MARSH RE

September 2026

Is the 2025 to 2026 Windstorm Season the New Normal?

Contents

Executive summary

- The 2025 to 2026 season experienced unusually large losses from storms affecting the Iberian Peninsula.
- The significant losses in the Iberian Peninsula were due in part to the severity of the wind, but also the wetness of the storms and heavy rain, which caused flooding in parts of Spain and Portugal.
- Climate change is expected to reduce the frequency and severity of windstorms and river flooding in Southern Europe. Flash flooding may increase due to more extreme rainfall. However, we can expect variability to dominate in the short term, with future years experiencing a mixture of high and low windstorm activity.
- Factors other than hazard, such as urban expansion, inflation, and flood defenses, can significantly affect insured losses.

Introduction

The winter of 2025 to 2026 stands out as an unusual European windstorm season. While multiple storms impacted Southern Europe and Scandinavia, key exposure regions across northern France, the Benelux countries, and Germany experienced limited impacts relative to the Iberian Peninsula. This spatial imbalance in storm activity highlights the importance of variability in storm tracks and associated hazards, rather than a clear shift in overall storm frequency or severity.

A defining feature of the season was the disproportionate impact on the Iberian Peninsula, where several storm systems brought not only strong winds but also heavy rain. As a result, a substantial share of the economic loss was driven by flooding rather than wind damage alone.

This briefing examines the meteorological and climatic conditions that contributed to the characteristics of the 2025 to 2026 season. It considers the role of natural climate variability, including the North Atlantic Oscillation (NAO), in shaping storm tracks and impacts, and reviews current evidence regarding the influence of climate change on European windstorm and flood risk.

Key 2025 to 2026 storms

The 2025 to 2026 winter season was characterized by a succession of storms affecting different regions of Europe. While storms continued to impact Northern and Western Europe, several of the highest loss-causing events tracked more southerly, bringing strong winds and heavy rainfall to Spain and Portugal. In contrast to many recent seasons, losses in the Iberian Peninsula represented a large share of total European insured losses, driven by both wind and rain.

Table 1 − Key storms affecting Europe during the 2025 to 2026 winter season

Storm name	Date	Countries affected	Primary sub-perils	Insured loss
Ex-hurricane Gabrielle	Sept. 28 to 30 2025	Eastern Spain	Heavy rain	Not available
Detlef/Amy	Oct. 3 to 5 2025	UK, Ireland, Norway, Denmark	Combination of wind and rain	< €200 million[2]
Helmut/Bram	Dec. 9 to 10 2025	UK, Ireland, France	Predominantly wind	< €200 million[2]
Elli/Goretti	Jan. 8 to 9 2026	France, Belgium, UK	Predominantly wind	€468 million[1]
Kristin	Jan. 28 to 31 2026	Spain and Portugal	Predominantly wind	€1,727 million[1]
Leonardo	Feb. 3 to 6 2026	Spain and Portugal	Predominantly rain	< €200 million[2]
Marta	Feb. 7 to 9 2026	Spain and Portugal	Predominantly rain	< €200 million[2]
Ulrike/Nils	Feb. 11 to 13 2026	France, Portugal, Spain	Combination of wind and rain	€695 million[1] (France)
Oriana	Feb. 12 to 15 2026	France, Portugal, Spain	Predominantly wind	< €200 million[2]
Yael/Pedro	Feb. 18 to 19 2026	France, Portugal, Spain, UK, Germany	Combination of wind and rain	Not available
Rapunzel/Dave	April 4 to 5 2026	UK, Ireland, Sweden, Denmark, Norway	Combination of wind and rain	< €200 million[2]

Sources: [1] PERILS, [2] Marsh Re

Factors affecting windstorm activity in Europe

Key reasons for changes in windstorm activity include:

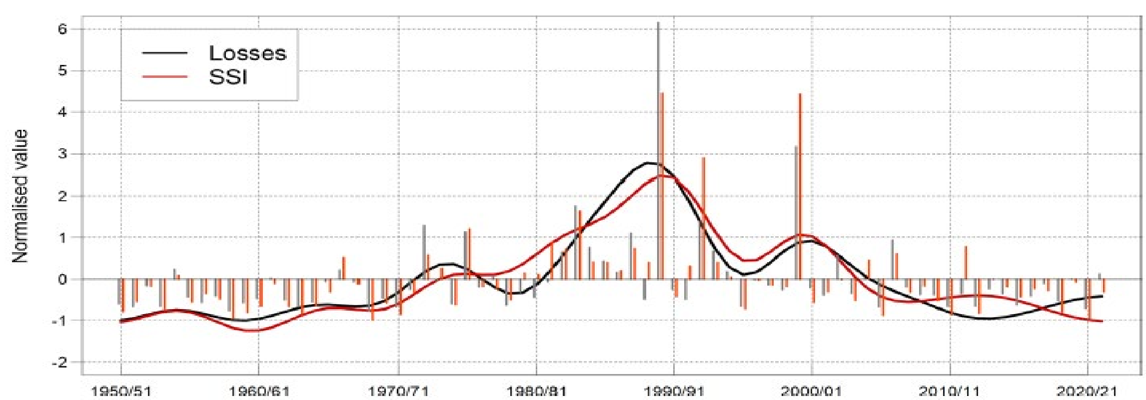
- **Natural variability –** The natural variation in storm activity arising from fluctuations in weather and climate conditions
- **NAO –** A positive NAO tends to favor storms in Northern Europe, and a negative NAO has a similar effect in Southern Europe. NAO contributes to natural variability.
- **Climate change –** There is little to no evidence of historical trends in windstorm activity due to climate change, but future warming may result in changes in the severity and wetness of storms in parts of Europe

These factors are explored in more detail in the following sections.

Natural variability

European windstorm activity is characterized by pronounced natural variability on annual and decadal timescales. Historical records show alternating periods of elevated and suppressed storm activity, reflecting natural fluctuations in atmospheric and oceanic conditions rather than a clear long-term trend (Cusack, 2023). As shown in Figure 1, substantial variations in storm losses and Storm Severity Index (SSI) values have occurred throughout the historical record, with periods such as the late 1980s and early 1990s exhibiting elevated activity, while other periods were comparatively inactive. The SSI represents the severity of a storm based on its geographical size and intensity of gusts.

Figure 1 – Time series of losses (black) and SSI (red), in normalized values, both for annual values (bars) and low-pass-filtered versions with a ten-year cutoff frequency (lines)

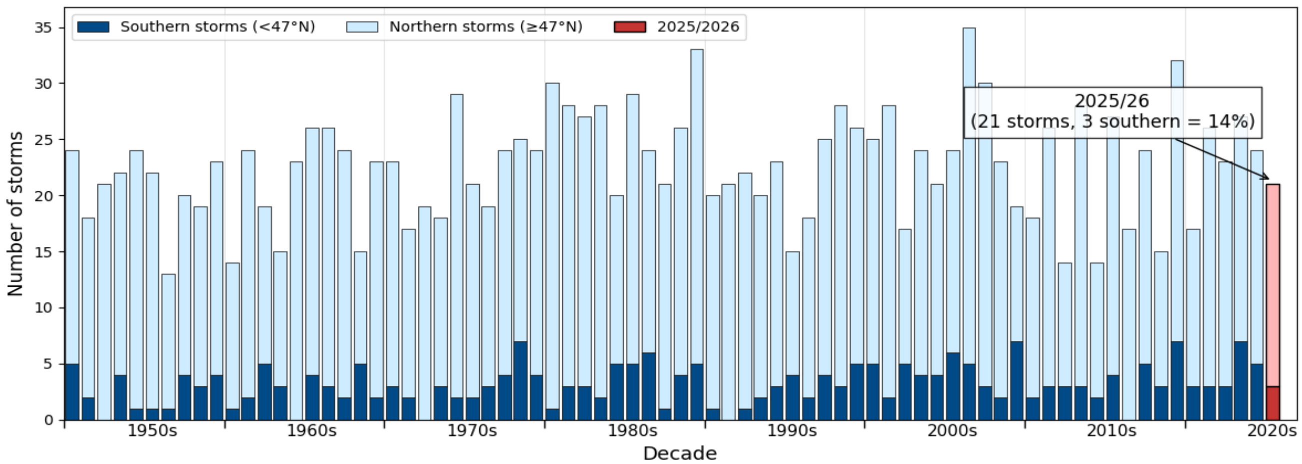


SSI in this figure is defined as the cube of the difference between the daily maximum wind gust and the 98th percentile of wind gust. Losses in this figure are defined as the population-weighted SSI.

Source: Cusack, 2023

The 2025 to 2026 season was not especially unusual in terms of either total storm count or the geographical distribution of storm activity. A total of 21 storms were identified, compared with a historical seasonal mean of approximately 22.

Figure 2 − Windstorm frequency by season − Southern vs. Northern storms (1950 to 2026)



Bars show the annual count of windstorms, separated into southern storms (where the location of maximum gust occurs south of 47°N) and northern storms (which occur north of 47°N). Historical storms include all storms since 1950 that are tracked using the Hodges algorithm applied over ERA5 reanalysis wind fields and sea-level pressure over Europe (also known as TRACK). Light blue bars indicate northern storms and dark blue bars indicate southern storms. The 2025 to 2026 season is highlighted in red, with southern storms in darker red.

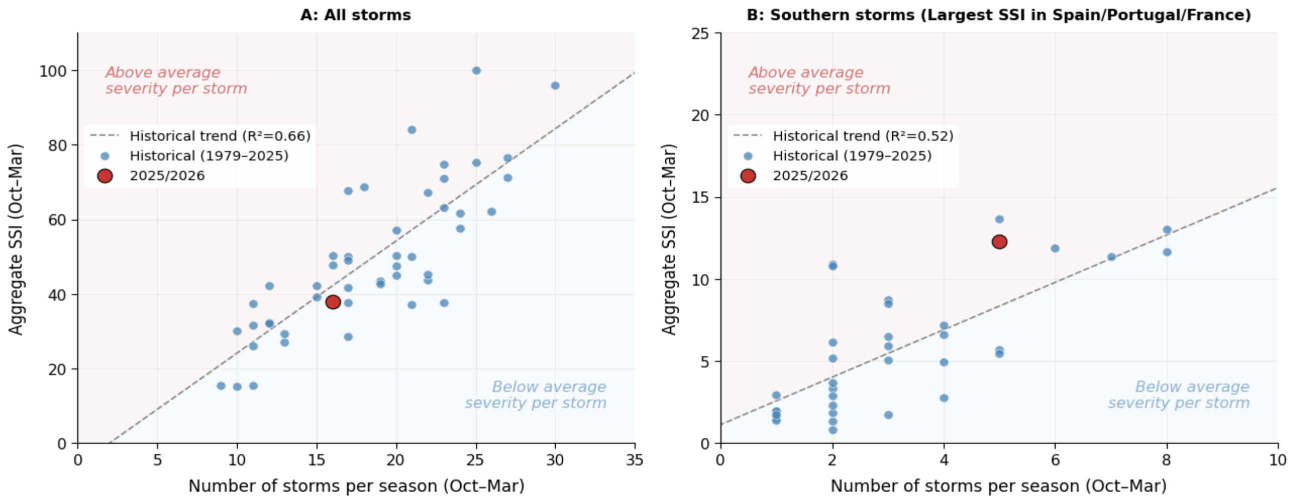
Source: Copernicus Climate Change Service (C3S, 2025), Marsh Re

Of the windstorm tracks identified using the TRACK algorithm, only three storms, or 14% of the total, reached maximum gusts at latitudes south of 47°N, which is consistent with the historical mean of 3.2 southern storms per season. However, seven named storms impacted Spain and/or Portugal during the 2025 to 2026 season. This places the 2025 to 2026 season around the middle of the historical distribution of southern European storms, based on the latitude of maximum gusts in the historical data, but the total number and impact of storms affecting the Iberian Peninsula were notably higher. As discussed in later sections, there is no evidence of an extreme anomaly, and any year-to-year variation remains consistent with natural variability.

The total number of storms from 2025 to 2026 was slightly below average, with 21 storms compared with a historical mean of 22 storms per season. Similarly, the number of storms reaching maximum gusts in northern Europe was 18, slightly below the historical mean of 19.3. Overall, the results suggest that 2025 to 2026 was a typical season, with total storm activity slightly below average rather than unusually elevated.

Figure 3 explores the severity of storms across Europe compared with France and the Iberian Peninsula. On a Europe-wide basis, the 2025 to 2026 season was broadly consistent with the historical relationship between storm frequency and aggregate severity (SSI), although it sat slightly below the trend line. This suggests that, for the number of storms observed, the average severity per storm was not unusually high across Europe as a whole. In contrast, the regional results for France and the Iberian Peninsula indicate a stronger signal, with aggregate SSI above that expected for the number of storms affecting the region. Overall, this suggests that while the 2025 to 2026 season was typical from a pan-European perspective, storms impacting southern Europe were relatively more severe than the historical average.

Figure 3 – Storm frequency compared to severity for (A) all storms in Europe and (B) storms in which the SSI value was largest in France, Spain or Portugal



Values above and to the left of the dashed line (red-shaded area) indicate seasons that exhibited above-average severity per storm, while those below and to the right (blue-shaded area) exhibited below-average severity per storm. SSI in this figure is computed as the difference between the daily maximum wind gust and 20 meters/second, averaged over the country's domain. In panel (B), the aggregate SSI includes SSI values for France, Spain, and Portugal only

Sources: (C3S, 2025), Marsh Re

It was also worth noting that a few of the 2025 to 2026 storms, such as Marta, Nils, and Oriana, occurred together in groups, a phenomenon known as serial clustering. Clustering commonly occurs for European windstorms and has been observed in multiple studies (Priestley et al., 2018; Mailier et al., 2006; Pinto et al., 2013). Sometimes an "offspring" storm can be generated by a "parent" storm, and a family of storms occurs one after another in close succession.

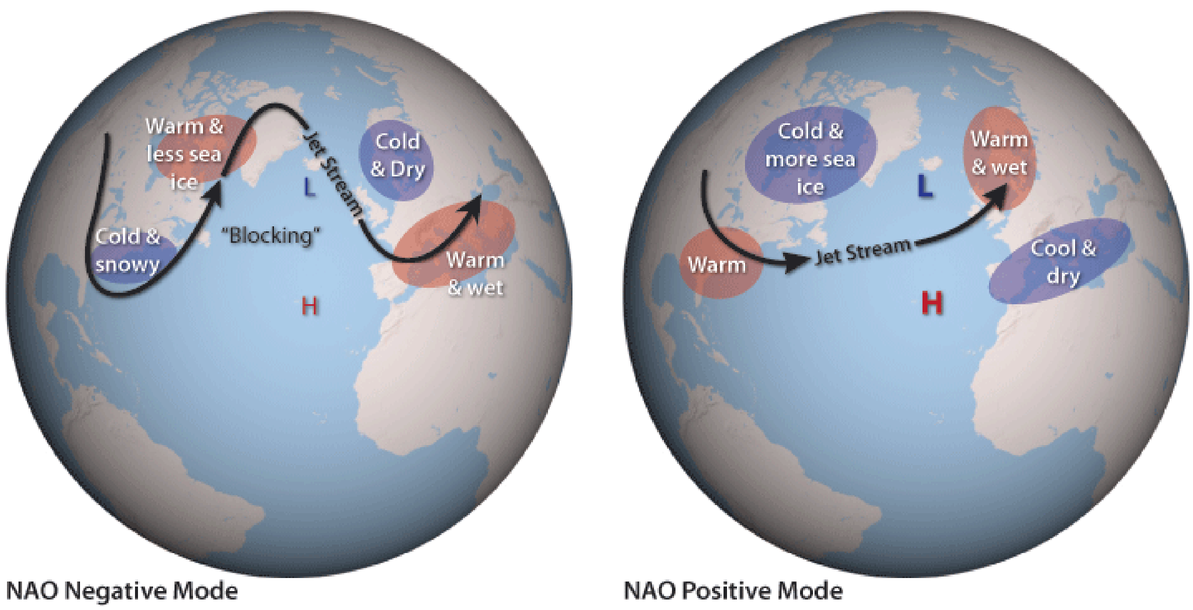
Thus, it is not uncommon for one storm to be followed close behind by another. These events may also be influenced by the storm identification methodology used to derive windstorm tracks. As a result, the apparently unremarkable number of southern storms may partly reflect the way clustered events are identified and grouped.

North Atlantic Oscillation

NAO is a large-scale circulation pattern defined by the pressure difference between Iceland (low pressure) and the Azores (high pressure). The strength of this pressure difference determines whether the NAO is positive or negative.

NAO negative conditions represent a weaker pressure difference, which typically results in a weaker and wavier jet stream. This can steer storms toward southern Europe. NAO-positive conditions represent a stronger pressure difference, which typically results in a stronger, straighter jet stream. Most storms under these conditions are steered toward Northwestern Europe.

Figure 4 – North Atlantic Oscillation



Source: National Oceanic and Atmospheric Administration

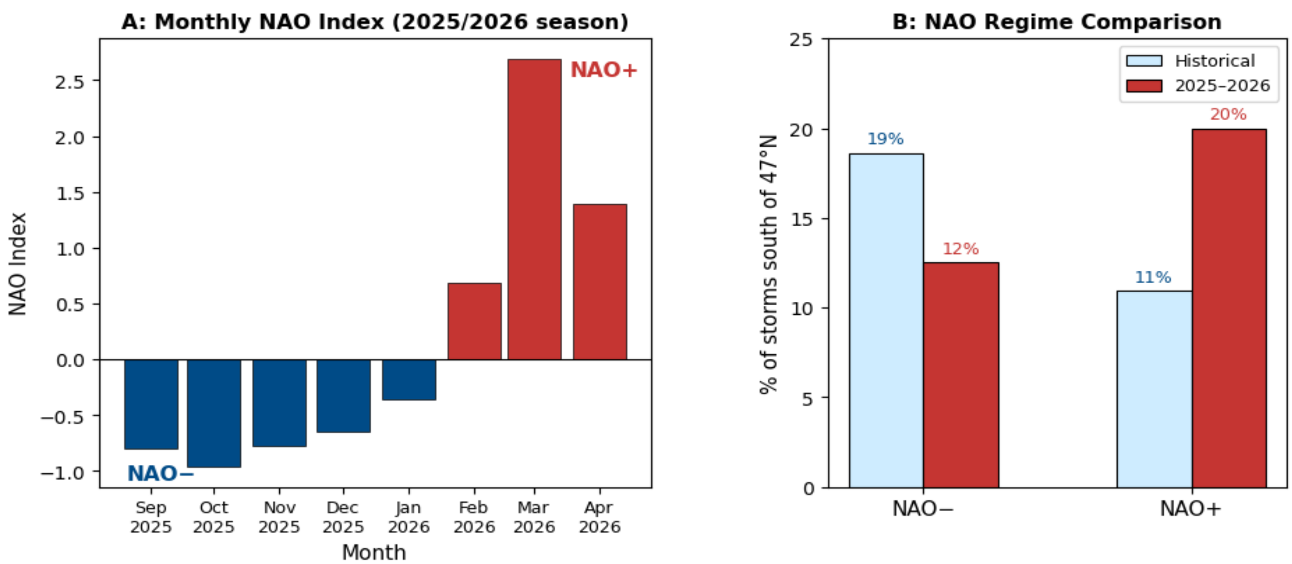
Figure 4 illustrates the expected relationship between the NAO and European windstorm tracks, with negative NAO conditions typically associated with a more southerly storm track and positive NAO conditions favouring a more northerly storm track. Note that the jet stream is simultaneously affected by other atmospheric conditions – the correlation does not apply for all seasons and regions.

Figure 5(A) shows that during the 2025 to 2026 season, the NAO exhibited a transition from weakly negative conditions in early winter to predominantly positive conditions from February onward. In the early part of the season, during the negative NAO phase, the frequency of southern storms was slightly lower than historical expectations.

Figure 5(B) shows a notable feature of the season: the frequency of southern European storms was slightly elevated during periods of positive NAO compared to historical windstorms. A study by Priestley et al. (2023) shows that while there is a positive correlation between NAO and storm activity (i.e., NAO positive associated with higher storm activity) in northern Europe, the correlation is weaker at lower latitudes. In southern Europe, there is a weakly negative correlation (i.e., NAO positive associated with lower-than-average storm activity). The NAO has a more significant impact on windstorm activity in Northern Europe than in Southern Europe, as shown in Figure 6.

In addition, the study shows that NAO is more important for overall windstorm activity and at lower return levels, with a smaller influence on extreme storms. Other studies, such as Walz and Leckebusch (2019) and Walz et al. (2018), show that windstorm activity in Spain is slightly higher than average for NAO negative phases but significantly lower for NAO positive phases (a negative correlation with the NAO) and that there is also some correlation with the East Atlantic circulation pattern.

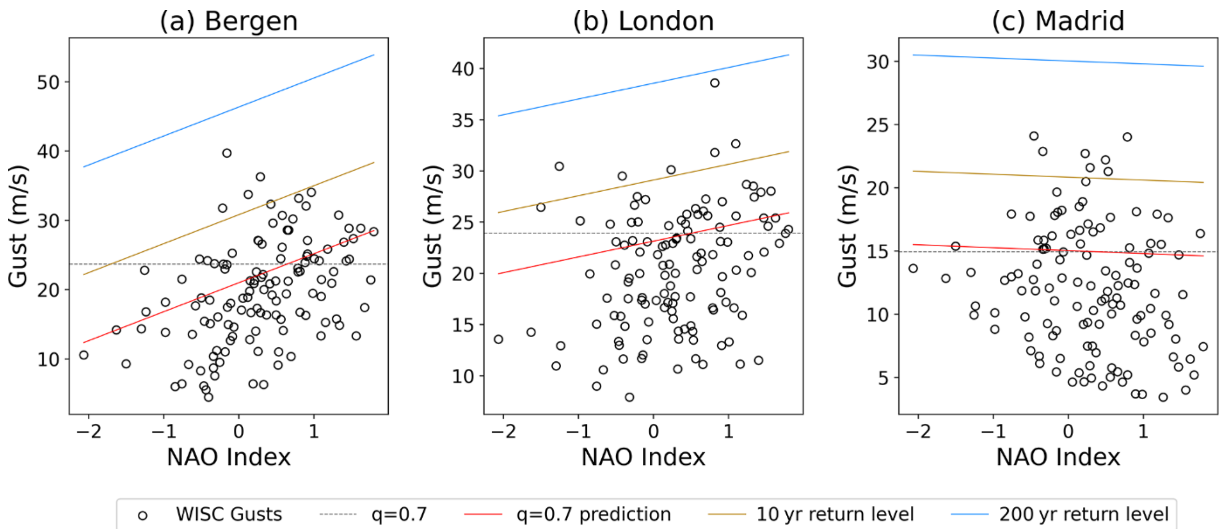
Figure 5 − NAO index and storm track regime comparison for the 2025 to 2026 European windstorm season



(A) shows the monthly NAO index from September 2025 to April 2026, highlighting the transition from weak negative (blue) to strong positive (red) NAO phase in February 2026. Panel B compares the percentage of storms for which lifetime maximum gusts occur south of 47°N, under negative (NAO-) and positive (NAO+) regimes, for both historical (light blue) and 2025 to 2026 (red) seasons.

Sources: (NCEI, 2025), (C3S, 2025), Marsh Re

Figure 6 – Dependence of gusts on the NAO at three locations across Europe – (a) Bergen, (b) London and (c) Madrid



Scatter points show Windstorm Information Service (WISC, 2017) gusts against the daily NAO index. The horizontal dashed black line indicates the 70th percentile of gusts for each location. The red line is the 70th percentile based on the NAO gust regression. The dark yellow line indicates the ten-year return level, and the blue line is the 200-year return level using the Gumbel domain estimation.

Source: Priestley et al. (2023)

Our results demonstrate that the southern storms in 2025 to 2026 cannot be explained by the NAO phase alone. Instead, while NAO likely contributed to early-season variability, it was not the dominant driver of the persistent southward storm track influence observed throughout the season, with overall natural variability likely having a more significant effect.

Non-wind losses

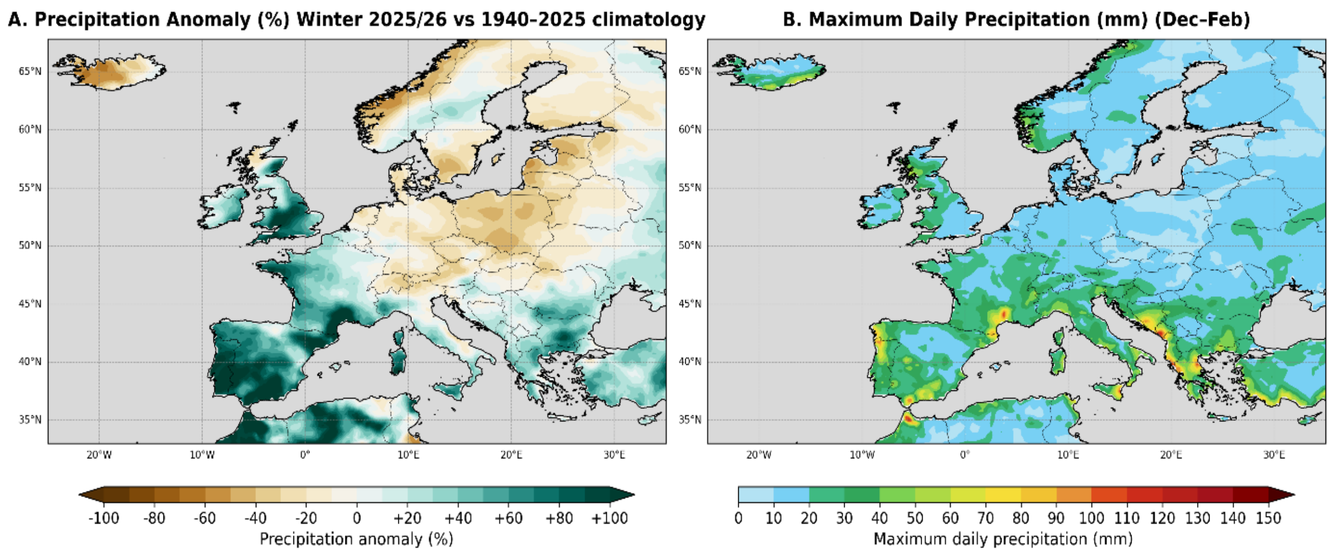
A significant proportion of insured losses in the Iberian Peninsula during the 2025 to 2026 season was due to rain and flooding. Thus, insured losses cannot be wholly explained by changes in wind activity.

As shown in Figure 7, the winter of 2025 to 2026 was marked by a sharp contrast in rainfall across the continent. Western Europe – particularly the Iberian Peninsula, France and parts of the UK – experienced significantly wetter-than-average conditions, while much of central and Eastern Europe remained anomalously dry. The most intense single-day rainfall events were concentrated over the Iberian Peninsula and the Cévennes region of southern France. This pattern was driven by a succession of atmospheric rivers, which are narrow corridors of water vapor transported from the tropics into the mid-latitudes. The south-shifted jet stream then steered this moist air toward southern Europe. The resulting combination of enhanced moisture availability and repeated cyclonic activity produced widespread flooding across the Iberian Peninsula and southern and western France throughout February.

Due to climate change, we can expect storms to become wetter in general and for rain to become heavier when it does occur. This is partly due to the physical property of a warmer atmosphere being able to hold more moisture. This can be further exacerbated by increasing North Atlantic Ocean and Mediterranean Sea temperatures, supplying additional moisture for storms.

Studies generally show that the most extreme storms from a wind perspective are often not highly correlated with the most extreme storms from a flooding perspective. This is because storms tend to either move rapidly across Europe with strong gusts or stall over Europe with weaker gusts and more rain. However, storms in general may become wetter, and so we can expect flooding to contribute an increasingly large proportion of overall losses from storms in a warming climate.

Figure 7 – Winter 2025 to 2026 precipitation over Europe



(A) Percentage anomaly of mean monthly precipitation relative to the 1940 to 2025 December to January to February (DJF) average. (B) Maximum single-day precipitation total (mm) at each grid point from December 2025 to February 2026, highlighting the spatial footprint of the most intense rainfall events.

Source: (Copernicus Climate Change Service, 2023)

Climate change

Overall, future climate change is expected to lead to a decrease in windstorm frequency and severity and in river flooding in southern Europe, but there is high uncertainty. Heavy rainfall, which can lead to flash flooding, may increase in the future under a warming climate. Changes in exposure (such as inflation, population growth), vulnerability, and resilience (such as flood defenses and drainage) usually have a greater impact than changes in hazard alone.

Windstorms – historical trends

There is no consensus on historical trends for European windstorm, with natural variability considered to be the dominant driver of windstorm activity across Europe.

- A review from Feser et al. (2015) found conflicting conclusions on historical trends in storminess in Europe
- A study of the high-loss events of January 2018 (Friederieke and Eleanor) concluded that climate change had no significant influence (Vautard et al., 2019)
- It was shown that even in the absence of a climate change signal, high losses (such as those seen during Daria) are plausible due to climate variability (Walz and Leckebusch, 2019)
- The Intergovernmental Panel on Climate Change's (IPCC) 2021 report states that there is low confidence in past-century trends in the number and intensity of the strongest extratropical cyclones (including European windstorms) due to the large inter-annual and decadal variability
- Some studies (Cusack, 2026) suggest that windstorm activity in northern Europe (including France but excluding Portugal and Spain) has been declining in recent decades due to a reduction in human-induced aerosols in the atmosphere and that this decline can be expected to continue. However, climate models and studies do not agree on the impact of aerosols.

Windstorms – future trends

There is emerging consensus from future projections of a slight increase in storminess over northwest Europe and a reduction over southern Europe.

Table 2 – Projected future changes in European windstorm activity

Region	Future Trend
Northwest Europe	Increase in storm severity and footprint size Decrease in frequency
Central Europe	Increase in storm severity Decrease in frequency
Southern Europe	Decrease in storm frequency and severity
Eastern Europe	Inconclusive change

Sources: Mölter et al. (2016), (IPCC, 2021), (Priestley and Catto, 2022), Priestley et al. (2024)

Surface water or flash flooding

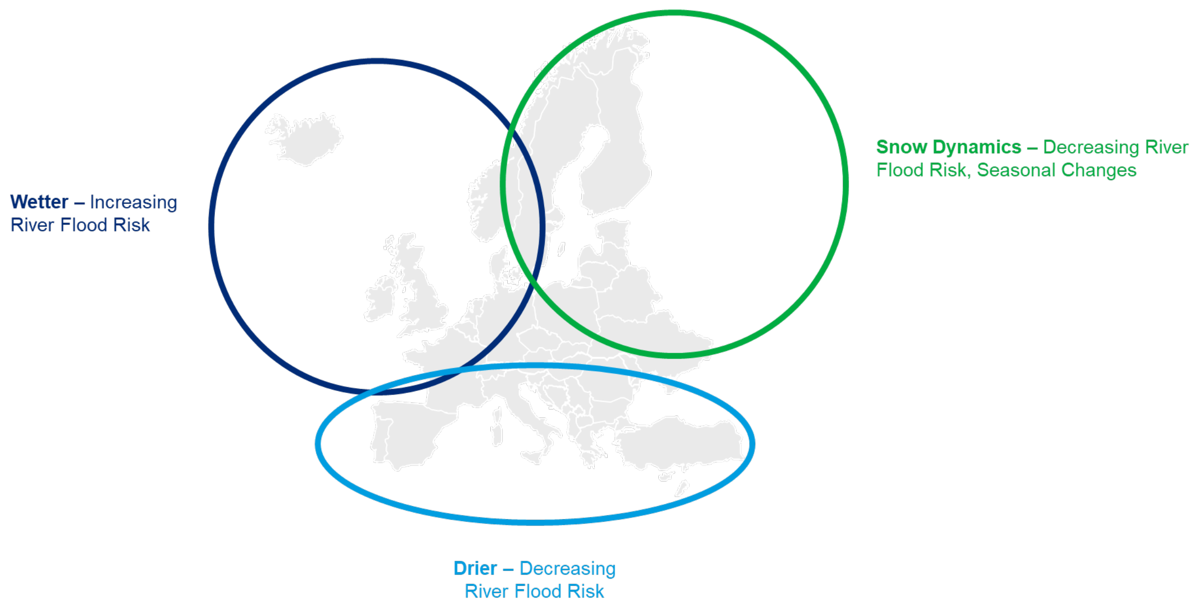
Intense rainfall has a relatively direct link to surface water flooding. Therefore, the climate change impact is generally well understood, with a warming climate expected to lead to increased extreme rainfall. The magnitude of change is less well understood, since coarse-resolution global climate models do not accurately capture rainfall, particularly local-scale intense rainfall. In addition, the ability of the ground and drainage systems to cope with heavy rain can influence flood impacts.

River flooding

The response of riverine flooding to climate change is dependent on multiple factors, including annual and extreme rainfall, soil moisture, temperature, snowmelt, and catchment characteristics. In addition, human factors such as flood defenses, dams, and reservoir management have a significant impact on river flooding risk. As a result, the impact of climate change on river flooding is complex, difficult to predict, and highly regional. In general, assuming no change to flood defenses or exposure:

- Wetter regions (Northern Europe) are generally becoming wetter, and drier regions (Southern Europe) are becoming drier
- Increasing flood risk in parts of western Europe, the UK, and Ireland due to increased rainfall
- Decreased snowfall and earlier snowmelt are expected to reduce flood risk in some Nordic countries and parts of Northeastern Europe and Alpine regions
- Evaporation is expected to increase, resulting in lower soil moisture levels and decreased flooding in parts of Southern Europe

Figure 8 – Regional indicative impacts of climate change on river flooding



Source: Marsh Re

Marsh Re models

Marsh Re is developing new GCAT™ Iberian Windstorm and Severe Convective Storm (SCS) models and an updated Portugal Flood Model to address the need for an updated view on modelling in the Iberian domain. These latest models are scheduled to be released in early 2027.

Model highlights include:

GCAT Iberian windstorm model

- Historical (1985 to 2026) and stochastic event sets available for past and future event loss verification, **including the 2025 to 2026 winter season**
- **Modelling across all of Portugal and Spain (including islands) –** the Azores, Madeira, Balearic, and Canary Islands are part of the modelling domain
- Utilizes climate model data to produce a realistic spatial structure of wind variations as well as wind engineering models for small-scale variations, **validated using published results and patterns in Marsh Re's claims datasets, as well as many weather stations from Agencia Estatal de Meteorología (AEMET) and Instituto Portugues do Mar e da Atmosfera (IPMA)**
- Utilization of large per-risk claims dataset for Spain and Portugal underpinning loss results
- **Built for the local market** with the ability to deal with varying hours clauses, as well as Consorcio losses and locally prevalent occupancies, such as condominiums, enabled in the model

GCAT Iberian SCS model

- Historical event set for **hail** (2013 to 2023), **straight-line wind, along with tornado**, included for event loss verification
- **50,000-year stochastic event set** for all of Portugal and Spain
- **Truly correlated sub-perils for SCS −** The new GCAT SCS Iberia Model takes advantage of the European Severe Storms Laboratory's (ESSL) AR-CHaMo model based on convective atmospheric parameters to define sub-peril co-occurrence of events via peril-specific triggers
- **Observation-based spatial distribution, parameter as well as maxima definition −** ESSL's European Severe Weather Database (ESWD) reports, used in conjunction with station, radar and lightning data, as well as convective parameters, aim to provide a holistic and more realistic representation of risk attributed to each sub-peril, with one highlight being ESSL's collaboration with IPMA experts on tornado risk in Portugal
- Both models take advantage of a building-level spatial and risk type disaggregation of exposure, **utilizing the location and likely characteristics of every single building in Portugal and Spain** captured via Catastro (Spain) as well as other locally available data sources (i.e., Census)

GCAT Portugal Flood Model

- **10,000-year stochastic catalogue**
- Coverage of **mainland Portugal** only − islands are excluded
- Availability of combined fluvial (river) and pluvial (flash) flooding results, as well as fluvial only and pluvial only outputs
- **Hazard maps at 30-meter resolution**, with advanced hydrological modelling
- Consideration of **multi-source flood defenses** and potential breaches to provide a more realistic risk landscape
- True **pan-European event set for cross-country correlations**
- Calibration based on approximately **67% market share**

(Re)insurance implications

The 2025 to 2026 winter season impacted (re)insurers in several ways. Insured losses in the Iberian Peninsula were higher than in previous years, driven by a sequence of storms and flash flooding. While the Spanish Consorcio offers protection to all lines of business except Contractors' All Risks (CAR) and Erection All Risks (EAR), not all losses are covered. If the wind gusts do not exceed the threshold of 120 kilometers per hour, Consorcio coverage is not activated.

This highlights the need for an increased focus on modelling of windstorm and flood risk, and their correlation in the Iberian Peninsula. Resilience and adaptation are key to mitigating potential future losses.

The 2025 to 2026 winter season reinforces several important considerations:

- Geographic variability can materially shift loss outcomes year-to-year
- Non-core regions (i.e., Iberian Peninsula) can drive reinsurance losses under certain climate configurations
- Flood risk embedded within windstorm events and multi-peril interactions are increasingly important
- Potential gaps in flood coverage and modelling. In Spain, only pure flood losses are covered − damages caused directly by rain are excluded. In Portugal, as mentioned in the previous section, a new Marsh Re model is in development.
- The recent publication by Consorcio with the list of municipalities covered in the storms that occurred from January 20 to February 20, 2026, might reduce the burden borne by Spanish insurers in this series of storms
- In Portugal, the losses estimated by reinsurers from this series of storms would amount to €1,100 to €1,200 million compared to €250 million in premiums from all non-life contracts. Although reinsurers have had several profitable years since the last storm in 2018 (Storm Lesley), this would certainly put some pressure on the next renewal negotiations.

Summary

The 2025 to 2026 winter season was not especially unusual in terms of total European storm frequency or the large-scale geographical distribution of storm activity. The number of storms reaching maximum gusts in Southern Europe was consistent with the historical average, but a larger number of named storms impacted Spain and Portugal than in recent years.

Some storms affecting the Iberian Peninsula appear to have been relatively severe for their frequency. This suggests that the season was notable, with several storms producing comparatively high impacts in the region. A southerly shifted jet stream in February, together with a series of atmospheric rivers, likely contributed to these impacts by directing storms and associated rainfall into Southern Europe.

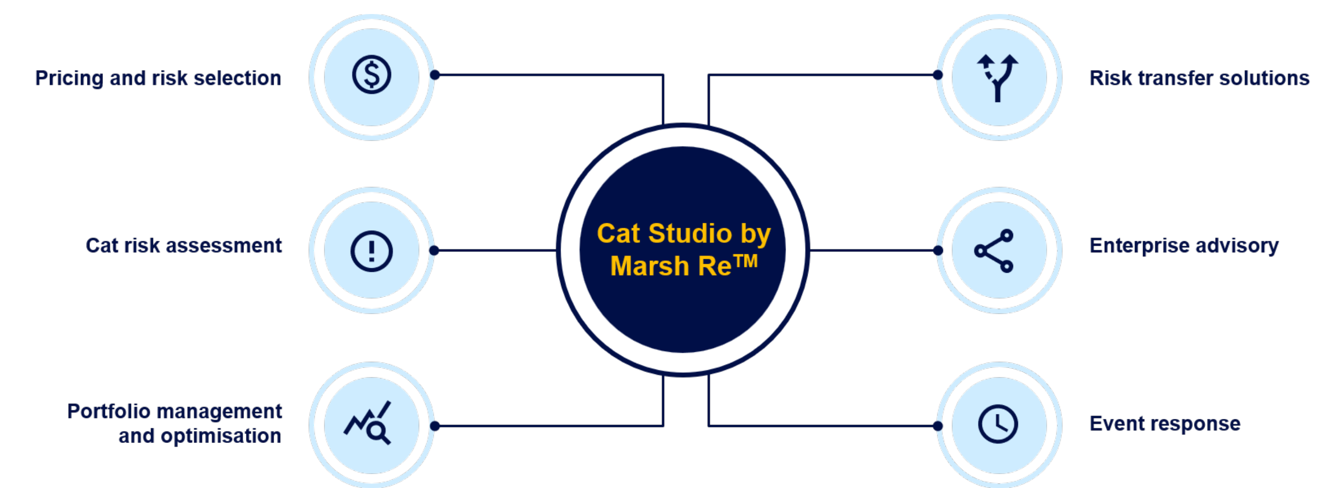
This led to a combination of wind and precipitation-related effects. The NAO appears to have played only a limited role in modulating the distribution of storms, with several severe Southern European storms occurring during a period of positive NAO. This is consistent with Priestley et al. (2023), who found that the NAO exerts a stronger influence on windstorm activity in Northern Europe than in Southern Europe.

Climate change is unlikely to have had a substantial influence on windstorm frequency to date. Accordingly, variability is expected to remain the dominant driver of year-to-year changes in storm activity over the short- to medium-term, with future seasons likely to include a mixture of relatively active and relatively quiet years. However, the intensity of rainfall and subsequent flooding, particularly flash flooding, is likely to increase in a warming climate. As a result, future storms may become wetter, with flood-related impacts increasing even in the absence of clear changes in storm frequency.

Discover Marsh Re's view of risk

Be sure to visit www.guycarp.com/solutions, or contact us to learn more about our offerings, including:

Model Suitability Analysis (MSA)®	**Cat modelling**	**Climate change products**	**Global risk rating products**



References

Catto, J., Little, A., and Priestley, M.: "Future changes in European windstorm severities and impacts", EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-15321, https://doi.org/10.5194/egusphere-egu21-15321, 2021.

Copernicus Climate Change Service (C3S): *Windstorm tracks and footprints derived from reanalysis over Europe between 1940 to present*, Climate Data Store (CDS), https://doi.org/10.24381/bf1f06a9, accessed 20 April 2025, 2025.

Copernicus Climate Change Service, Climate Data Store (2023): *ERA5 hourly data on single levels from 1940 to present*. Copernicus Climate Change Service (C3S) Climate Data Store (CDS). DOI: 10.24381/cds.adbb2d47 (Accessed on 12-May-2025).

Cusack, S., "A long record of European windstorm losses and its comparison to standard climate indices", Nat. Hazards Earth Syst. Sci., 23, 2841–2856, 2023, https://doi.org/10.5194/nhess-23-2841-2023

Cusack, S., "Anthropogenic aerosol forcing of European windstorms in CMIP6 climate models" EGUsphere, 2026, https://doi.org/10.5194/egusphere-2025-6232

Feser, F., Barcikowska, M., Krueger, O., Schenk, F., Weisse, R., Xia, L., "Storminess over the North Atlantic and northwestern Europe—A review" Quarterly Journal of the Royal Meteorological Society, 2015, https://doi.org/10.1002/qj.2364

IPCC, 2021: "Climate Change 2021: The Physical Science Basis". Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.

Mailier, P. J., Stephenson, D. B., Ferro, C. A. T., and Hodges, K. I.: Serial Clustering of Extratropical Cyclones, Mon. Weather Rev., 134, 2224–2240, https://doi.org/10.1175/MWR3160.1, 2006

Mölter, T., Schindler, D., Albrecht, A.T., & Kohnle, U. (2016). "Review on the Projections of Future Storminess over the North Atlantic European Region". Atmosphere, 7(4), 60. https://doi.org/10.3390/atmos7040060.

National Centers for Environmental Information (NCEI): *North Atlantic Oscillation (NAO) Index*, National Oceanic and Atmospheric Administration (NOAA), available at: https://www.ncei.noaa.gov/access/monitoring/nao/, accessed 20 April 2025, 2025.

National Oceanic and Atmospheric Administration (NOAA): *[Image related to North Atlantic Oscillation]*. Available at: https://www.climate.gov/media/5522, accessed: 20 April 2025.

Pinto, J. G., Bellenbaum, N., Karremann, M. K., and Della-Marta, P. M.: Serial clustering of extratropical cyclones over the North Atlantic and Europe under recent and future climate conditions, J. Geophys. Res.-Atmos., 118, 12476–12485, https://doi.org/10.1002/2013JD020564, 2013

Priestley, M. D. K. and Dacre, H. F. and Shaffrey, L. C. and Hodges, K. I. and Pinto, J. G. (2018). “The role of serial European windstorm clustering for extreme seasonal losses as determined from multi-centennial simulations of high-resolution global climate model data”. Natural Hazards and Earth System Sciences, 18, 11, 2991-3006. 10.5194/nhess-18-2991-2018

Priestley, M.D.K. and Catto, J. L. (2022): “Future changes in the extratropical storm tracks and cyclone intensity, wind speed, and structure.” Weather Climate Dynamics, 3, 337–360, https://doi.org/10.5194/wcd-3-337-2022

Priestley, M. D. K., Stephenson, D. B., Scaife, A. A., Bannister, D., Allen, C. J. T., and Wilkie, D.: Return levels of extreme European windstorms, their dependency on the North Atlantic Oscillation, and potential future risks, Nat. Hazards Earth Syst. Sci., 23, 3845–3861, https://doi.org/10.5194/nhess-23-3845-2023, 2023.

Priestley, M.D.K., Stephenson, D.B., Scaife, A.A., Bannister, D., Allen, C.J.T. & Wilkie, D. (2024) “Forced trends and internal variability in climate change projections of extreme European windstorm frequency and severity”. Quarterly Journal of the Royal Meteorological Society, 1–18. https://doi.org/10.1002/qj.4849

Vautard, R., van Oldenborgh, G. J., Otto, F.E.L., Yiou, P., de Vries, H., van Meijgaard, E., Stepek, A., Soubeyroux, J.-M., Philip, S., Kew, S.F., Costella, C., Singh, R., Tebaldi, C., “Human influence on European winter wind storms such as those of January 2018.” 2019, Earth System Dynamics, Volume 10, Number 2, Pages 271-286. https://DOI = 10.5194/esd-10-271-2019

Walz MA, Befort DJ, Kirchner-Bossi NO, Ulbrich U, Leckebusch GC. Modelling serial clustering and inter-annual variability of European winter windstorms based on large-scale drivers. Int J Climatol. 2018;38:3044–3057. https://doi.org/10.1002/joc.5481

Walz, M & Leckebusch, G 2019, “Loss potentials based on an ensemble forecast: how likely are winter windstorm losses similar to 1990?'. Atmospheric Science Letters, vol. 20, no. 4, e891. https://doi.org/10.1002/asl.891

Contacts

Marc Melsen

Global Analytics and Advisory
Head of Catastrophe Advisory,
Continental Europe

marc.melsen@marsh.com

Ana Nieto

Global Analytics and Advisory
Head of Analytics Iberia

ana.nieto@marsh.com

Sandra Hansen

Global Analytics and Advisory
Head of International Peril Advisory

sandra.hansen@marsh.com

Luis Coelho

Global Analytics and Advisory
Analytics Iberia

luis.coelho@marsh.com

Edward Wilson

Global Analytics and Advisory
International Peril Advisory

edward.wilson@marsh.com

Ching Ho Justin Ng

Global Analytics and Advisory
International Peril Advisory

ching-ho-justin.ng@marsh.com

MARSH RE

Marsh Re & Company, LLC
Tower Place West
London, EC3R 5BU, UK
www.guycarp.com