Verisk™

Assessing the Recent Low Activity of European Windstorms

Have We Just Been Lucky?

Alex Doyle – OASIS Insight Conference Paris 2025

Today's Agenda

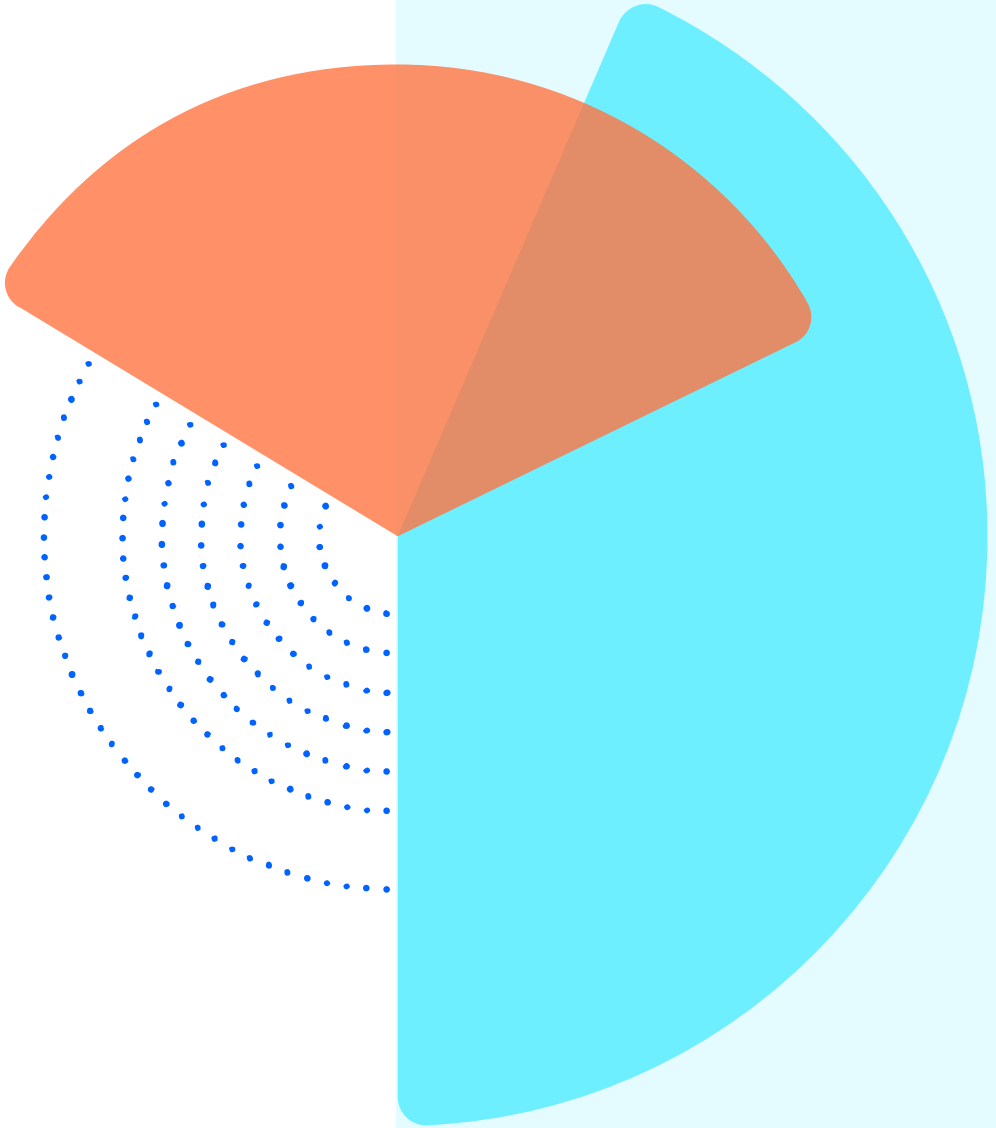
1 Background

2 Verisk's EU ETC cat model

3 Historical trends in ETC frequency and intensity

4 Counterfactuals of historical insured losses

5 Summary



Background

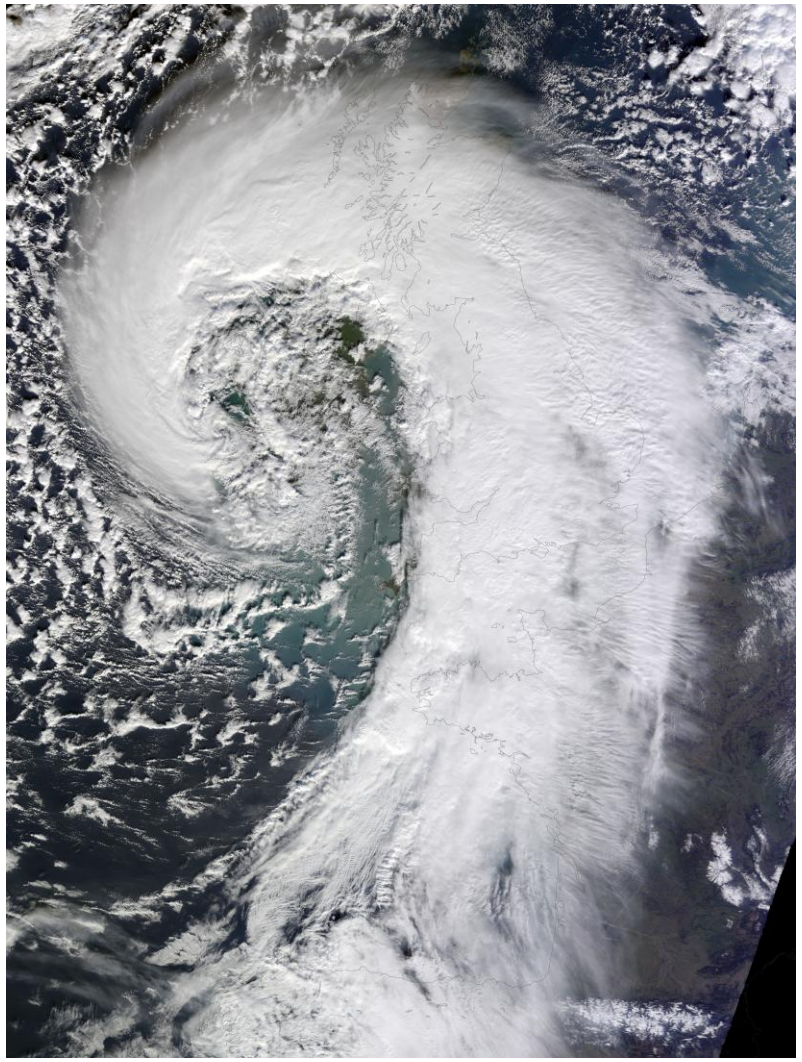
Extra-tropical cyclone (ETC) frequency & intensity vary on several timescales of variability

1. Interannual
2. Decadal
3. Climate Change

There's not just one story when it comes to changes in ETCs over time

- Time-period & season
- Region of interest
- Frequency, intensity, or loss?
- Choice of dataset/model

Have we just been "lucky" recently? Could a high-loss storm occur today?



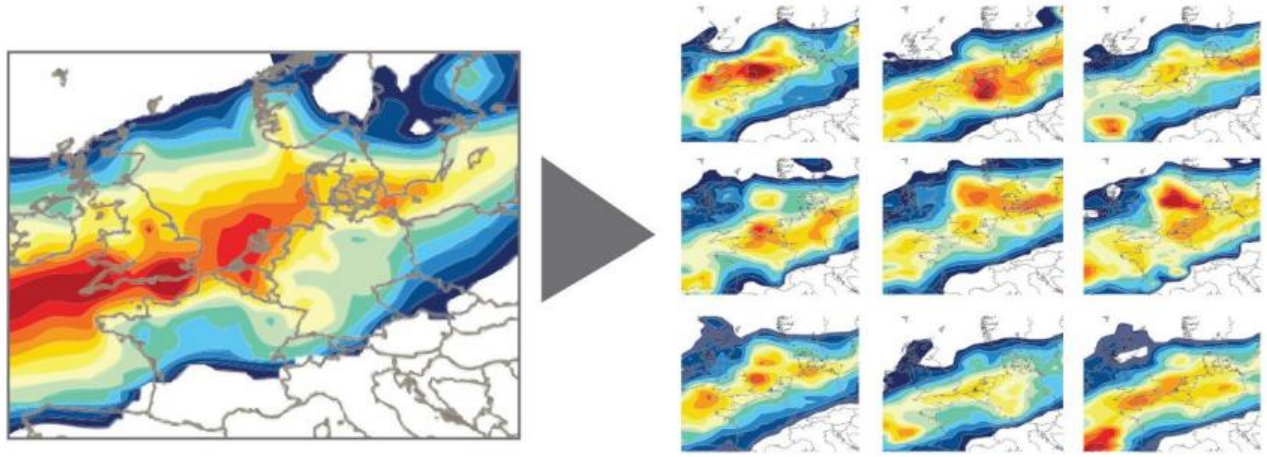
Verisk's EU ETC Catastrophe Model

Verisk's current ETC model for Europe reflects post-satellite era historical data

- Historical seed storms tracked from Numerical Weather Prediction simulations with reanalysis data initial conditions

Around 1750 historical seed storms are perturbed to produce stochastic storms:

- Track angle perturbation
- Stochastic wind field generation using principal component analysis

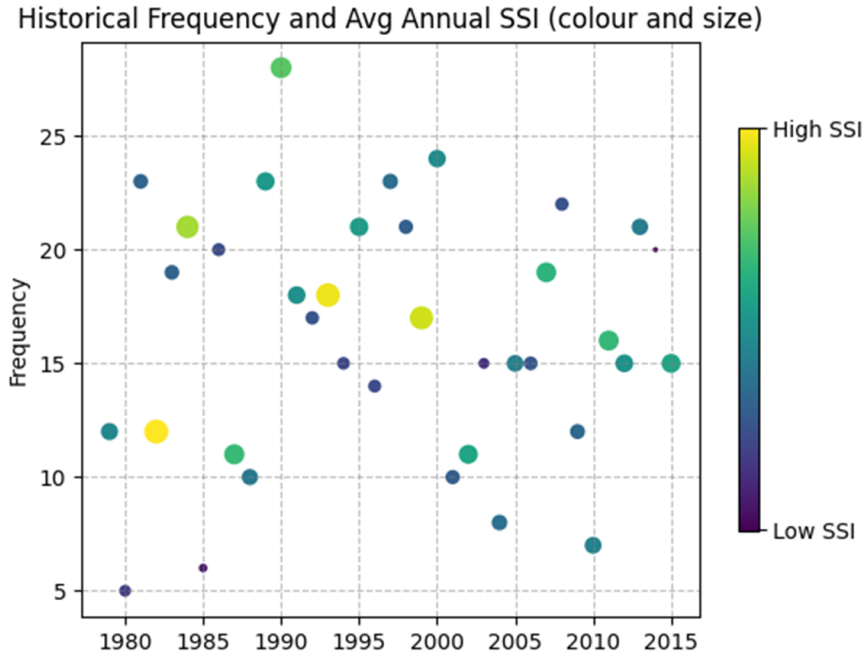


A historical seed storm is perturbed to create a set of realistic simulated stochastic storms. This gives us an alternate view of history!

Frequency & Intensity of ETCs Over Time

How have EU-wide storm frequency and intensity (Storm Severity Index) changed in last few decades?

Europe-wide



Timeseries of historical storm frequency (y-axis) and SSI (size and colour) for a Europe-wide domain, as tracked by Verisk's EU ETC model

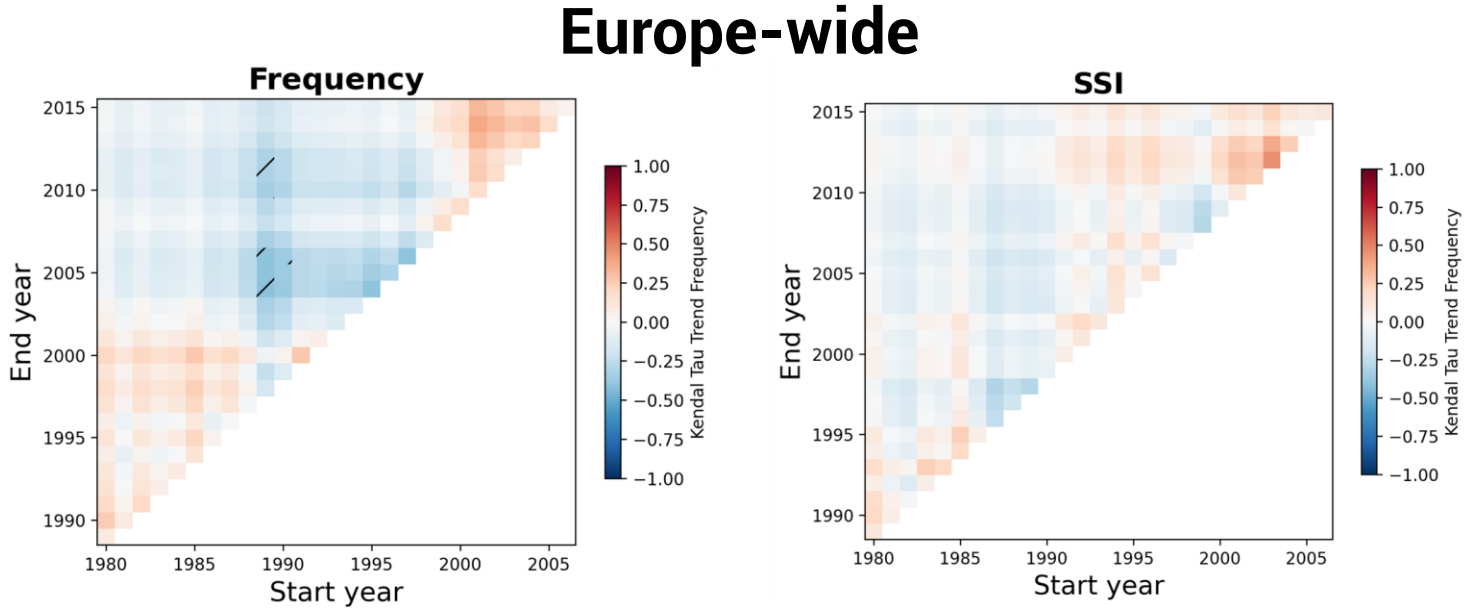
Number of storms and SSI appear higher in the late 1980s and 1990s, with a relative minima in the early 2000s

Interannual variability dominates on this scale

Frequency & Intensity of ETCs Over Time – Significance of Trends?

How have EU-wide storm frequency and intensity (Storm Severity Index) changed in last few decades?

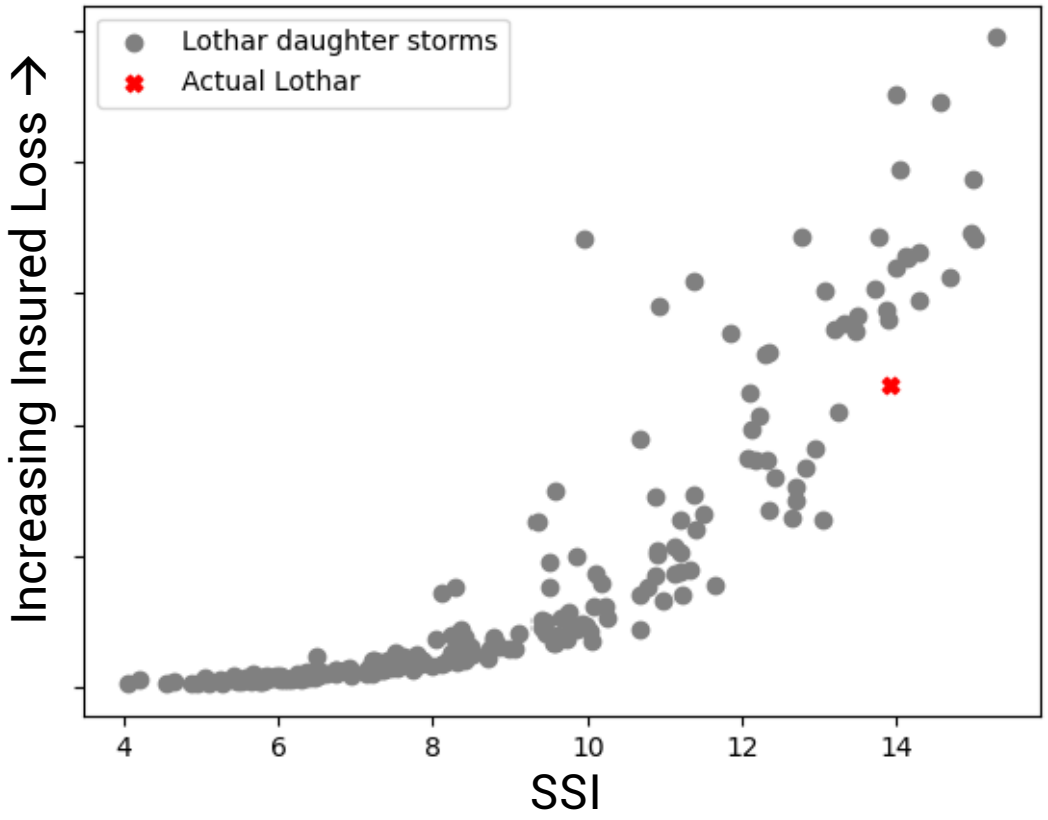
- We perform Mann-Kendal tests on the historical seed storm data
- These show few statistically significant trends in frequency or SSI for Europe ETCs over the satellite era



Kendall-Tau trend (blue decreasing, red increasing) for frequency (left) and SSI (right). Each grid box represents a range of years between a start year (x-axis) and an end year (y-axis). Hatching shows where the trend is statistically significant (if any)

Higher Loss Does Not Always Correspond to a Higher Storm Severity Index

France SSI-Loss Distribution Storm Lothar

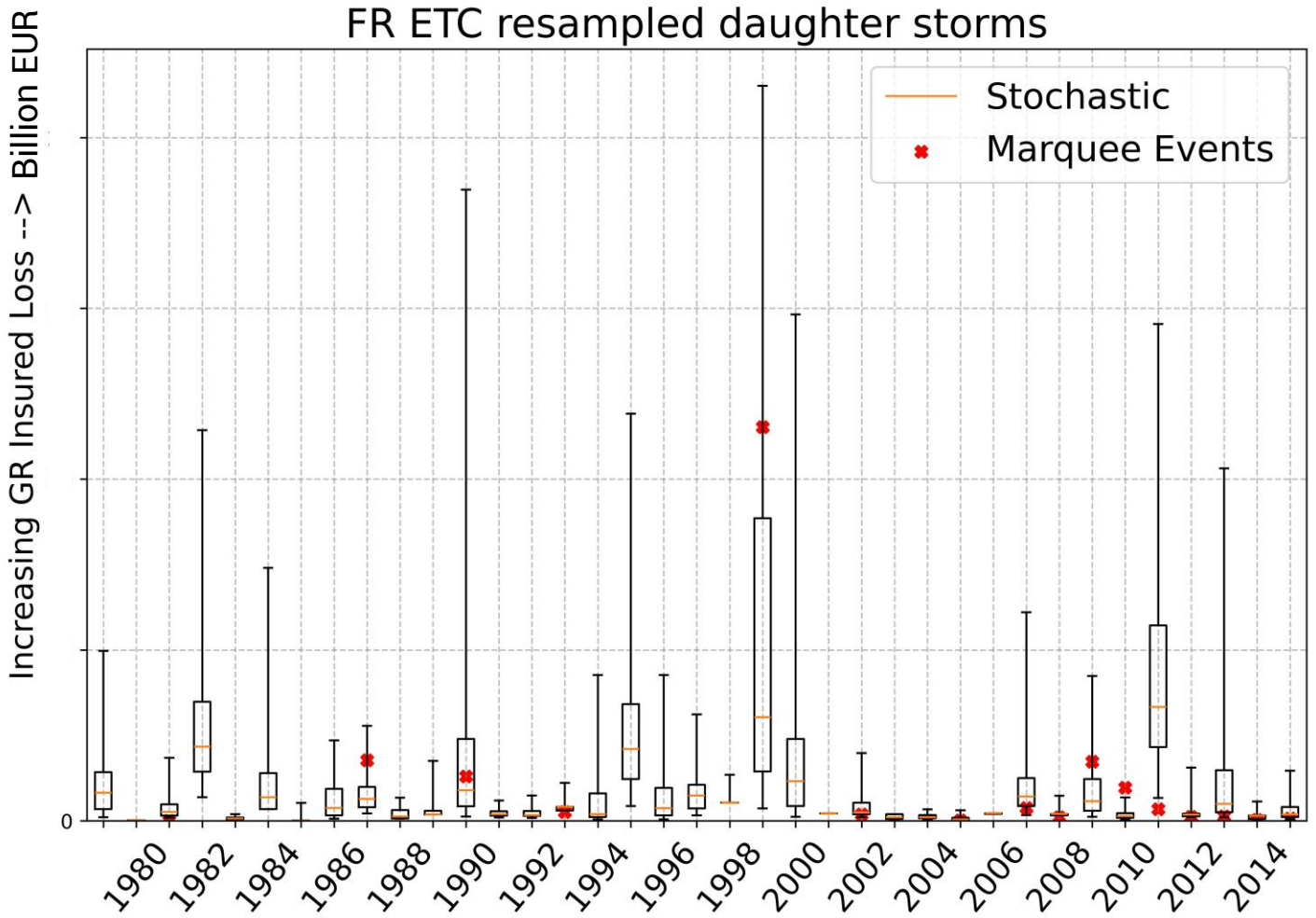


- In the Verisk model, each seed storm spawns numerous daughter storms.
- Many perturbations have higher losses than Lothar – despite a lower SSI, i.e. precise location of highest gusts is important (but very uncertain)
- These daughter storms can be leveraged to give us a 'counterfactual' view of history, as they represent an alternate never-seen-before storm that is **intrinsically related to the original storm and its background environment**

How Could Insured Losses Have Varied Between 1979 and 2015 in France?

By randomly resampling for perturbations of our seed storms, we see that max losses each year could have been much higher than recorded (e.g. 2011 & 2013)

- Lothar (1999) an "unlucky" scenario for losses based on its intrinsic properties
- 87J also an "unlucky" scenario, but could have had even higher losses
- Storm Joachim in 2011 essentially a best-case scenario – Have we been "lucky" with storms this century?
- 2013/2014 stormiest winter for around 20 years in terms of number of stations with gust speeds > 60 knots (Kendon & McCarthy, 2015)

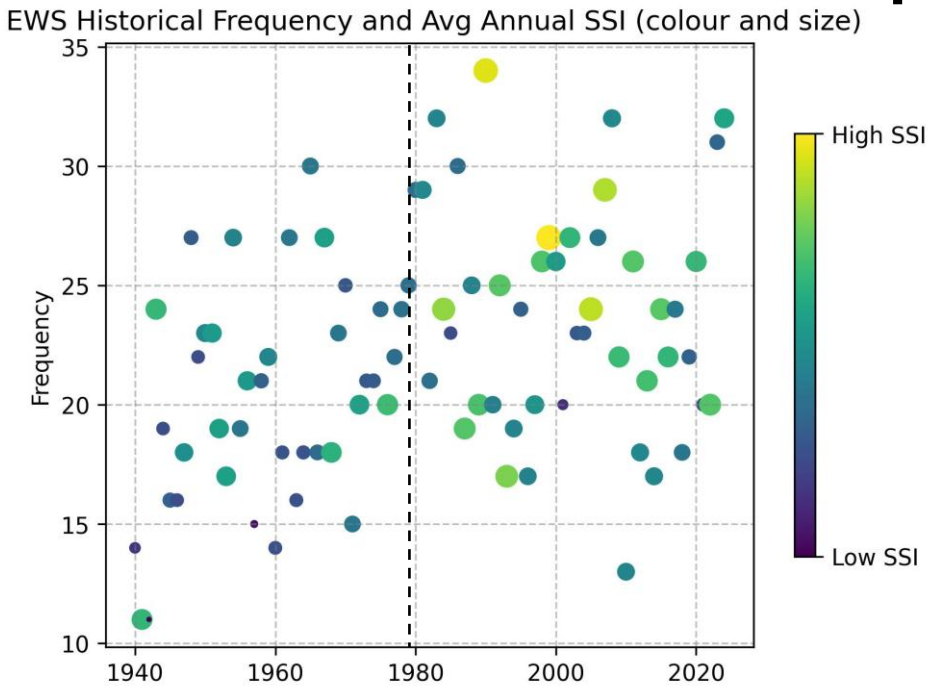


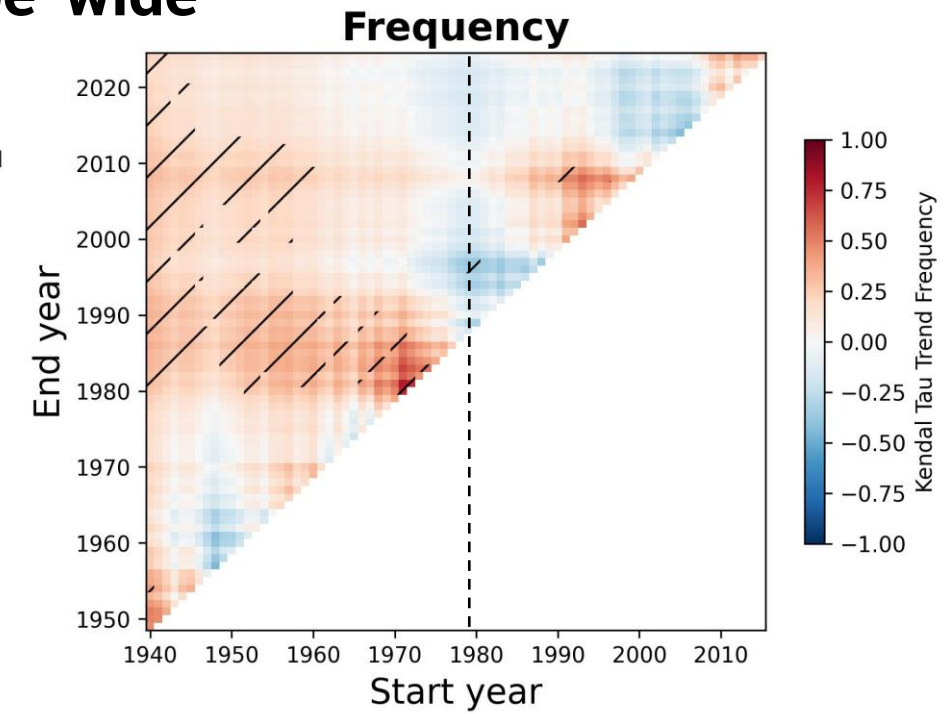
NB Only marquee events (select seed storms) impacting France shown by red crosses. Boxplots show 2nd to 98th percentile

What About Long-Term Trends in Other Data?

- **Enhanced windstorm service catalogue** provides downscaled European windstorm footprints from **1940 to present-day** using ERA5
- But earlier decades show suspiciously low activity relative to the post-satellite era. Future work could look to detrend any bias to obtain a longer, robust, historical record.

Europe-wide



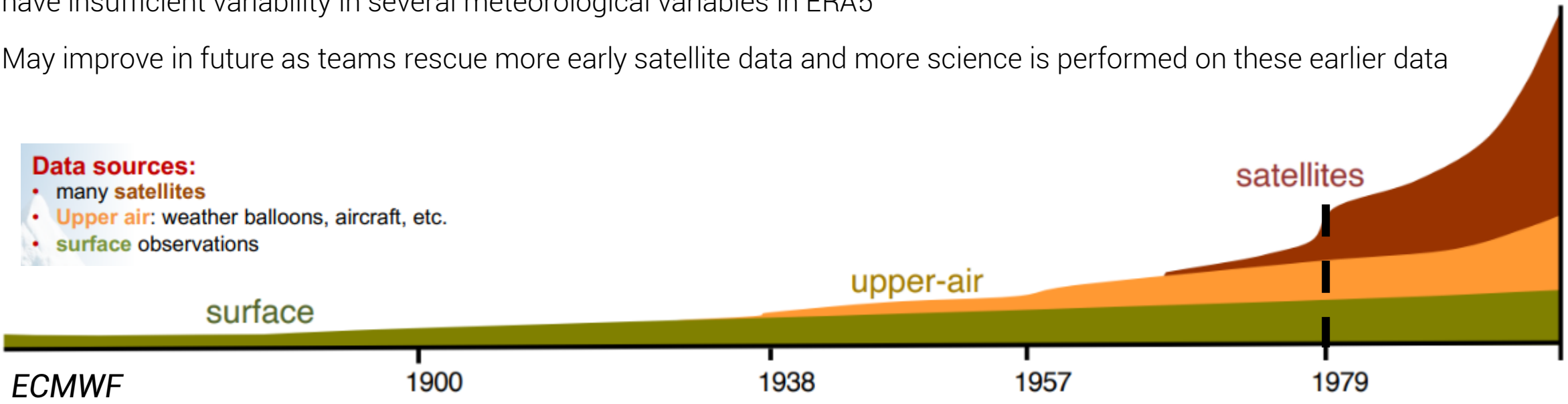


Should We Trust Reanalysis Data Pre-1979?

Used extensively by weather and climate scientists and cat modellers to build an idea of trends in weather and climate over time, and for good reason, it's often the best we have

But a few reasons to be cautious:

- Reconstructing older time periods relies on the model and fewer surface observations to constrain it. The 1940s is thought to have insufficient variability in several meteorological variables in ERA5
- May improve in future as teams rescue more early satellite data and more science is performed on these earlier data



Summary

- Trends in ETC activity are complex, as there are different stories to be had
  1. Scale
  2. Metric (hazard/loss)
  3. Dataset/model

- Stories on ETC trends informing risk management decisions should align on these factors and consider significance

- No clear signal to suggest that we cannot see a return to the high-loss environment of the 1990s

- We have also analysed longer datasets from 1940 to present day – Lack of clear trends in European windstorm activity from the 1970s onwards… cautious about the robustness of data pre-satellite era

Thank you

Happy to take questions now and during the upcoming coffee break

+44 (0)20 37640300

adoyle@verisk.com

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