

Tm (s) Threshold 8.0 s

Mean wave period Tm (s). Red dashed line = internal MARS L2 numeric threshold at 8.0 s.

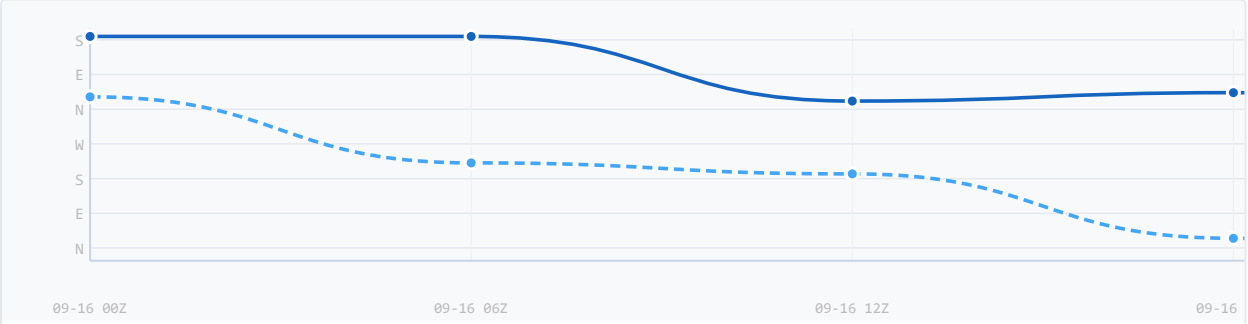


C DIRECTIONAL COMPARISON — WIND AND WAVES

Wind direction (°) Wave direction (°) —

Wind direction (solid blue) and wave direction (dashed light blue), in degrees.

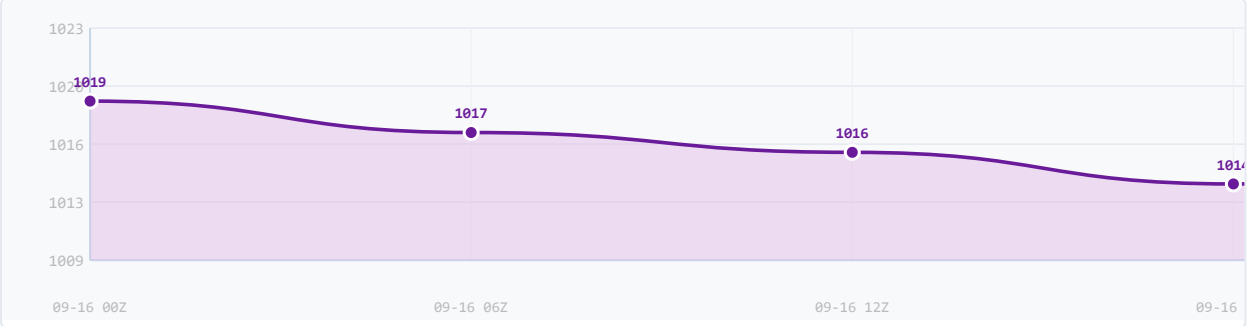
⚠ Angular unwrap applied: transitions near N (e.g. 355°→5°) are rendered as continuous rotations to avoid misleading visual jumps.



D BAROMETRIC TREND — MSL PRESSURE

P MSL (hPa)

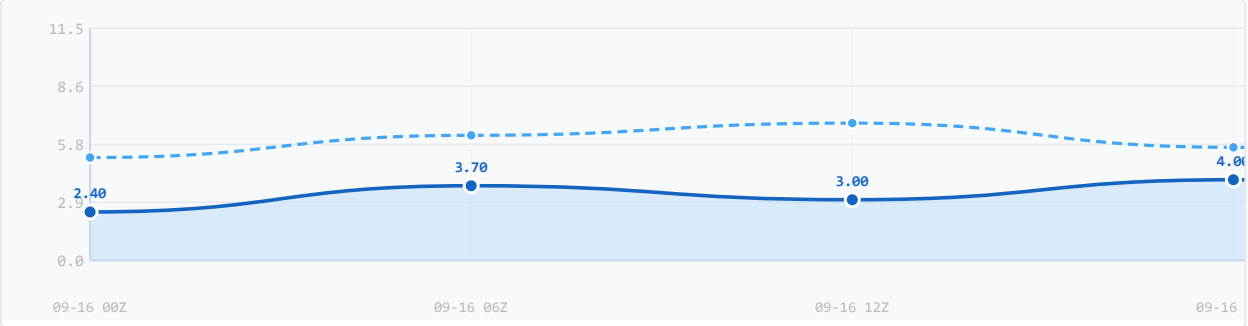
Mean sea level atmospheric pressure (hPa). Synoptic context.



E MEAN U10 WIND AND GUSTS

Mean U10 wind Gusts

ERA5 mean 10 m wind and gust speed (kt). Beaufort force is derived solely from mean U10 wind.



B

APPENDIX B — INPUT DATA AND MARS PROCESSING

M1

ERA5 PRESSURES — MACRO BASINS (HPA)

BASIN	2026-09-16 00Z	2026-09-16 06Z	2026-09-16 12Z	2026-09-16 18Z	2026-09-17 00Z
ALBO Alboran	1018.4	1016.0	1015.6	1013.3	1014.6
ALGP Algero-Provençal	1018.0	1017.0	1016.4	1014.4	1014.8
LION Lion	1017.5	1016.8	1016.7	1015.9	1016.9
TYRR Tyrrhenian	1016.8	1016.4	1016.3	1014.8	1014.8
IONI Ionian	1014.6	1015.3	1015.4	1015.1	1016.2
EGEE Aegean	1013.2	1013.4	1013.0	1012.3	1011.9

M1

PORT DATA — ORAN

PARAMETER	2026-09-16 00Z	2026-09-16 06Z	2026-09-16 12Z	2026-09-16 18Z	2026-09-17 00Z
MSL Pressure	1018.6hPa	1016.7hPa	1015.5hPa	1013.6hPa	1014.7hPa
Wind 10m	2.4 kt	3.7 kt	3.0 kt	4.0 kt	2.6 kt
Wind dir.	189.0°	189.0°	21.0°	43.0°	255.0°
Gust	5.1 kt	6.2 kt	6.8 kt	5.6 kt	2.9 kt
Temp.	19.1°C	17.0°C	30.1°C	26.4°C	23.5°C
Precip.	0.0 mm	0.0 mm	0.0 mm	0.0 mm	0.0 mm
Liquid rain	0.0 mm	0.0 mm	0.0 mm	0.0 mm	0.0 mm
WMO weather code	0	0	0	0	0
Relative humidity 2 m	87 %	88 %	27 %	50 %	69 %
Dew point 2 m	16.9°C	15.0°C	9.3°C	15.2°C	17.4°C
Low cloud	0 %	0 %	0 %	0 %	0 %

M1 MODELLED VISIBILITY — SEPARATE SOURCE

UTC	ΔH	Horizontal visibility	WMO weather / rain
2026-09-16T00:00:00.000Z	-12	12940 m	WMO 0 · 0.0 mm
2026-09-16T01:00:00.000Z	-11	6260 m	WMO 0 · 0.0 mm
2026-09-16T02:00:00.000Z	-10	8040 m	WMO 0 · 0.0 mm
2026-09-16T03:00:00.000Z	-9	9480 m	WMO 0 · 0.0 mm
2026-09-16T04:00:00.000Z	-8	8540 m	WMO 0 · 0.0 mm
2026-09-16T05:00:00.000Z	-7	5360 m	WMO 0 · 0.0 mm
2026-09-16T06:00:00.000Z	-6	3300 m	WMO 0 · 0.0 mm
2026-09-16T07:00:00.000Z	-5	2540 m	WMO 0 · 0.0 mm
2026-09-16T08:00:00.000Z	-4	2140 m	WMO 0 · 0.0 mm
2026-09-16T09:00:00.000Z	-3	37960 m	WMO 0 · 0.0 mm
2026-09-16T10:00:00.000Z	-2	41860 m	WMO 0 · 0.0 mm
2026-09-16T11:00:00.000Z	-1	44040 m	WMO 0 · 0.0 mm
2026-09-16T12:00:00.000Z	+0	44840 m	WMO 0 · 0.0 mm
2026-09-16T13:00:00.000Z	+1	44400 m	WMO 0 · 0.0 mm
2026-09-16T14:00:00.000Z	+2	43760 m	WMO 0 · 0.0 mm
2026-09-16T15:00:00.000Z	+3	43400 m	WMO 0 · 0.0 mm
2026-09-16T16:00:00.000Z	+4	42780 m	WMO 0 · 0.0 mm
2026-09-16T17:00:00.000Z	+5	41060 m	WMO 0 · 0.0 mm
2026-09-16T18:00:00.000Z	+6	40880 m	WMO 0 · 0.0 mm
2026-09-16T19:00:00.000Z	+7	39680 m	WMO 0 · 0.0 mm
2026-09-16T20:00:00.000Z	+8	37520 m	WMO 0 · 0.0 mm
2026-09-16T21:00:00.000Z	+9	38340 m	WMO 0 · 0.0 mm
2026-09-16T22:00:00.000Z	+10	39860 m	WMO 0 · 0.0 mm
2026-09-16T23:00:00.000Z	+11	37980 m	WMO 1 · 0.0 mm
2026-09-17T00:00:00.000Z	+12	37820 m	WMO 0 · 0.0 mm

Historical Forecast model field — not an in-situ observation — OK

M1 OFFSHORE SEA STATE ERA5 API

PARAMETER	2026-09-16 00Z	2026-09-16 06Z	2026-09-16 12Z	2026-09-16 18Z	2026-09-17 00Z
Hs	0.14 m	0.16 m	0.14 m	0.20 m	0.26 m
Tm	3.1 s	2.5 s	2.5 s	2.5 s	3.8 s
Wave direction	32°	221°	192°	25°	347°

C APPENDIX C — TRACEABILITY AND TIMESTAMPING

Inputs acquired through Open-Meteo: the ERA5-Seamless atmospheric product, an Open-Meteo combination based on ERA5/ERA5-Land, the ERA5-Ocean marine model and, separately when available, the Historical Forecast visibility field. These are reanalysis or model fields, not in-situ measurements. Source URLs, acquisition timestamps and the SHA-256 digest scope are recorded in this report.

● RFC 3161 timestamp token received — FreeTSA.org

Time-stamped at (UTC)	2026-09-23T06:58:26Z
TSA Serial	085492c4
SHA-256	5f9e2e8927d164542541f278e94cccede4805835d764f3b8da85656f306064fc
Engine version	KORSO MARITIME v2.17.1
MARS	v1.3.0
Configuration	v1.1.0
Port coefficients	v1.1.0
Delivery fingerprint	sha256:691c85b2c3ac1ee1940bc74c3f28d8e6ceb543f42f8a7a0466dfe75bac20c572
TSR Token (Base64)	MIISIDADAgEAMIISFwYJKoZIhvcNAQcCoIISCDCCEgQCAQMxDzANBglghkgBZQMEAgMFADCCAZAGCyqGSIb3DQEJEAEEoIIBfwSCAXswggF3AgEBBgQqAwQBMDEwDQYJYIZIAWUDBAIBBQAEIF+eLokn0WRUJUHyeOlMzO3kgFg112TzuNqFZW8wYGT8AgQIVJLEGA8yMDI2MDkyMzA2NTgwNloBAf8CCC214t31vIYxoIIBE6SCAQ8wggELMREwDwYDVQQKDAhGcmVlIFRTQTEMMAoGA1UECwwDVFNBMXYwdAYDVQQNDG1UaGlzIGNlcnRpZmljYXRlIGRpZ2l0YWxseSBzaWducyBkb2N1bWVudHMgYW5kIHRpbWUgc3RhbXAgcmVxdWVzdHMgbWFkZSB1c2luZyB0aGUgZnJlZXRzYS5vcmcgb25saW5lIHNlcnZpY2VzMRgwFgYDVQQDDA93d3cuZnJlZXRzYS5vcmcxJDAiBgkqhkiG9w0BCQEWFWJ1c2lsZXphc0BtYWlsYm94Lm9yZzESMBAGA1UEBwwJV3VlcnpidXJnMQswCQYDVQQGEwJERTEPMA0GA1UECAwGQmF5ZXJuuIIOZzCCBmAwggRIoAMCAQICCQDC6YYWDajpzTANBgkqhkiG9w0BAQ0FADCBlTERMA8GA1UEChMIRnJlZSBUU0ExEDAOBgNVBAsTB1Jvb3QgQ0ExGDAWBgNVBAMTD3d3dy5mcmVldHNhLm9yZzEiMCAGCSqGSIb3DQEJARYTYnVzaWxlemFzQGdtYWlsLmNvbTESMBAGA1UEBxMJV3VlcnpidXJnMQ8wDQYDVQQIEwZCYXllc4xCzAJBgNVBAYTAkRFMB4XDTI2MDIxNTE5NDQyMloXDTQwMDIwMjE5NDQyMlowgggELMREwDwYDVQQKDAhGcmVlIFRTQTEMMAoGA1UECwwDVFNBMXYwdAYDVQQNDG1UaGlzIGNlcnRpZmljYXRlIGRpZ2l0YWxseSBzaWducyBkb2N1bWVudHMgYW5kIHRpbWUgc3RhbXAgcmVxdWVzdHMgbWFkZSB1c2luZyB0aGUgZnJlZXRzYS5vcmcgb25saW5lIHNlcnZpY2VzMRgwFgYDVQQDDA93d3cuZnJlZXRzYS5vcmcxJDAiBgkqhkiG9w0BCQEWFWJ1c2lsZXphc0BtYWlsYm94Lm9yZzESMBAGA1UEBwwJV3VlcnpidXJnMQswCQYDVQQGEwJERTEPMA0GA1UECAwGQmF5ZXJuMHYwEAYHKoZIzj0CAQYFK4EEACIDYgAEohXhobLWy4cYsdKOFALpjUsB1FJTntwwb7PH2LOfNMAA1uFaKhkgsdeW6etU0pl5MC5tSVuPF52yy4sz+mbY3L7IVdx/bs9m0ud7IA14YNcC2yIQLa2gvnxwsrR3rlWro4IB5jCCAeIwCQYDVR0TBAIwADAdBgNVHQ4EFgQUFcC9JuvUXYLRXZMmMS/vcLKLR14wHwYDVR0jBBgwFoAU+lUNjDRmUUNM9+ezp2yVr3rmpJcwCwYDVR0PBAQDAgbAMBYGA1UdJQEB/wQMMAoGCCsGAQUFBwEBBGAwXjAzBggrBgEFBQcwAoYnaHR0cDovL3d3dy5mcmVldHNhLm9yZy9maWxlcy9jYWNlcnQucGVtMCcGCCsGAQUFBzABhhtodHRwOi8vd3d3LmZyZWV0c2Eub3JnOjI1NjAwNwYDVR0fBDAwLjAsoCqgKIYmaHR0cDovL3d3dy5mcmVldHNhLm9yZy9jcmwvcm9vdF9jYS5jcmwwgcgGA1UdIASBwDCBvTCBugYDKwUIMIGyMDMGCCsGAQUFBwIBFidodHRwOi8vd3d3LmZyZWV0c2Eub3JnL2ZyZWV0c2FfY3BzLmh0bWwwMgYIKwYBBQUHAgEWJmh0dHA6Ly93d3cuZnJlZXRzYS5vcmcvZnJlZXRzYV9jcHMucGRmMEcGCCsGAQUFBwICMDsaOUZyZWVUU0EgdHJ1c3RlZCB0aW11c3RhbXBpbmcgU29mdHdhcmUgYXMgYSBTZXJ2aWNlIChTYWFTKTANBgkqhkiG9w0BAQ0FAAOCAgEAazFUv2H53zK9M4mZ3rAVDqwzUazTYLdyIDDQ8DYcJeqClh1SIZWJzP+W6JY326WUwG6r8RyN87U9P7MMUDqk2reagSUQGP1R9Z/0+DPbg40rrt6n4dGR+Ty/RDaqFVuOIuTU/850Hr9jBlzgB8M/ZGcMM8/TBV+oWxoQalmvp5QKm+2O9ihc4995tTlR8VdlpeGA/X/dW2UxaVBBluCrW5JsaX/4hiD2n+Fh6aAVvzuhM6HzCmJc+Ml8hAYdMEUVcl5bS64/jBR6oXvj7DAZZav3QmjuFvxfgLhxJbu2lGFjAEnpaYVgCYlLDTK+RwKHgkkoIpan9QkqFgvpOnuN9+BcpviMuHLDHsfjxuK0nalyVUPgFhHUWo0jyoe8g36TZHZzusqkCf7UnddV0OXC9DPY1rgg9cx5YAPrvkdnK8t8qNt4w+6kxi4Wall1wslooB99P0P0V44w8K3OAyYkPoEWNBYXU2Kpb4DAT6+C3CSpzZLIr3Y/pG8+21Um6wQM0YmsyvZfONf+VzLT/Qbw9ISgqUBbz/T0oAgvBEJyqoEntuhUiQWgEHAOU5yvDReI5GxJQcX/88oez9yIx7KN+Y7YFFg9f4rYPQSVm2FMCeLXyC6QdhdMG5NRnGQwg2aMlt1397awKc/2Xfd4Bd46HPR4fURb3ikc1kO3XVLd3oEwggf/MIIF56ADAgECAgkAwemGFg2o6YAwDQYJKoZIhvcNAQENBQAwgZUxETAPBgNVBAoTCEZyZWUgVFNBMRAwDgYDVQQLEwdSb290IENBMRgwFgYDVQQDEw93d3cuZnJlZXRzYS5vcmcxIjAgBgkqhkiG9w0BCQEWE2J1c2lsZXphc0BnbWFpbC5jb20xEjAQBgNVBAcTCVd1ZXJ6YnVyZzEPMA0GA1UECBMGQmF5ZXJuMQswCQYDVQQGEwJERTAeFw0xNjAzMTMwMTUyMTNaFw00MTA2MDcwMTUyMTNaMIGVMREwDwYDVQQKEwhGcmVlIFRTQTEQMA4GA1UECxMHUm9vdCBDQTEYMBYGA1UEAxMPd3d3LmZyZWV0c2Eub3JnMSIwIAYJKoZIhvcNAQkBFhNidXNpbGV6YXNAZ21haWwuY29tMRIwEAYDVQQHEwlXdWVyemJ1cmcxDzANBgNVBAgTBkJheWVybjELMAkGA1UEBhMCREUwggIiMA0GCSqGSIb3DQEBAQUAA4ICDwAwggIKAoICAQC2Ao4OMDLxERDZZM2pS50CeOGUKukTqqWZB82ml5OZW9msfjO62f43BNocAamNIa/j9ZglnXBncFFnmY9QFnIuCrRish9DkXHSz8xFk/NzWveUpasxH2wBDHiY3jPXXEUQ7nb0vR0UmM8X0wPwal3Z95bMbKm2V6Vv4+pP77585rahjT41owzuX/Fw0c85ozPT/aiWTSLbaFsp5WG+iQ8KqEWHOy6Eqyarg5/+j63p0juzHmHSc8ybiAZJGF+r7PoFNGAKupAbYU4uhUWC3qIib8Gc199SvtUNh3fNmYjAU6P8fcMoegaKT/ErcTzZgDZm6VU4VFb/OPgCmM9rk4VukiR3SmbPHN0Rwvjv2FID10WLJWZLE+1jnN7U/4ET1sxTU9JylHPDwwcVfHIqpbXdC/stbDixuTdJyIHsYAJtCJUbOCS9cbrLzkc669Y28LkYtKLI/0aU8HRXry1vHPglVNF3D9ef9dMU3NEEzdyryUE4BW388Bfn64Vy/VL3AUTxiNoF9YI/WN0GKX5zh77S13LBPagmZgEEX+QS3XCYbAyYe6c0S5A3OHUW0ljniFtR+JaLfyYBITvEy0yF+P8LhK9qmIM3zfuBho9+zzHcpnFtfsLdgCwWcmKeXABSyzV90pqvxD9hWzsf+dThzgjHHHPh/rt9xWozYhMp6e1sIwIDAQABo4ICTjCCAkowDAYDVR0TBAUwAwEB/zAOBgNVHQ8BAf8EBAMCAcYwHQYDVR0OBBYEFPpVDYw0ZlFDTPfns6dsla965qSXMIHKBgNVHSMEgcIwgb+AFPpVDYw0ZlFDTPfns6dsla965qSXoYGbpIGYMIGVMREwDwYDVQQKEwhGcmVlIFRTQTEQMA4GA1UECxMHUm9vdCBDQTEYMBYGA1UEAxMPd3d3LmZyZWV0c2Eub3JnMSIwIAYJKoZIhvcNAQkBFhNidXNpbGV6YXNAZ21haWwuY29tMRIwEAYDVQQHEwlXdWVyemJ1cmcxDzANBgNVBAgTBkJheWVybjELMAkGA1UEBhMCREUwggIiMA0GCSqGSIb3DQEBAQUAA4ICDwAwggIKAoICAQCRYmaHR0cDovL3d3dy5mcmVldHNhLm9yZy9mYWRwYIKwYBBQUHAgIwOxo5RnJlZVRTQSB0cnVzdGVkIHRpbWVzdGFtcGluZyBTb2Z0d2FyZSBhcyBhIFNlcnZpY2UgKFNhYVMpMDcGCCsGAQUFBwEBMCswKTAnBggrBgEFBQcwAYYbaHR0cDovL3d3dy5mcmVldHNhLm9yZzoyNTYwMA0GCSqGSIb3DQEBDQUAA4ICAQBor36/k4Vi70rrO1gL4vr2zDWiZ3KWLz2VkB+lYwyH0JGYmEzooGoz+KnCgu2fHLEaxsI+FxCO5O/Ob7KU3pXBMyYiVXJVIsph1x1KO394JQ37jUruwPsZWbFkEAUgucEOZMYmYuStTQq64imPyUj8Tpno2ea4/b5EBBIex8FCLqyyydcyjgc5bmC087uAOtSlVcgP77U/hed2SgqftK/DmfTNL1+/WHEFxggc89BTN7a7fRsBC3SfSIjJEvNpaGG2kC13t9/ARsBKDMHsT40YXi2lXft7wqIDbGIZJGpPmd27bx+Ck5jzuAPcCtkNy1m+9MJ8d0BLmQQ7eCcYZ5kRUsOZ8Sy/xMY1rcCWNVrkTjQhAOxRelAuLwb5QLjUNZm7wRVPiudhoLDVVftKE5HU80IK+NvxLy1925133OFTeAQHSvF15PLW1Vs0tdb33L3TFzCvVkgNTAz/FD+eg7wVGGbQug8LvcR/4nhkF2u9bBq4XfMl7fd3iJvERxvz+nPlbMWR6LFgzaeweGoewErDsk+i4o1dGeXkgATV4WaoPILsb9VPs4Xrr3EzqFtS3kbbUkThw0ro025xL5/ODUk9fT7dWGxhmOPsPm6WNG9BesnyIeCv8zqPagse9MAjYwt2raqNkUM4JezEHEmluYsYHH2jDpl6uVTHPCzYBa/amTGCAe0wggHpAgEBMIGjMIGVMREwDwYDVQQKEwhGcmVlIFRTQTEQMA4GA1UECxMHUm9vdCBDQTEYMBYGA1UEAxMPd3d3LmZyZWV0c2Eub3JnMSIwIAYJKoZIhvcNAQkBFhNidXNpbGV6YXNAZ21haWwuY29tMRIwEAYDVQQHEwlXdWVyemJ1cmcxDzANBgNVBAgTBkJheWVybjELMAkGA1UEBhMCREUwggIiMA0GCSqGSIb3DQEBAQUAA4ICDwAwggIKAoICAQkBFhNidXNpbGV6YXNAZ21haWwuY29tMRIwEAYDVQQHEwlXdWVyemJ1cmcxDzANBgNVBAgTBkJheWVybjELMAkGA1UEBhMCREUwggIiMA0GCSqGSIb3DQEBAQUAA4ICDwAwggIKAoICAQDC6YYWDajpzTANBgIghkgBZQMEAgMFAKCBuDAaBgkqhkiG9w0BCQMxDQYLKoZIhvcNAQkQAQQwHAYJKoZIhvcNAQkFMQ8XDTI2MDkyMzA2NTgyNlowKwYLKoZIhvcNAQkQAgwxHDAaMBgwFgQUSB/VPFNNOEGAwChlGaA2+YhUR2YwTwYJKoZIhvcNAQkEMUIEQLINw2hPLBszCvaCdnDN3qt1LlQyx8PvAdzKpAztgoW9UaOwJLWb2eYj5xei7oYe1tdbeARme2LpzXZ1Lnbyx9AwCgYIKoIzj0EAwQEaDBmAjEAs4kGxKct6OA6fK7f/vENlptpNIn/Cj1EuRA2LdiH0Ysc3awaxuvN0DiyXg0p+AzfAjEAyEER5OjuUW2ZxFowuFj4210HtqB2duwpcE++Ih84HULp0kf7eILz80D/AzDCe92W
TSQ Request (Base64)	MEMCAQEwMTANBglghkgBZQMEAgEFAAQgX54uiSfRZFQlQfJ46UzM7eSAWDXXZPO42oVlbzBgZPwCCC214t31vIYxAQH/

Server verification completed (OpenSSL — Verification: OK):

```
openssl ts -verify -in token.tsr -queryfile request.tsq -CAfile cacert.pem -untrusted tsa.crt
```

Current FreeTSA verification files : https://freetsa.org/files/cacert.pem · https://freetsa.org/files/tsa.crt

Scope: this token links a third-party time assertion to the SHA-256 digest; it does not certify report accuracy, source authenticity or legal admissibility.

Combined delivery identity
M1 v2.17.1 · MARS v1.3.0 · CFG 1.1.0 · PORTCFG 1.1.0
CFG SHA-256 · sha256:5866d84dd43dcc06b5bb36a0fe8dc96a7919f70955d6d94ba87215b18da381f6
PORTCFG SHA-256 · sha256:e862b13cfc9c86f97b1c459de1e3950a2bb951d3ef9fedd18cca8eaac6b36e08
RELEASE SHA-256 · sha256:691c85b2c3ac1ee1940bc74c3f28d8e6ceb543f42f8a7a0466dfe75bac20c572

TR ACQUISITION URLS — 9 SOURCES

01 — MACRO — Alboran (ALBO)

https://archive-api.open-meteo.com/v1/archive?latitude=36&longitude=-3&start_date=2026-09-16&end_date=2026-09-17&hourly=pressure_msl%2Cwind_speed_10m%2Cwind_direction_10m%2Ctemperature_2m%2Cwind_gusts_10m%2Cprecipitation%2Crain%2Cweather_code%2Crelative_humidity_2m%2Cdew_point_2m%2Ccloud_cover_low&timezone=UTC&models=era5_seamless&cell_selection=nearest&wind_speed_unit=kn&precipitation_unit=mm&elevation=nan

API : ERA5-Seamless — Open-Meteo | 2026-09-23T06:58:20.476Z | Requested coordinates: Lat 36 / Lon -3 | Returned grid: Lat 36 / Lon -3 | Requested-to-returned great-circle distance: 0.0 km | Units: cloud_cover_low=%, dew_point_2m=°C, precipitation=mm, pressure_msl=hPa, rain=mm, relative_humidity_2m=%, temperature_2m=°C, time=iso8601, weather_code=wmo code, wind_direction_10m=°, wind_gusts_10m=kn, wind_speed_10m=kn | OK

02 — MACRO — Algero-Provençal (ALGP)

https://archive-api.open-meteo.com/v1/archive?latitude=37.5&longitude=4&start_date=2026-09-16&end_date=2026-09-17&hourly=pressure_msl%2Cwind_speed_10m%2Cwind_direction_10m%2Ctemperature_2m%2Cwind_gusts_10m%2Cprecipitation%2Crain%2Cweather_code%2Crelative_humidity_2m%2Cdew_point_2m%2Ccloud_cover_low&timezone=UTC&models=era5_seamless&cell_selection=nearest&wind_speed_unit=kn&precipitation_unit=mm&elevation=nan

API : ERA5-Seamless — Open-Meteo | 2026-09-23T06:58:21.334Z | Requested coordinates: Lat 37.5 / Lon 4 | Returned grid: Lat 37.5 / Lon 4 | Requested-to-returned great-circle distance: 0.0 km | Units: cloud_cover_low=%, dew_point_2m=°C, precipitation=mm, pressure_msl=hPa, rain=mm, relative_humidity_2m=%, temperature_2m=°C, time=iso8601, weather_code=wmo code, wind_direction_10m=°, wind_gusts_10m=kn, wind_speed_10m=kn | OK

03 — MACRO — Lion (LION)

https://archive-api.open-meteo.com/v1/archive?latitude=42.5&longitude=4.5&start_date=2026-09-16&end_date=2026-09-17&hourly=pressure_msl%2Cwind_speed_10m%2Cwind_direction_10m%2Ctemperature_2m%2Cwind_gusts_10m%2Cprecipitation%2Crain%2Cweather_code%2Crelative_humidity_2m%2Cdew_point_2m%2Ccloud_cover_low&timezone=UTC&models=era5_seamless&cell_selection=nearest&wind_speed_unit=kn&precipitation_unit=mm&elevation=nan

API : ERA5-Seamless — Open-Meteo | 2026-09-23T06:58:22.049Z | Requested coordinates: Lat 42.5 / Lon 4.5 | Returned grid: Lat 42.5 / Lon 4.5 | Requested-to-returned great-circle distance: 0.0 km | Units: cloud_cover_low=%, dew_point_2m=°C, precipitation=mm, pressure_msl=hPa, rain=mm, relative_humidity_2m=%, temperature_2m=°C, time=iso8601, weather_code=wmo code, wind_direction_10m=°, wind_gusts_10m=kn, wind_speed_10m=kn | OK

04 — MACRO — Tyrrhenian (TYRR)

https://archive-api.open-meteo.com/v1/archive?latitude=40&longitude=11&start_date=2026-09-16&end_date=2026-09-17&hourly=pressure_msl%2Cwind_speed_10m%2Cwind_direction_10m%2Ctemperature_2m%2Cwind_gusts_10m%2Cprecipitation%2Crain%2Cweather_code%2Crelative_humidity_2m%2Cdew_point_2m%2Ccloud_cover_low&timezone=UTC&models=era5_seamless&cell_selection=nearest&wind_speed_unit=kn&precipitation_unit=mm&elevation=nan

API : ERA5-Seamless — Open-Meteo | 2026-09-23T06:58:22.746Z | Requested coordinates: Lat 40 / Lon 11 | Returned grid: Lat 40 / Lon 11 | Requested-to-returned great-circle distance: 0.0 km | Units: cloud_cover_low=%, dew_point_2m=°C, precipitation=mm, pressure_msl=hPa, rain=mm, relative_humidity_2m=%, temperature_2m=°C, time=iso8601, weather_code=wmo code, wind_direction_10m=°, wind_gusts_10m=kn, wind_speed_10m=kn | OK

05 — MACRO — Ionian (IONI)

https://archive-api.open-meteo.com/v1/archive?latitude=36&longitude=17&start_date=2026-09-16&end_date=2026-09-17&hourly=pressure_msl%2Cwind_speed_10m%2Cwind_direction_10m%2Ctemperature_2m%2Cwind_gusts_10m%2Cprecipitation%2Crain%2Cweather_code%2Crelative_humidity_2m%2Cdew_point_2m%2Ccloud_cover_low&timezone=UTC&models=era5_seamless&cell_selection=nearest&wind_speed_unit=kn&precipitation_unit=mm&elevation=nan

API : ERA5-Seamless — Open-Meteo | 2026-09-23T06:58:23.450Z | Requested coordinates: Lat 36 / Lon 17 | Returned grid: Lat 36 / Lon 17 | Requested-to-returned great-circle distance: 0.0 km | Units: cloud_cover_low=%, dew_point_2m=°C, precipitation=mm, pressure_msl=hPa, rain=mm, relative_humidity_2m=%, temperature_2m=°C, time=iso8601, weather_code=wmo code, wind_direction_10m=°, wind_gusts_10m=kn, wind_speed_10m=kn | OK

06 — MACRO — Aegean (EGEE)

https://archive-api.open-meteo.com/v1/archive?latitude=37&longitude=25&start_date=2026-09-16&end_date=2026-09-17&hourly=pressure_msl%2Cwind_speed_10m%2Cwind_direction_10m%2Ctemperature_2m%2Cwind_gusts_10m%2Cprecipitation%2Crain%2Cweather_code%2Crelative_humidity_2m%2Cdew_point_2m%2Ccloud_cover_low&timezone=UTC&models=era5_seamless&cell_selection=nearest&wind_speed_unit=kn&precipitation_unit=mm&elevation=nan

API : ERA5-Seamless — Open-Meteo | 2026-09-23T06:58:24.216Z | Requested coordinates: Lat 37 / Lon 25 | Returned grid: Lat 37 / Lon 25 | Requested-to-returned great-circle distance: 0.0 km | Units: cloud_cover_low=%, dew_point_2m=°C, precipitation=mm, pressure_msl=hPa, rain=mm, relative_humidity_2m=%, temperature_2m=°C, time=iso8601, weather_code=wmo code, wind_direction_10m=°, wind_gusts_10m=kn, wind_speed_10m=kn | OK

07 — PORT ATMOS — Oran (ORAN)

https://archive-api.open-meteo.com/v1/archive?latitude=35.69&longitude=-0.63&start_date=2026-09-16&end_date=2026-09-17&hourly=pressure_msl%2Cwind_speed_10m%2Cwind_direction_10m%2Ctemperature_2m%2Cwind_gusts_10m%2Cprecipitation%2Crain%2Cweather_code%2Crelative_humidity_2m%2Cdew_point_2m%2Ccloud_cover_low&timezone=UTC&models=era5_seamless&cell_selection=nearest&wind_speed_unit=kn&precipitation_unit=mm&elevation=nan

API : ERA5-Seamless — Open-Meteo | 2026-09-23T06:58:24.897Z | Requested coordinates: Lat 35.69 / Lon -0.63 | Returned grid: Lat 35.700005 / Lon -0.59999084 | Requested-to-returned great-circle distance: 2.9 km | Units: cloud_cover_low=%, dew_point_2m=°C, precipitation=mm, pressure_msl=hPa, rain=mm, relative_humidity_2m=%, temperature_2m=°C, time=iso8601, weather_code=wmo code, wind_direction_10m=°, wind_gusts_10m=kn, wind_speed_10m=kn | OK

08 — PORT VISIBILITÉ — Oran (ORAN)

https://historical-forecast-api.open-meteo.com/v1/forecast?latitude=35.69&longitude=-0.63&start_date=2026-09-16&end_date=2026-09-17&hourly=visibility&timezone=UTC&models=best_match&cell_selection=nearest

API : Visibilité modélisée — Open-Meteo Historical Forecast | 2026-09-23T06:58:25.456Z | Requested coordinates: Lat 35.69 / Lon -0.63 | Returned grid: Lat 35.6875 / Lon -0.625 | Requested-to-returned great-circle distance: 0.5 km | Units: time=iso8601, visibility=m | OK | MODEL_FIELD_NOT_IN_SITU_OBSERVATION

09 — PORT MARINE OFFSHORE — Oran (ORAN)

https://marine-api.open-meteo.com/v1/marine?latitude=35.85&longitude=-0.63&start_date=2026-09-16&end_date=2026-09-17&hourly=wave_height%2Cwave_period%2Cwave_direction%2Cswell_wave_height&timezone=UTC&models=era5_ocean&cell_selection=sea

API : ERA5-Ocean — Open-Meteo | 2026-09-23T06:58:26.011Z | Requested coordinates: Lat 35.85 / Lon -0.63 | Returned grid: Lat 36 / Lon -0.5 | Requested-to-returned great-circle distance: 20.4 km | Units: swell_wave_height=undefined, time=iso8601, wave_direction=°, wave_height=m, wave_period=s | MARS v1.3.0 — chaîne de modélisation numérique exécutée · hauteurs ERA5-Ocean utilisées directement · 0 valeur Hs reconstruite par repli · 2 diagnostics non transformants

D APPENDIX — PRIMARY AND INSTITUTIONAL REFERENCES

1. **ECMWF** — ERA5: ECMWF fifth-generation atmospheric reanalysis, produced for the Copernicus Climate Change Service. https://www.ecmwf.int/en/forecasts/dataset/ecmwf-reanalysis-v5
2. **Open-Meteo** — Historical Weather API: ERA5/ERA5-Land sources, hourly precipitation variables and WMO weather-code interpretation. https://open-meteo.com/en/docs/historical-weather-api
3. **Open-Meteo** — Historical Forecast API: archived model forecasts and hourly horizontal-visibility field. https://open-meteo.com/en/docs/historical-forecast-api
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