Met Éireann

The Irish Meteorological Service

Storm Agnes

Marine Storm Report

Marine Unit

Report Date: 20 August 2025

Report Time: 13:41 UTC

Storm Overview

Dates: 2023-09-27, 2023-09-28

Description: First named storm of 2023-24 season. Brought strong winds and heavy rain across Ireland.

Peak Winds: 80+ km/h

Areas Affected: West Coast, Southwest, South Coast

Marine Observations Summary

Data Sources

- **Buoy 62091** (M1 Buoy): 53.47°N, 5.42°W - West Coast
- **Buoy 62092** (M2 Buoy): 53.48°N, 5.42°W - West Coast
- **Buoy 62093** (M3 Buoy): 51.22°N, 6.70°W - Southwest Coast
- **Buoy 62094** (M4 Buoy): 51.69°N, 6.70°W - Southwest Coast
- **Buoy 62095** (M5 Buoy): 53.06°N, 7.90°W - West Coast

Peak Conditions Observed

- **Maximum Wind Speed:** 43.1 m/s (155.0 km/h) at Buoy 62092
- **Maximum Significant Wave Height (Hm0):** 8.4 m at Buoy 62092
- **Maximum Wave Height (Hmax):** 13.1 m at Buoy 62092
- **Minimum Pressure:** 980.4 hPa at Buoy 62092
- **Temperature Range:** 11.5°C (Buoy 62095) to 17.2°C (Buoy 62091)
- **Total Observations:** 924 records from 5 stations (QC good data only)

Station-by-Station Analysis

Buoy 62091 - M1 Buoy

- **Location:** 53.47°N, 5.42°W
- **Region:** West Coast
- **Peak Wind Speed:** 38.6 m/s (139.0 km/h)
- **Peak Significant Wave Height (Hm0):** 5.0 m
- **Peak Maximum Wave Height (Hmax):** 6.1 m
- **Minimum Pressure:** 988.3 hPa
- **Data Quality:** Excellent (100.0% good data)
- **Observations:** 191 records (QC good data only)

Buoy 62092 - M2 Buoy

- **Location:** 53.48°N, 5.42°W
- **Region:** West Coast
- **Peak Wind Speed:** 43.1 m/s (155.0 km/h)
- **Peak Significant Wave Height (Hm0):** 8.4 m
- **Peak Maximum Wave Height (Hmax):** 13.1 m
- **Minimum Pressure:** 980.4 hPa
- **Data Quality:** Excellent (100.0% good data)
- **Observations:** 178 records (QC good data only)

Buoy 62093 - M3 Buoy

- **Location:** 51.22°N, 6.70°W
- **Region:** Southwest Coast
- **Peak Wind Speed:** 31.0 m/s (111.5 km/h)
- **Peak Significant Wave Height (Hm0):** 5.7 m
- **Peak Maximum Wave Height (Hmax):** 9.6 m
- **Minimum Pressure:** 986.0 hPa
- **Data Quality:** Excellent (100.0% good data)
- **Observations:** 187 records (QC good data only)

Buoy 62094 - M4 Buoy

- **Location:** 51.69°N, 6.70°W
- **Region:** Southwest Coast
- **Peak Wind Speed:** 28.9 m/s (104.1 km/h)
- **Peak Significant Wave Height (Hm0):** 8.2 m
- **Peak Maximum Wave Height (Hmax):** 11.7 m

- **Minimum Pressure:** 992.8 hPa
- **Data Quality:** Excellent (100.0% good data)
- **Observations:** 177 records (QC good data only)

Buoy 62095 - M5 Buoy

- **Location:** 53.06°N, 7.90°W
- **Region:** West Coast
- **Peak Wind Speed:** 27.4 m/s (98.8 km/h)
- **Peak Significant Wave Height (Hm0):** 5.6 m
- **Peak Maximum Wave Height (Hmax):** 8.7 m
- **Minimum Pressure:** 990.4 hPa
- **Data Quality:** Excellent (100.0% good data)
- **Observations:** 191 records (QC good data only)

Meteorological Analysis

Wind Analysis

The storm produced maximum sustained winds of **43.1 m/s** (155.0 km/h), representing significant marine weather conditions. Wind speeds of this magnitude pose considerable risks to marine operations and coastal areas.

Wind Categories:

- Force 7 (Strong Gale): 13.9-17.1 m/s (50-61 km/h)
- Force 8 (Gale): 17.2-20.7 m/s (62-74 km/h)
- Force 9 (Strong Gale): 20.8-24.4 m/s (75-88 km/h)
- Force 10+ (Storm): >24.5 m/s (>88 km/h)

Wave Analysis

Significant Wave Heights (Hm0): Peak values reached **8.4 m**, representing **high** sea states according to the World Meteorological Organization classification.

Maximum Wave Heights (Hmax): Individual wave heights peaked at **13.1 m**, representing **very high** conditions for maximum wave heights.

Wave Height Relationship: The Hmax/Hm0 ratio was **1.57**, within normal range (1.3-1.8).

Sea State Classification (Hm0):

- Rough: 2.5-4.0 m
- Very Rough: 4.0-6.0 m
- High: 6.0-9.0 m
- Very High: 9.0-14.0 m
- Phenomenal: >14.0 m

Wave Height Definitions:

- **Hm0 (Significant Wave Height):** Average height of the highest one-third of waves

- **Hmax (Maximum Wave Height):** Highest individual wave recorded during the period

Pressure Analysis

Atmospheric pressure dropped to a minimum of **980.4 hPa**, representing a pressure anomaly of 32.9 hPa below standard atmospheric pressure (1013.25 hPa).

Pressure Categories:

- Normal: 1013-1023 hPa
- Low: 1000-1013 hPa
- Very Low: 980-1000 hPa
- Extremely Low: <980 hPa

Storm Timeline

Storm Period: 2023-09-26 00:00 to 2023-09-30 00:00 UTC

Duration: 4 days, 0 hours

Key Timeline Points:

- Storm approach: Pressure began dropping and winds increased
- Peak intensity: Maximum winds and waves recorded
- Storm passage: Gradual improvement in conditions

Quality Control Summary

Total Records: 924

QC Status Distribution:

- Good Data (QC=1): 924 records (100.0%)
- Adjusted Data (QC=5): 0 records (0.0%)
- Failed QC (QC=4): 0 records (0.0%)
- Missing Data (QC=9): 0 records (0.0%)
- No QC (QC=0): 0 records (0.0%)

Data Visualization

!Storm Overview

Figure 1: Comprehensive marine meteorological analysis showing wind speed, wave height, atmospheric pressure, air temperature, wind direction, and wave period during Storm Agnes.

Technical Notes

QC Methods Applied

- **Manual QC:** Visual inspection and expert validation
- **Automatic QC:** Range checks, spike detection, and flat-line identification
- **AI-powered QC:** Machine learning algorithms for anomaly detection

Data Quality Indicators

- 0: No QC performed
- 1: QC performed, data OK
- 4: QC performed, raw data not OK and not adjusted
- 5: QC performed, raw data not OK but value adjusted/interpolated
- 6: QC performed, data OK (Datawell Hmax sensor specific)
- 9: Data missing

Measurement Uncertainties

- Wind Speed: ±0.3 m/s
- Wave Height: ±5% or 0.5m (whichever greater)
- Atmospheric Pressure: ±0.5 hPa
- Air Temperature: ±0.2°C

Report generated by Marine Storm Analysis System Data source: Irish Marine Data Buoy Network Quality controlled data from Met Éireann marine observations

Marine Meteorological Analysis

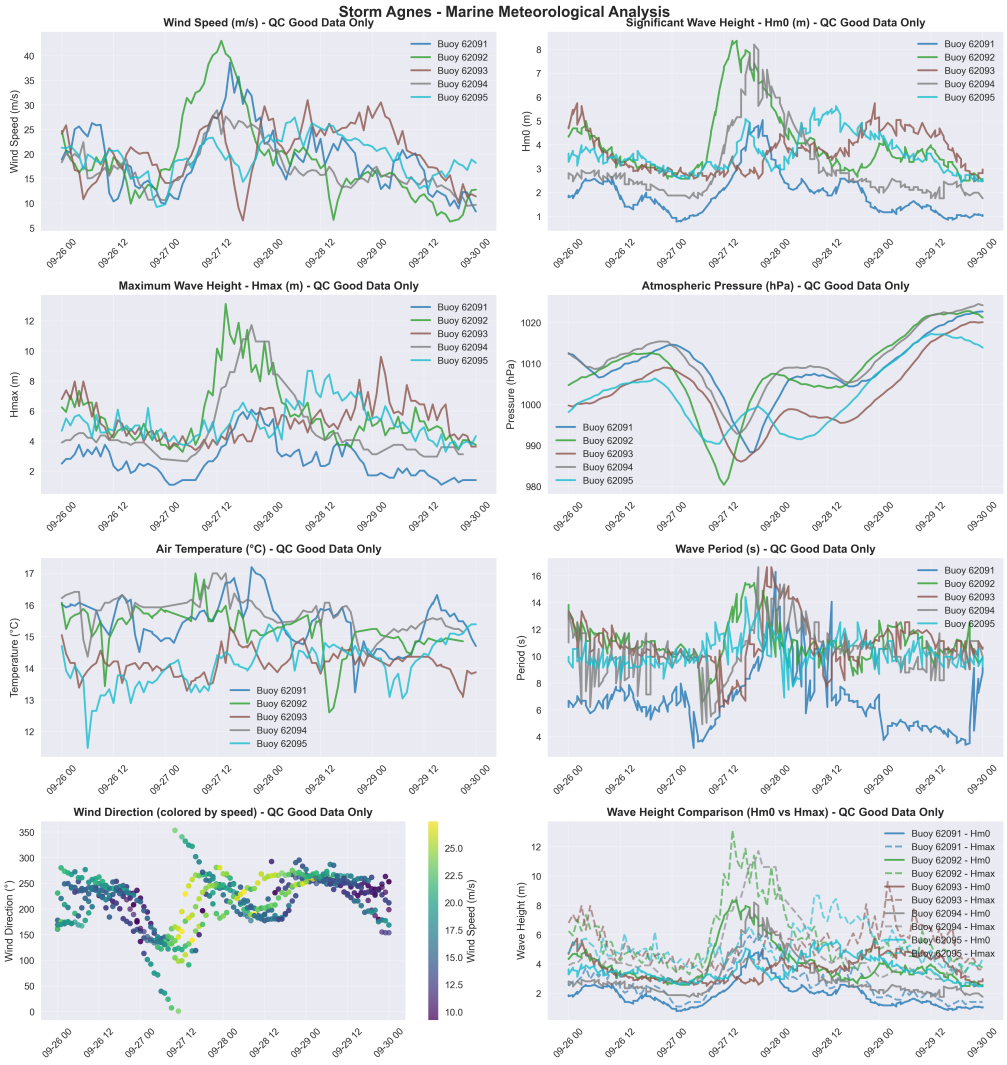

Figure 1: Marine meteorological observations during Storm Agnes. Eight-panel analysis showing wind speed, significant wave height (Hm0), maximum wave height (Hmax), atmospheric pressure, air temperature, wave period, wind direction patterns, and comparative wave heights across the Irish Marine Data Buoy Network. Quality-controlled data only.

Met Éireann Marine Unit

Irish Marine Data Buoy Network

Valentia Observatory, Co. Kerry

www.met.ie/climate/storm-centre