Real-time climate event analysis tools

Auteurs

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Agenda

1. Introduction
2. Event response Automation
3. Storm Ciarán – before, during and after
4. Industry impact
5. Future of event response
6. Conclusions

Event response : is about helping insurers to anticipate and manage resources

First forecasts on Day-3

before the event
EuroTempest footprint,
ECMWF model

A full report on Day-1 :

The Gallagher Re team will provide you with a more detailed report 24 to 48 hours before the Storm.

To go further...

Customize alert thresholds and content

Email alerts every 24 hours

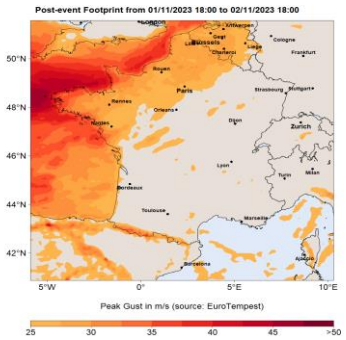
From Day-3 to Day of event, receive a daily alert with the latest forecasts and estimates specific to your exposures.

Post-event

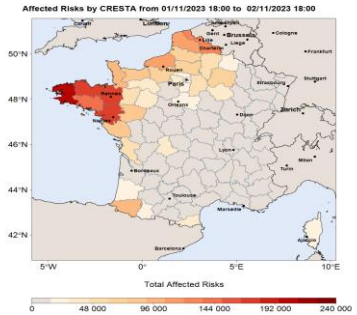
As a follow-up to the storm, market estimates based on a final footprint are provided, as well as an update for your exposures.

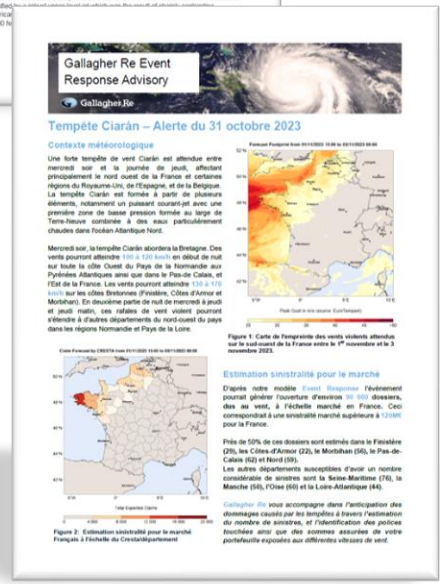
Let's talk it over!

Your most recent exposures:
A default threshold: gusts exceeding 90 km/h over more than 10% of the territory



Ciaran

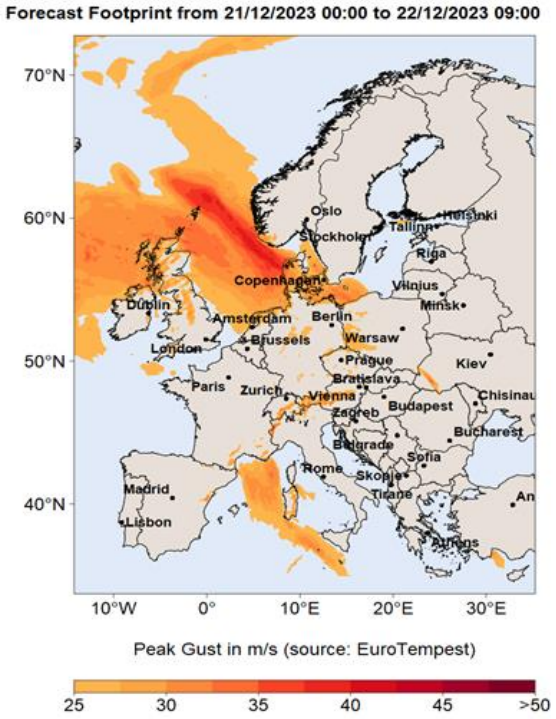




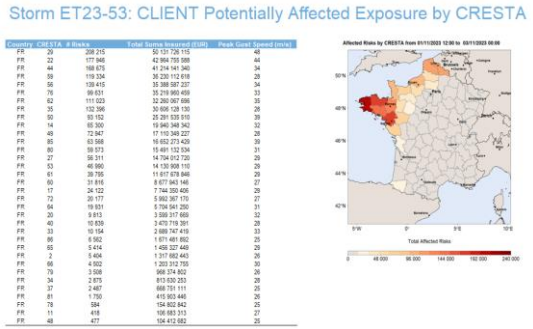
SAMPLE REPORTS FOR CIARAN

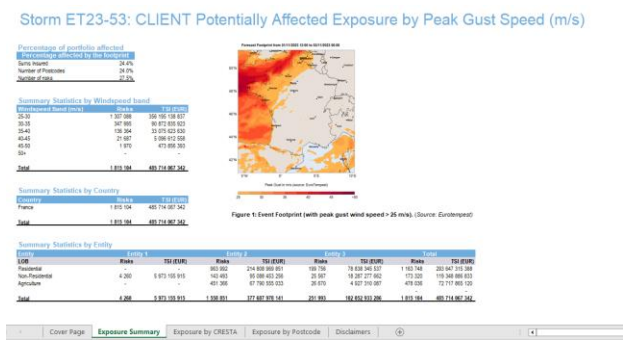
Event response automation

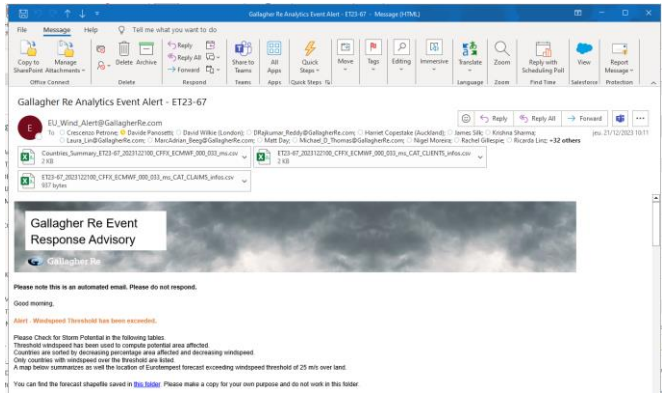
- Follow the event at European level with Footprints plots and Statistic of potentially affected areas by Country.
- When threshold in gust speed and percentage area affected is triggered, statistics for France / Belgium /Lux of Client potentially affected are generated, and customized Excel reports with summary by subdivisions (windspeed bands, sub-entities, LOBs, Cresta, Postcode) are created.
- Preliminary Loss estimations by client using a Machine learning tools followed by more deep analysis on similar historical events and SSEs



Country	% Area with winds over Threshold	Max Windspeed (m/s)	Max Windspeed (km/h)
Denmark	87	38	137
Austria	35	37	133
United Kingdom	34	38	137
Netherlands	29	29	104
Switzerland	24	37	133
Germany	11	34	122
Poland	11	31	112
Czechia	11	30	108
Ireland	10	32	115
Italy	7	38	137
France	3	37	133







Storm ET23-53: CLIENT Potentially Affected Exposure by Postcode

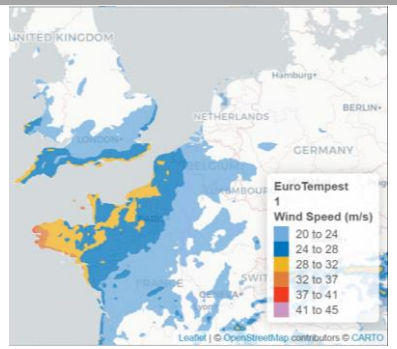
Country	CRESTA	Postcode	Portfolio	LOB	# Risks	Total Sums Insured	Peak Gust Speed (m/s)	Entity
FR	76	76600	GAN_IMM	Residential	1106	3 408 662 040	28	GAN
FR	44	44000	GAN_IMM	Residential	731	1 973 671 147	25	GAN
FR	76	76000	GAN_IMM	Residential	687	1 878 582 319	26	GAN
FR	22	22420	CR_COLL	Non-Residential	6	1 477 499 939	31	CR
FR	14	14000	GAN_IMM	Residential	310	1 121 091 995	26	GAN
FR	22	22400	CR_RES	Residential	4347	1 073 759 615	30	CR
FR	59	59140	GAN_IMM	Residential	336	971 575 340	26	GAN
FR	29	29800	CR_RES	Residential	3415	969 728 199	36	CR

Storm Ciarán response – Before

- **Forecast**
  - "bomb cyclone" - a low pressure system crossed the Atlantic in late October 2023 and developed into a strong storm rapidly as it moved towards France. Severe weather warnings were put in place over parts of France and the UK
  - The late strengthening made predicting wind speeds accurately difficult
- **Gallagher Re Early Alert** forewarned clients that substantial event was likely
- **Event loss forecast** – Fully automated process highlights potential for large loss. Estimate is based on robust Machine learning tools depends on the forecast wind speed maximum if there is high uncertainty in footprint this will impact losses.

Storm Ciarán timeline

29/10/23

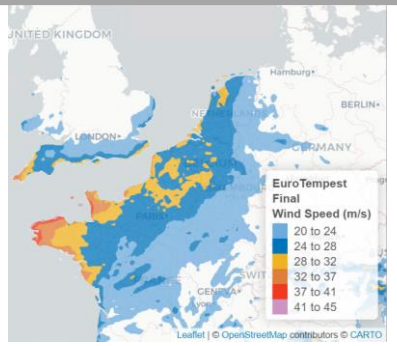


Initial wind speed alert

31/10/23

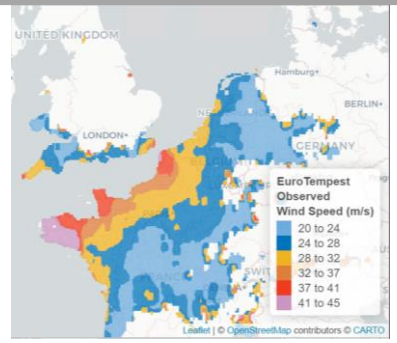
Gallagher Re client alert

02/11/23



Event impacts France / UK

03/11/23



Gallagher Re Event Response. Including early Gallagher Re SSE's

8-10/11/23

Vendor loss estimates and SSE's

Storm Ciarán response – During

- Strong winds impacted North-West of France, Channel islands, Southern coast of UK on 02/11/23
- Forecast evolved 1) initially notable wind speeds in Brittany, 2) then expanded to Brittany and West Normandy.
- Observed wind speeds were stronger than forecast and covered a larger area
- Maximum wind speeds across Brittany
  - Finistère wind speed was record breaking (207 km/h, 58m/s)

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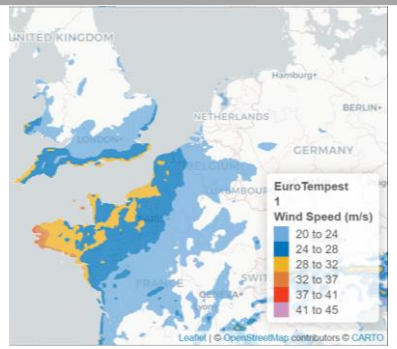

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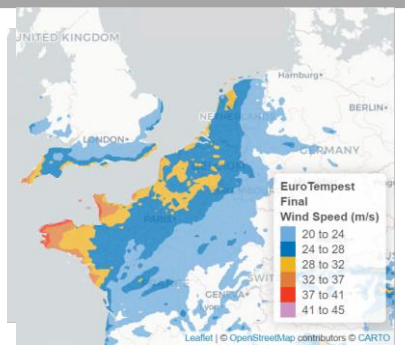

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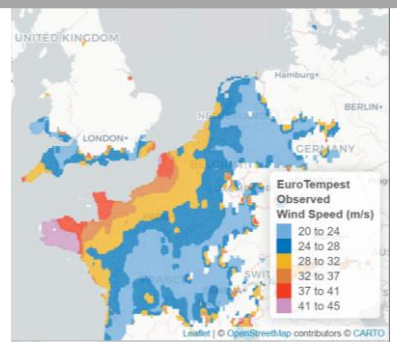

Gallagher Re Event Response. Including early Gallagher Re SSE's

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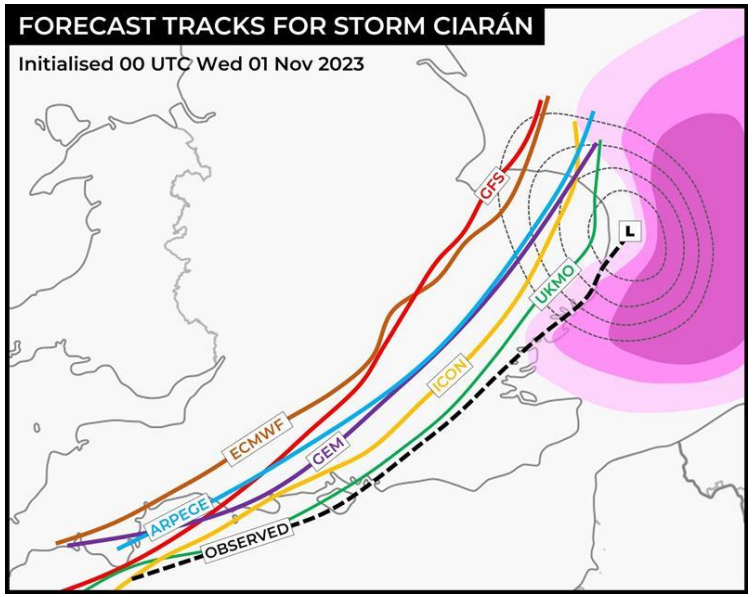
Vendor loss estimates and SSE's

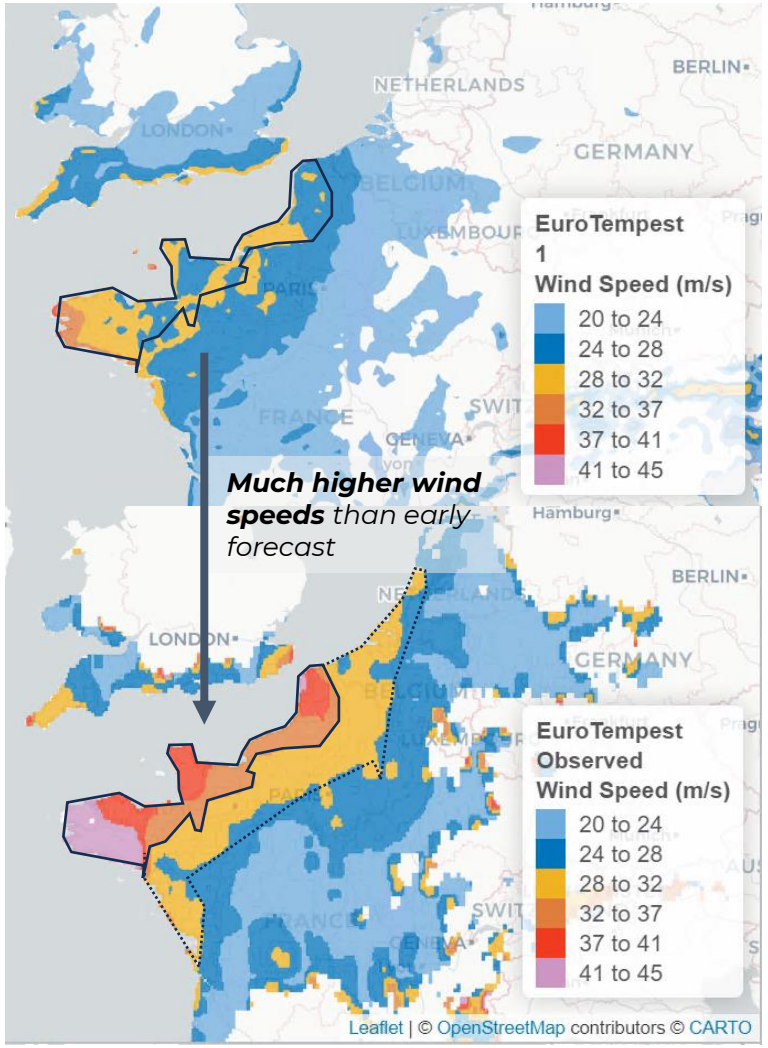
Storm Ciarán response – During

Large uncertainty in wind speed forecast caused by late intensification as the storm tracked towards France. This can be seen in the differences between forecast tracks:

- Observed track sits lower than any forecast
- Particularly ECMWF sits furthest North (important as strongest winds occur towards the South of the track)
- Changes in track explain underestimation of forecasts compared to the observed footprint

EuroTempest post-event observed footprints give valuable information that is necessary for accurate estimation of event loss



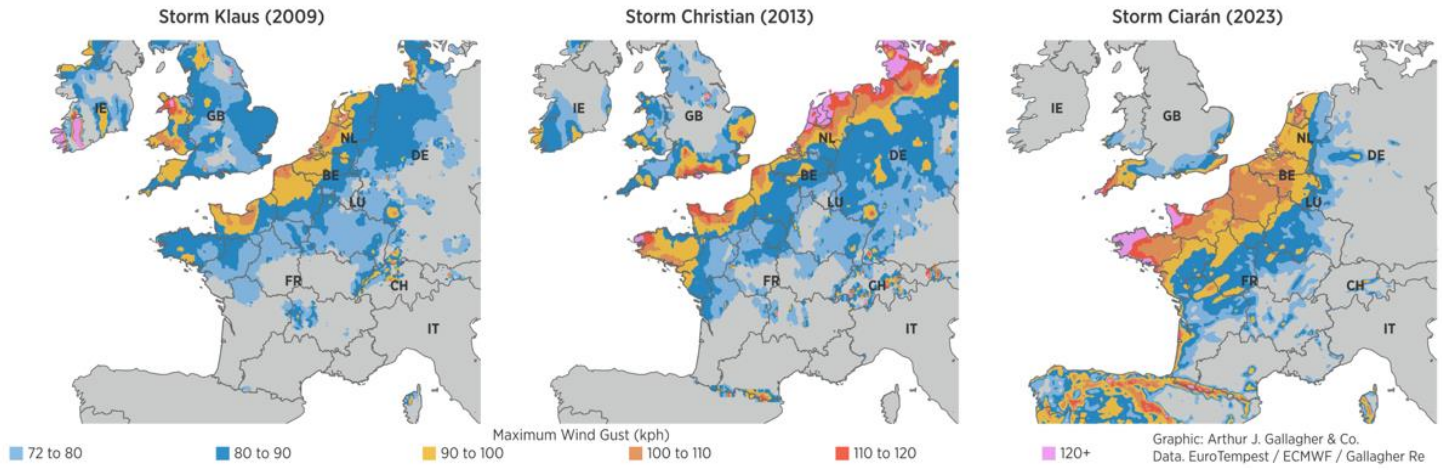


Storm Ciarán response – After

Shortly after Ciaran's extreme winds subsided Gallagher Re issued an **Event response report** which summarises:

- Meteorological conditions caused extreme wind speeds
- Qualitative event comparison
  - Manually compare observed footprint to historically noteworthy events
  - Gives a "feeling" of how event compared to well-known analogues
- Initial damage estimate:

> *"Insured losses from Ciarán were currently not anticipated to reach an overall 2023 inflated event level of Klaus (2009) EUR4.6 billion, Christian (2013) EUR2.2 billion or Eunice (2022) EUR3.4 billion."*

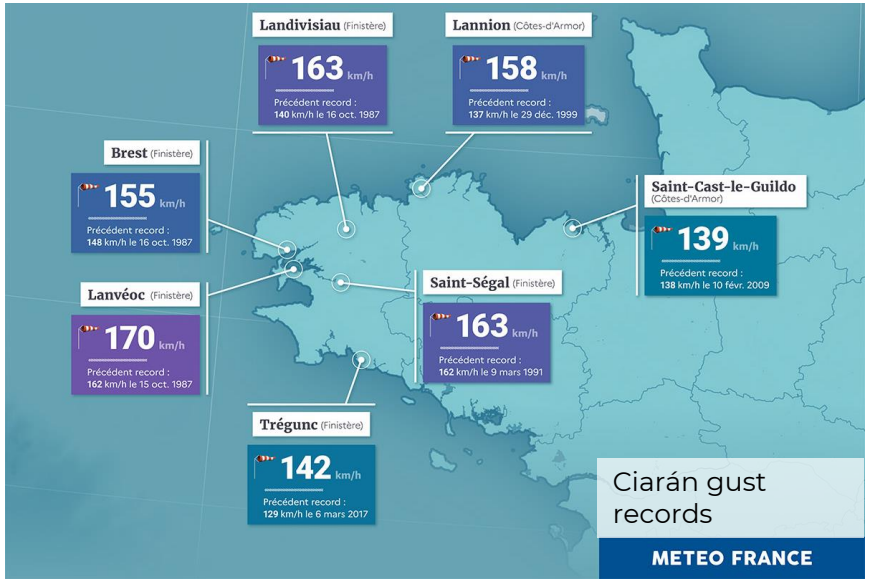


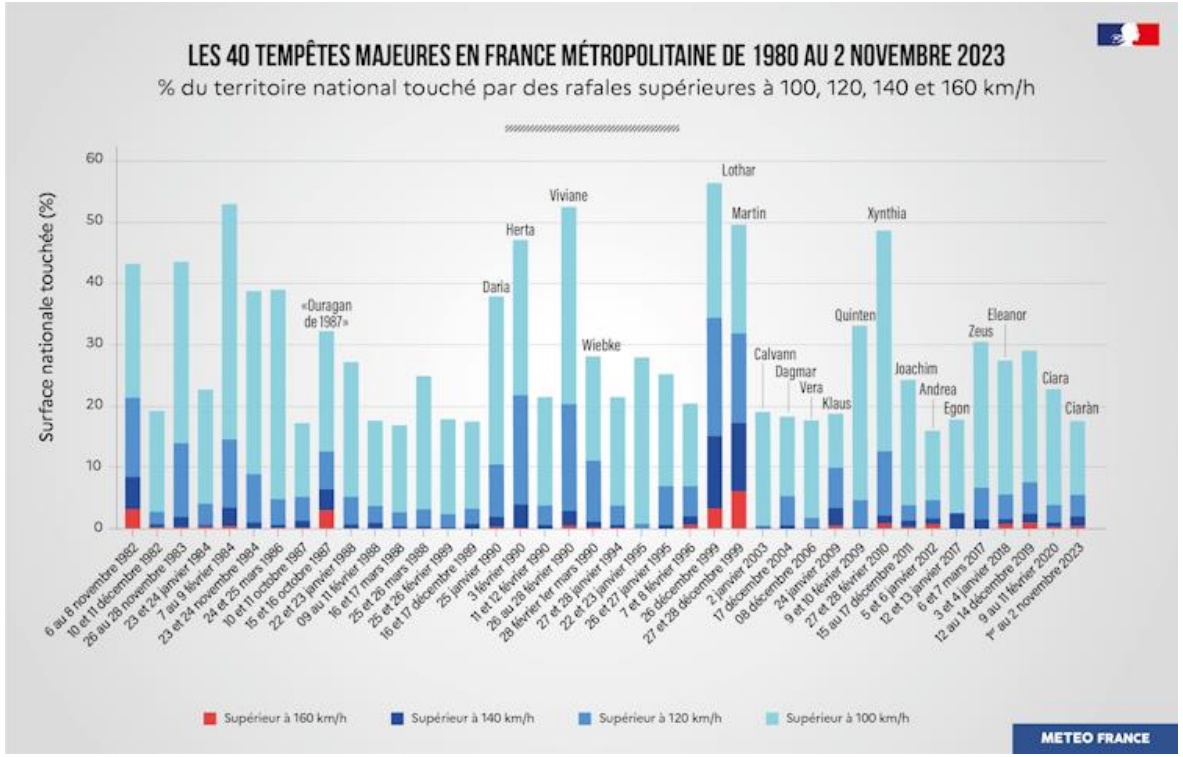
Observed wind footprints for Klaus (left) and Christian (middle). Ciaran (right) is based on the ECMWF forecast from EuroTempest.

Storm	Year	France	Belgium
Lothar	**1990**	Similar peak wind speeds but Intense winds from Lothar impacted a much larger area.	
Klaus	**2009**	Klaus had similar extent but was less intense	
Christian	**2013**	Similar extent but Christian less intense in Brittany	
87J	**1987**	Similar extent but 87J had much higher intensity along channel coast	
Eunice	**2022**	Eunice mainly impacted north-east not Brittany	Similar, Eunice slightly more intense inland
Ana	**2017**	Similar extent but the most intense winds in Ana impacted further south and were less intense in Brittany	N/A
Zeus	**2017**	Zeus had similar impacts in Brittany but not along rest of channel coastline. Zeus was most intense in southern France, unlike Ciaran	N/A

Storm Ciarán response – After

- The peak wind speeds from Ciarán approached those reached during storm Lothar (1990). Peak observations of 125-175 km/h inland (34-50 m/s).
- This is relevant as Lothar was one of the most extreme wind storms to impact France in a 40-year observation period.
- However, area impacted much smaller than Lothar
- 6th largest wind event loss to impact France (Gallagher Re event loss database)





Source: https://meteofrance.com/actualites-et-dossiers/actualites/ciaran-et-domingos-la-france-balayee-par-deux-violentes-tempetes

Storm Ciarán response – Estimating losses

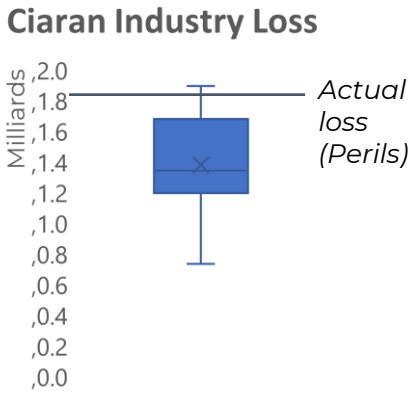
“Similar Stochastic Events” are events selected from a catastrophe model that are similar to the observed event. They allow rapid loss estimation for both the market and individual insurers.

How do we select them?

- Analyse the full catastrophe model event set (**40-50k** footprints)
- Pre-filter – evaluate all footprints at key exposure concentrations (top 10 cities by population per country)
- Filter – compare footprints to observation and rank in terms of wind speed error and spatial correlation
- Average of top 10 events provide market loss estimate

Ciarán Loss Estimate = actual ~1.9Bn Euro (Europewide)

Automated process can deliver a loss estimate within hours of receiving the post-event footprint, model vendors can take much longer.

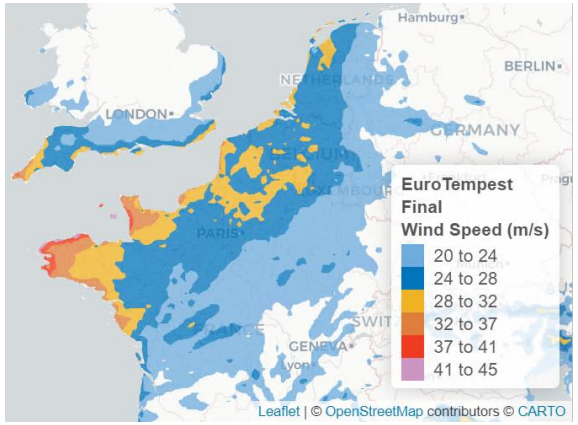


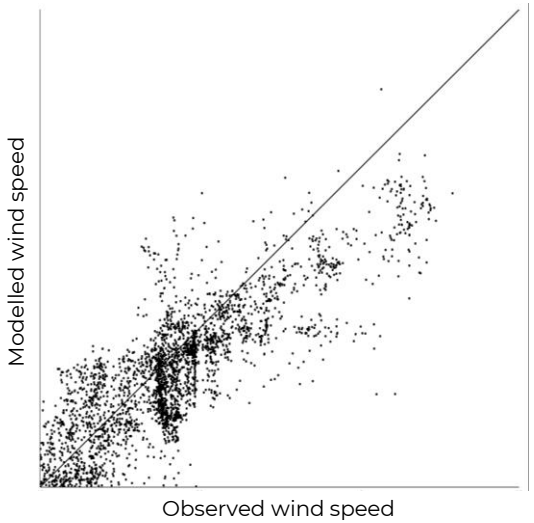
How to check that an event is a good match?

1. Compare the footprint to the observed
2. Check for bias in predicted wind speeds
3. Check correlation in wind speed

Benefits:

- Use already trusted tool
- Rapid estimation of losses
- Built in sensitivity ”what-if” scenario check

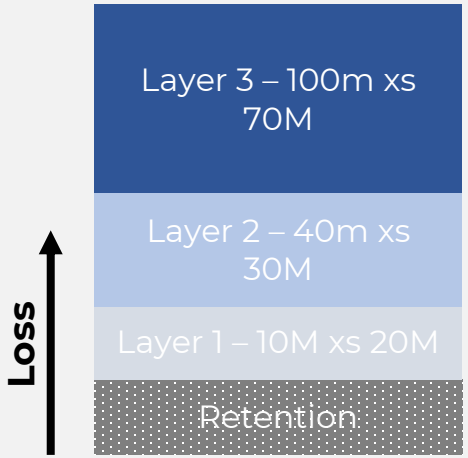




How important was Ciaran?

Reinsurance allows losses to be shared between insurers (cedant) and reinsurer.

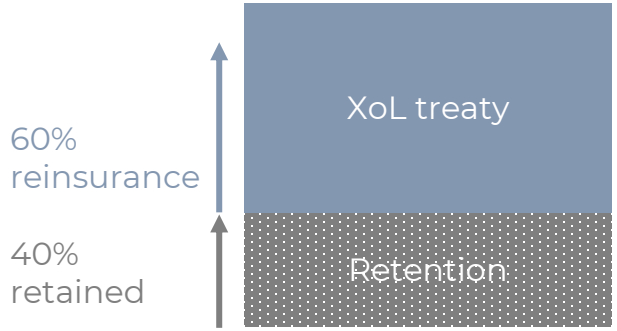
- Reinsurance programs are typically structured in layers (Excess of Loss treaty)
- Typically visualised as a tower where “10M xs 20M” means a layer covering losses between 20M and 30M Euros
- Losses only trigger a payout when they exceed a layer threshold. In the example the loss would cause a payout from layer 1 and 2



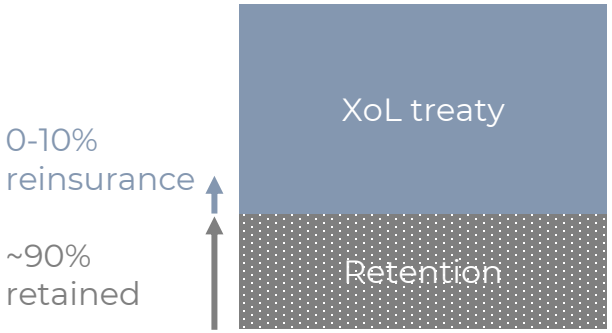
Ciaran caused:

- Notable loss to insurers ~1.9Bn Euro sitting between a 10-15 year return period in France (on a market-wide basis)
- The share covered by reinsurance varies considerably between insurers
- The very high peak wind speed but relatively small footprints caused high losses for insurers with substantial exposure in Brittany
- However, on a book balanced across France only small reinsurance recoveries
- This event highlights the importance of analysing and balancing risk aggregations

Brittany exposed loss



France-wide exposure



What's the future of event response

The current approach works well for European Windstorms where footprints are relatively large compared to other perils. For flood and severe convective storm (hail) which are important types of loss a different approach is needed

Event footprint any peril

Same method applied for:
- Windstorm
- Hail
- Flood

Euro Tempest Windstorm Activity Report

External data

Key information:
- Company exposure - to calculate impact on portfolio
- Vulnerability curves – per peril to calculate damage at a given location

Cloud platform

Ties process into a efficient and reliable framework

Apply financial terms

Event loss estimate

Rapid event loss estimation for:
- event impact
- reinsurance recoveries