

Storm Klaus

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Introduction

An explosive cyclogenesis event occurred in the Atlantic on 23-25 January 2009 and caused a high-impact storm named Klaus. The storm gave rise to very high winds and significant property damage and personal injuries in Spain and France. Storm Klaus resulted in more than 265,000 claims handled and more than 564.1 million euros in indemnities paid out by Consorcio de Compensación de Seguros (CCS). It is by far the most severe episode of extreme winds CCS has had to face and at the time posed a major challenge to the insurance industry as a whole. The approaches employed to tackle this historic loss event laid the foundation for managing subsequent extreme windstorms and are a model for public-private cooperation in the field of property insurance in Spain.

Changes in the concept of extreme winds over time

The definition of extreme winds as a legal concept has been evolving continuously since the CCS's inception in 1954.

In the initial stage lasting until 1963, winds were defined as extreme if they had sustained speeds above 91 km/h. This initial definition was imprecise, in that what sustained wind speed actually was had not been clearly defined.

The concept of extreme wind was redefined in 1963 as wind classified as extreme by the authorities in each individual instance based on its exceptional intensity and characteristics and the extent of the damage produced, without prescribing any additional condition or objective threshold for coverage.



CCS has had to deal with such major and harmful catastrophes as the Lorca earthquake and the September 2019 closed low referred to above, and these unquestionably put a strain on the handling capacity of CCS on its own. Even so, the sheer number of claims ensuing from storm Klaus far outstripped its handling capacity. CCS was therefore confronted with a major challenge: handling an unprecedented number of losses far in excess of its direct handling capacity and its ability to coordinate with the private insurance companies without impairing the quality of service provided to the insured.



A dual-faceted concept of atypical cyclonic storm (TCA, for the Spanish) was introduced in 1986:

- violent tropical cyclones with wind speeds above 96 km/h averaged by 10-minute intervals and precipitation in excess of 40 l/m²/h
- and intense cold lows, with wind speeds higher than 84 km/h averaged by 10-minute intervals and temperatures lower than 6 °C below zero measured at the closest point on the coast.

Since then, the CCS's coverage of wind events has no longer depended on a declaration by the authorities but, providing that the pre-established conditions and thresholds are met, is instead based on a new definition that could be used to define these events quickly, automatically, and objectively.

An important change took place in 2004, when the legal concept of TCA was expanded to include two new types:

- tornadoes – a violently rotating column of air, narrow in diameter, that is in contact with the ground and descends from a cumulonimbus cloud
- and extreme winds, gusting at speeds higher than 135 km/h.

The two last-mentioned TCAs, tornadoes and extreme winds, are the kinds that occur most frequently and cause nearly all claims from wind paid out by the CCS.

Finally, some years later, in 2011, the current definition of a TCA took effect, reducing the threshold for extreme wind coverage from 135 to 120 km/h.

Therefore, when storm Klaus hit in January 2009, the threshold for extreme wind was 135 km/h.

The following table summarises the timeline for the successive legal definitions of extreme wind.

Time period	Definition of extreme wind
From 1956 to 1963	Sustained wind speed of more than 91 km/h
From 1963 to 1986	No quantitative definition; instead, a declaration of extreme wind by the authorities based on the exceptional intensity and characteristics of the wind and the extent of the damage produced.
From 1986 to 2004	<p>The concept of atypical cyclonic storm (TCA) was introduced, including:</p> <p>1°.- Violent tropical cyclones with wind speeds above 96 km/h averaged by 10-minute intervals, i.e., covering a distance of more than 16,000 m during that interval, and precipitation in excess of 40 l/m²/h.</p> <p>2°.- Intense cold lows, with advected Arctic air, comprising wind speeds higher than 84 km/h, likewise averaged by 10-minute intervals, i.e., covering a distance of more than 14,000 m during that interval, coupled with potential temperatures lower than 6 °C below zero measured at sea level pressure at the closest point on the coast.</p>
From 2004 to 2011	<p>Two new types of atypical cyclonic storm were included:</p> <p>3°.- Tornadoes, defined as extratropical cyclones generating rotating storms produced by an extremely violent storm, taking the form of a cloud column narrow in diameter projecting downwards from a cumulonimbus cloud to the ground.</p> <p>4°.- Extreme winds, defined as winds gusting at speeds higher than 135 km/h. A gust is defined as the highest wind speed sustained for a three-second interval.</p>
From 2011	The coverage threshold for atypical cyclonic storm type 4 (extreme winds) was lowered from 135 km/h to 120 km/h .

The Implementing Regulations for the Reglamento del Seguro de Riesgos Extraordinarios [Extraordinary Risk Insurance Scheme] provides that the wind data will be furnished to CCS by the Agencia Estatal de Meteorología [Spain's National Weather Service] (AEMET from the Spanish abbreviation). Therefore, systematically, whenever a windstorm occurs, CCS immediately asks AEMET for a report so that it can determine the locations where the TCA has struck.

Coverage for wind damage in Spain: a shared risk

Unlike other extraordinary perils, wind is shared by private insurance companies and the CCS. This makes these organisations interdependent and requires good coordination between them to be able jointly to offer good services to the insured.

Three regions can be established based on the highest gust reached during a given event as depicted in the following Figure:

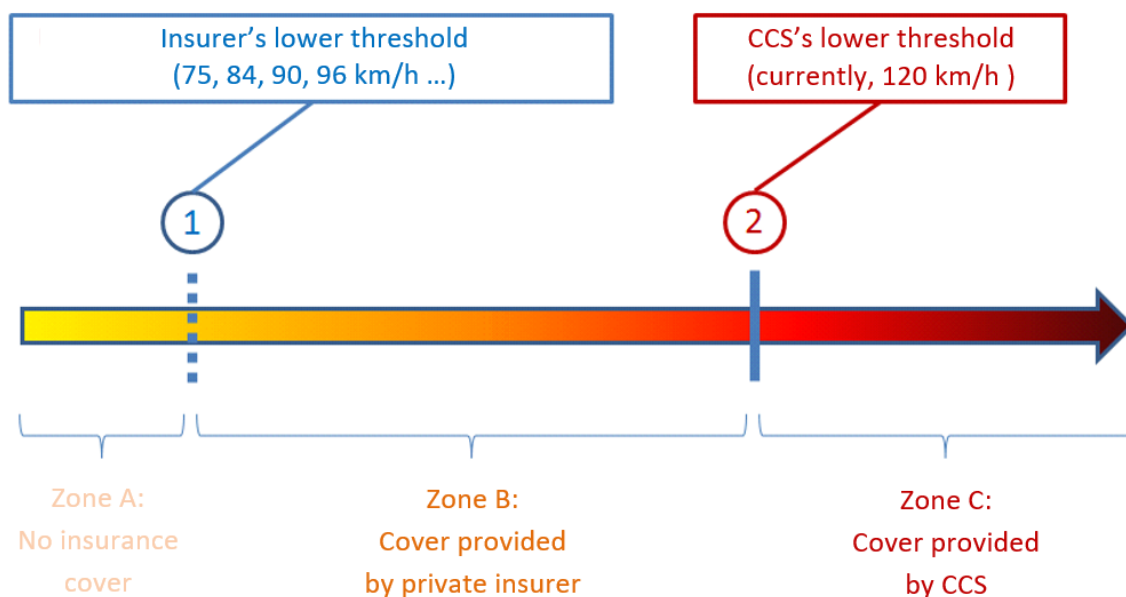


Figure 1. Distribution of coverage for wind damage between the CCS and private insurance companies depending on the peak gust.

In region A, the winds are below the coverage threshold set by the insurance company (point 1), and the damage is not covered by insurance. It is important to point out that there is no single coverage threshold. Instead, each insurance company sets its own peak gust of 75 km/h, 84 km/h, 90 km/h, 96 km/h, etc.

Private insurance companies cover wind damage if the gusts are located in intermediate region B (between points 1 and 2), where the winds are higher than the insurer's coverage threshold but lower than the threshold for coverage by CCS.

A peak gust in excess of 120 km/h (135 km/h until 2011) moves us into region C, where the winds are higher than the threshold for coverage by CCS (point 2), and damage is consequently covered by the public insurance compensation scheme.

Klaus: the strongest windstorm

TCA's are Spain's second most damaging exceptional peril, accounting for 15.9% of all the indemnities paid over the historical series from 1987 to 2021, after flooding, which accounts for 69.6% of total indemnities (Table 1).

Property, business interruption and personal injury loss Aggregated data, 1987- 2021 series. By peril / cause

Amounts in Euros as of 31 December 2021

Peril	Claims handled	%	Loss	%	Mean costs
Flood (incl. coastal flood)	783,323	48.8%	6,897,387,229 €	69.6%	8,805 €
Earthquake	54,964	3.4%	622,038,013 €	6.3%	11,317 €
Volcanic eruption	6,052	0.4%	223,070,187 €	2.3%	36,869 €
Windstorm and tornado	728,401	45.4%	1,571,795,561 €	15.9%	2,158 €
Meteorite falling	3	0.0%	110,394 €	0.0%	36,798 €
Terrorism	22,375	5.0%	496,122,161 €	5.0%	22,173 €
Riot	153	0.0%	1,241,356 €	0.0%	8,113 €
Social commotion	7,082	0.9%	91,021,462 €	0.9%	12,853 €
Acts of armed forces in times of peace	2,524	0.1%	5,822,825 €	0.1%	2,307 €
TOTAL	1,604,877	100%	9,908,609,189	100%	6,174 €

Table 1. Property damage, pecuniary losses, and personal injuries. Time series 1987-2021.

As shown in Table 2, over the period 1987 to 2020, the CCS received nearly 700,000 claims as a result of TCAs and paid out indemnities totalling over 1.5 billion euros for that same cause. Nearly 40% of those are attributable to just one event, storm Klaus in January 2009, the single most important windstorm the CCS has had to deal with, much larger than other significant storms like Delta, Floora, Xynthia, Kurt, and Gloria.

Series 1971-2020

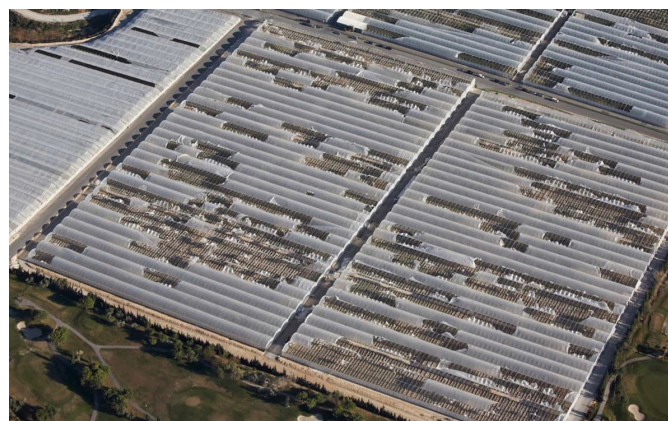
Updated loss as of 31 December 2020

Month / Year	Name	Claims		Loss	
		No.	%	Amount (M€)	%
November 2005	TCA Delta	15,482	2%	100.7	7%
January 2009	TCA Klaus	265,243	38%	564.1	39%
January 2010	TCA Floora	39,348	6%	48.9	3%
February 2010	TCA Xynthia	39,259	6%	65.7	5%
January 2013	TCA Gong	17,104	2%	15.4	1%
December 2013	TCA Dirk	23,587	3%	28.7	2%
December 2014	TCA Cataluña	16,490	2%	26.3	2%
February 2017	TCA Kurt	57,361	8%	72.0	5%
December 2019	TCA Daniel, Elsa y Fabien	34,061	5%	37.2	3%
January 2020	TCA Gloria	41,630	6%	57.5	4%
	Other windstorms	143,004	21%	415.6	29%
	Total series 1971-2020	692,569	100%	1,432.1	100%

Table 2. Main exceptional windstorms.

Management of storm Klaus: a major challenge

Until storm Klaus, CCS managed exceptional windstorm events directly, receiving claims for compensation from the insured parties or their representatives. It assessed the damage using its own network of associated adjusters, reviewed the documents for each claim using its own processing services, and finally compensated the insured by bank transfer. The procedure followed was the same as the procedure used to handle any other exceptional peril like floods, earthquakes, or volcanic eruptions.



The largest windstorms —storm Klaus in particular— impact extremely broad areas and give rise to large numbers of claims, though with an appreciably lower average cost than claims caused by earthquakes, floods, or volcanic eruptions. Table 3 compares¹ Klaus with two other past natural disasters, the Lorca earthquake and the September 2019 cut-off low flood event. The Table shows that while the total indemnities paid out were similar in all three cases, around 500 million euros, the average cost paid out for Klaus was much lower than for the cut-off low —one-fourth as much— and for the Lorca event —one-ninth as much.

Event	Claim number	Loss	Mean cost
Windstorm Klaus (January 2019)	271,347	600,585,658 €	2,213 €
Lorca earthquake (May 2011)	28,856	552,298,293 €	19,140 €
SE peninsular floods (September 2019)	56,067	474,701,759 €	8,467 €

Table 3. Totals current as of 31 December 2021.

Experience shows that the difficulty attaching to claims handling depends mainly on the volume of claims, more than on the size of the damage.

CCS has had to deal with such major and harmful catastrophes as the Lorca earthquake and the September 2019 closed low referred to above, and these unquestionably put a strain on the handling capacity of CCS on its own. Even so, the sheer number of claims ensuing from storm Klaus far outstripped its handling capacity. CCS was therefore confronted with a major challenge: handling an unprecedented number of losses far in excess of its direct handling

¹ The figures in some of the Tables in this article are current as of 31 December 2021 and others are current as of 31 December 2020, and this could give rise to differences in the valuation of the monetary costs. Furthermore, “processing” is conceptually different from “claim”, and this too could give rise to some slight variations in the figures in certain cases.

capacity and its ability to coordinate with the private insurance companies without impairing the quality of service provided to the insured.

Mapping TCA Klaus

To plot the map of TCA Klaus, AEMET used a geostatistical interpolation method called universal kriging. Besides the wind data observations recorded at weather stations, this approach also considers another three variables, ground elevation, distance to the sea, and the peak wind gust fields from the HARMONIE-AEMET numerical model. AEMET still uses this method, with some changes and enhancements, in drawing up TCA maps (that is, in determining municipalities in which CCS is to pay wind losses after a given storm).

A few days after the storm, AEMET sent CCS its initial provisional report. That report already noted the large size of the storm, which covered more than 20 provinces. In these circumstances, in its information note issued on 28 January 2009, CCS had already made plans for the insurance companies to settle claims from their insured parties and afterwards to apply to CCS for reimbursement by way of an alternative to the usual procedure of direct claims handling by CCS.

As its analysis of the storm progressed, between February and May 2019 AEMET issued a further four reports, expanding the area that had been covered by the storm. The final report was issued on 2 July 2009. Based on that last report, CCS finally determined the coverage area, taking into account such other factors as the uncertainties and complexities intrinsic to windstorms and other indicative data, such as wind measurements in the neighbourhood of the coverage threshold and data reported by the insurers. The coverage area consisted of the following three zones:

- Cities and towns where gusting was over 135 km/h (shown in blue on the map on the left below).
- Cities and towns where gusting was very close to that 135 km/h threshold and hence for that reason, and also based on geographical proximity, the probability that they were directly affected by the atypical cyclonic storm could be assumed to be reasonably high (shown in red).
- Cities and towns that were located at the edge of the coverage area based on the two preceding factors and so could have been affected by the atypical cyclonic storm (shown in yellow).

The map spanned 2,778 municipalities with an overall affected population of 13.5 million inhabitants, that is, almost 30% of the population.

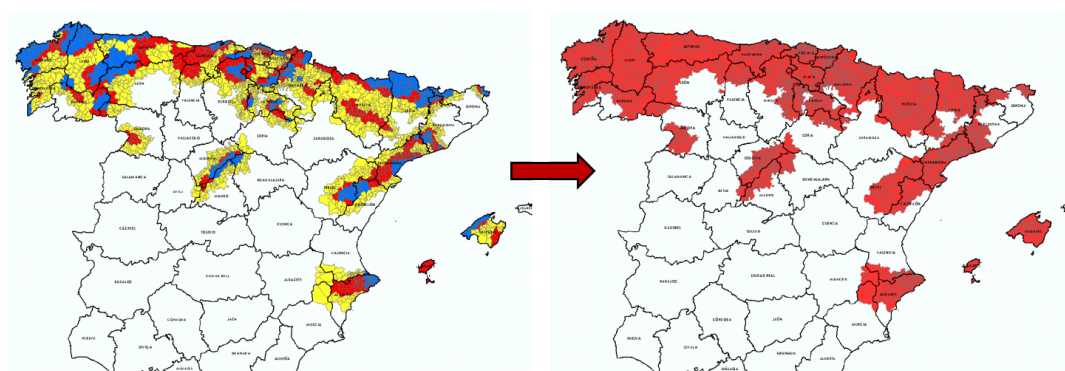


Figure 2. Map of the areas affected by ACS Klaus.

Handling storm Klaus: an example of cooperation between CCS and private insurers

It was clear from the very first that the size of the TCA ruled out direct handling by CCS. For this reason, through the Spanish Insurers' Association, UNESPA, private insurers in Spain and CCS set up a joint handling procedure for storm Klaus set out in a document entitled "Claims handling and reimbursement protocol for the atypical cyclonic storm on 23-25 January 2009" [*"Protocolo sobre gestión de siniestros y reembolsos derivados de los mismos con motivo de la tempestad ciclónica atípica producida entre los días 23 a 25 de enero de 2009"*]. Both parties signed the Protocol at the end of July 2009 after the final map of the TCA had been published at the beginning of that month.

The Protocol set the rules and time limits for claims handling by the private insurers and subsequent review and reimbursement by CCS.

Besides the indemnity paid to the insured or the costs of repairs paid, reimbursement covered the adjusters' fees and other external expenses for claims handling paid by the private insurers.

The supporting documents to be submitted by the private insurers included the full contract of insurance (general, special, and particular terms and conditions), the damage appraisal (the adjuster's report or the invoice or estimate from the company making the repairs), and proof of payment for all sums to be reimbursed (proof of payment of the indemnity, of the repairs, of the adjusters' services, or of other external expenses).



The following procedure was put in place for submitting documents and review by CCS:

- The insurers were to group their reimbursement requests together and send them to CCS in batches of cases.
- An online procedure was developed to expedite submission of the batches of reimbursement requests, though submission of hard copies was also allowed.
- Since the insurers had already paid out the indemnities or repairs to the insured, it was agreed that CCS would reimburse 80% of the sum requested immediately on receipt, with reimbursement of the remainder depending on the outcome of the review.
- CCS reviewed all requests for reimbursement greater than or equal to 30,000 euros and reimbursed the total resulting from the review.

- Requests for amounts below 30,000 euros were reviewed by means of random samples taken from batches for reimbursement of that amount or less, with a tolerable error of 7% and a confidence level of 95%.
- All the cases included in the samples taken were reviewed by a team of adjusters associated with CCS.
- Where the review of a batch yielded a difference of more than 5% between the sum requested and the sum calculated by the review, a second more precise sample was taken with a tolerable error of 5%, i.e., less than the tolerable error of 7% of the first sample.
- The final outcome of the sample-based review was then extrapolated to the reimbursement request for the corresponding batch.

It is important to highlight that working within the scope of the reimbursement protocol did not prevent the insurers from asking CCS to process and indemnify individual losses directly because of their complexity or high monetary cost or because this was requested by the insured.

It should also be noted that in the period before the Protocol was signed, from late January to late July 2009, CCS had handled and indemnified claims directly at the request of insured parties whose properties were located within the TCA area based on the prior information periodically submitted by AEMET.

Klaus in numbers

General statistics

Number of cities and towns affected: 2,778.

Population affected: 13.5 million inhabitants.

	Direct indemnification to policyholders	Reimbursement to insurance companies	Total
Claim number	36,838	228,405	265,243
Indemnified amount ¹	220.5 M€ ²	343.6 M€	564.1 M€

¹ Totals current as of 31 December 2020.

² Of this amount, 22% or 48.5 million euros was for damage to the overhead electrical grid caused by trees or other items falling on electric lines or by downed transmission towers, and 10% or 22.1 million euros was for damage to wind power generating facilities.

Table 4. General statistics.

Kind of property	Claim No.	Loss ⁵	
		M€	%
DWELLINGS	230,325	307.3	54.5%
AUTOS	6,281	7.2	1.3%
SHOPS, WAREHOUSES AND OTHERS	13,175	58.3	10.3%
BUREAUS	708	1.6	0.3%
INDUSTRIES ⁴	14,693	187.8	33.3%
CIVIL WORKS	61	1.9	0.3%
Total of loss event	265,243	564.1	100%

⁴ A major component was the high level of indemnities for industrial risks, which tend to have light-weight enclosures and roofs spanning large areas that are extremely vulnerable to strong winds.

⁵ Totals current as of 31 December 2020.

Table 5. TCA Klaus. Indemnities by kind of property.

Province	Claim No.	Loss ⁶	
		M€	%
HUESCA	1,494	3.5	0.6%
TERUEL	335	0.5	0.1%
ZARAGOZA	313	0.7	0.1%
CANTABRIA	19,494	26.6	4.7%
ASTURIAS	18,271	34.6	6.1%
ÁVILA	15	0	0.0%
BURGOS	1,748	2.1	0.4%
LEÓN	2,055	3.2	0.6%
PALENCIA	146	0.1	0.0%
SEGOVIA	541	0.6	0.1%
SORIA	136	0.2	0.0%
ZAMORA	250	0.2	0.0%
NAVARRA	2,618	6.7	1.2%
LA RIOJA	3,886	7.2	1.3%
ARABA/ÁLAVA	2,685	3.6	0.6%
BIZKAIA	21,882	32.6	5.8%
GIPUZKOA	10,608	11.5	2.0%
A CORUÑA	25,311	85.8	15.2%
LUGO	10,519	20.9	3.7%
OURENSE	3,083	6	1.1%
PONTEVEDRA	7,168	11.5	2.0%
BARCELONA	52,149	161.7	28.7%
GIRONA	936	1.9	0.3%
LLEIDA	4,847	9.5	1.7%
TARRAGONA	23,697	46.5	8.2%
ALACANT/ALICANTE	36,905	59.6	10.6%
CASTELLÓ/CASTELLÓN	203	0.3	0.1%
VALÈNCIA/VALENCIA	2,977	3.8	0.7%
MURCIA	264	0.3	0.1%
ILLES BALEARS	8,715	14.7	2.6%
ALBACETE	204	3.5	0.6%
GUADALAJARA	31	2.3	0.4%
MADRID	1,757	1.9	0.3%
TOTAL	265,243	564.1	100.0%

⁶ Totals current as of 31 December 2020.

Table 6. Indemnities by province.

Statistics on the management of reimbursements to insurers

Number of insurance companies that adhered to the Protocol. 56.

38 of these companies submitted information using the online procedure and 18 chose to submit documents in the form of hard copies.

Number of reimbursement batches submitted by the insurers: 196.

	Batches of less than 30,000€	Batches of 30,000€ or more	Total
Number of reimbursement requests reviewed	7,926	631	8,557
Number of reimbursement requests received	228,405	631	229,036
Sample size	3.5%	100.0%	3.7%
Reimbursement requested	278.0 M€	70.6 M€	348.6 M€
Actual reimbursement	273.8 M€	69.8 M€	343.6 M€

Updated loss as of 31 December 2020

Table 7. Requests for reimbursement submitted to CCS by insurers.

Conclusion:

To date, storm Klaus was the largest windstorm CCS has had to deal with in its entire history. The huge size of the storm and the tremendous amount of insured damage far outstripped CCS's direct claim handling capacity at the time and posed an enormous challenge not only to CCS itself but also to the insurance industry as a whole.

To be able to handle claims efficiently without impairing the quality of the services provided to the insured, a coordinated handling procedure was devised in which claims by the insured were handled and indemnified by the insurance companies, which then applied to CCS for reimbursement of the sums they had already paid out.

Joint coordinated handling of this historic loss event by CCS and private insurers is an example of public-private cooperation, and with some changes and improvements the handling procedure devised then is still in effect and has been used successfully for high-impact windstorms that hit after Klaus (Floora and Xynthia in 2010; Gong and Dirk in 2013; Kurt and Ana in 2017; Daniel, Elsa, and Fabien in 2019; and Gloria, Jorge, Karine, Miriam, and Norberto in 2020).