



# Evaluation of an air pressure based proxy for storm activity

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## Motivation

- ▶ wind time series are often **inhomogeneous** and **too short**
  - ▶ air pressure readings are usually homogeneous
  - ▶ Thus, the statistics of derived geostrophic wind speeds can be used as a proxy for past storm activity.
- It is commonly believed, however unproven, that the variation of the statistics of strong geostrophic wind speeds describes the variation of statistics of ground level wind speeds.

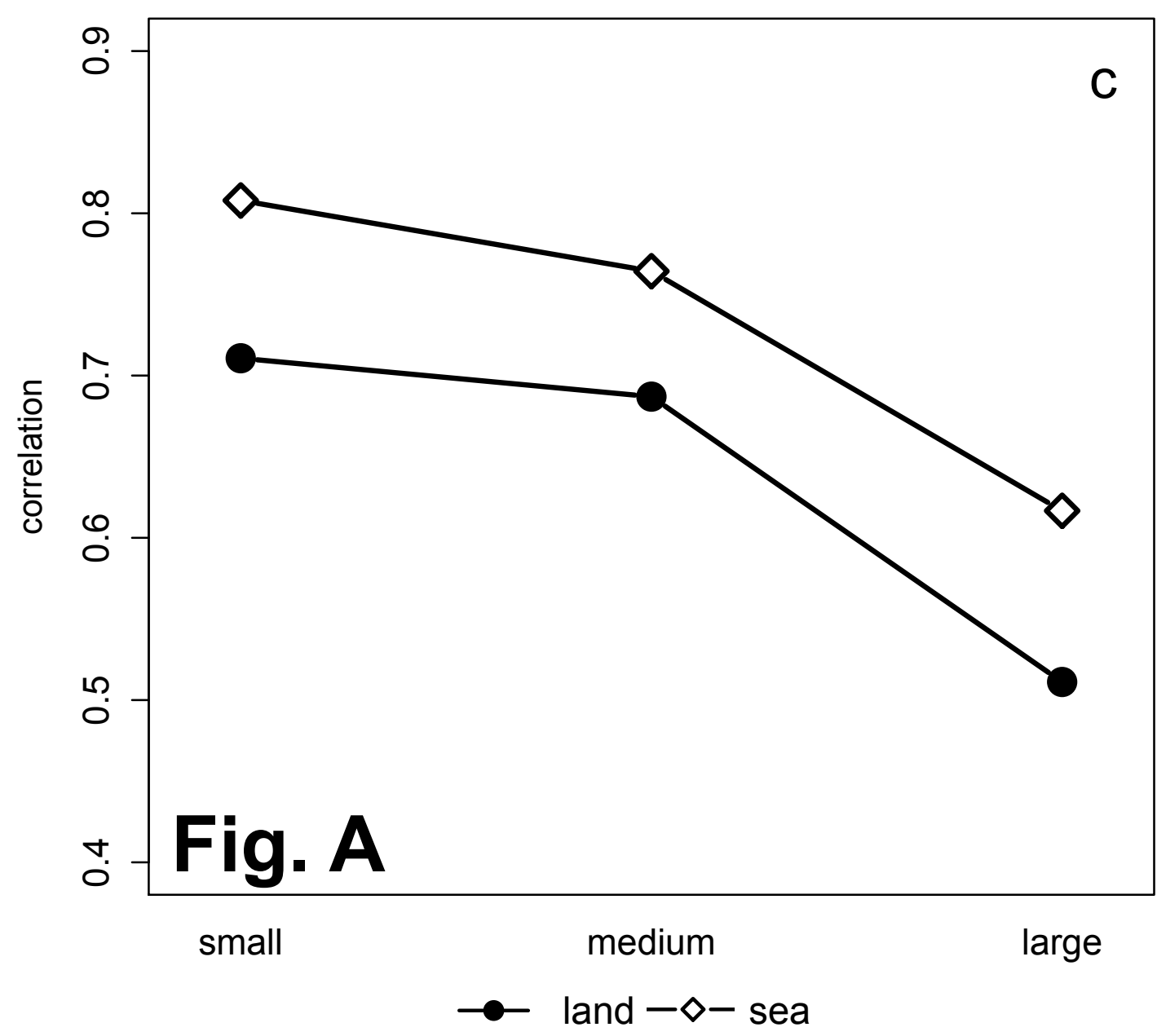
This study evaluates this approach by examining the correlation between quantiles of yearly and seasonal geostrophic wind speed and of atmospheric wind speed to determine whether the two distributions are linearly linked.

## Dataset

- ▶ Diagnostic 10m wind and surface air pressure fields from the spectrally nudged and NCEP driven REMO (Weisse et al., 2009), known as coastDat, are made use of. The dataset covers Europe and the North Atlantic.
- ▶ The period 1959-2005 is analysed.

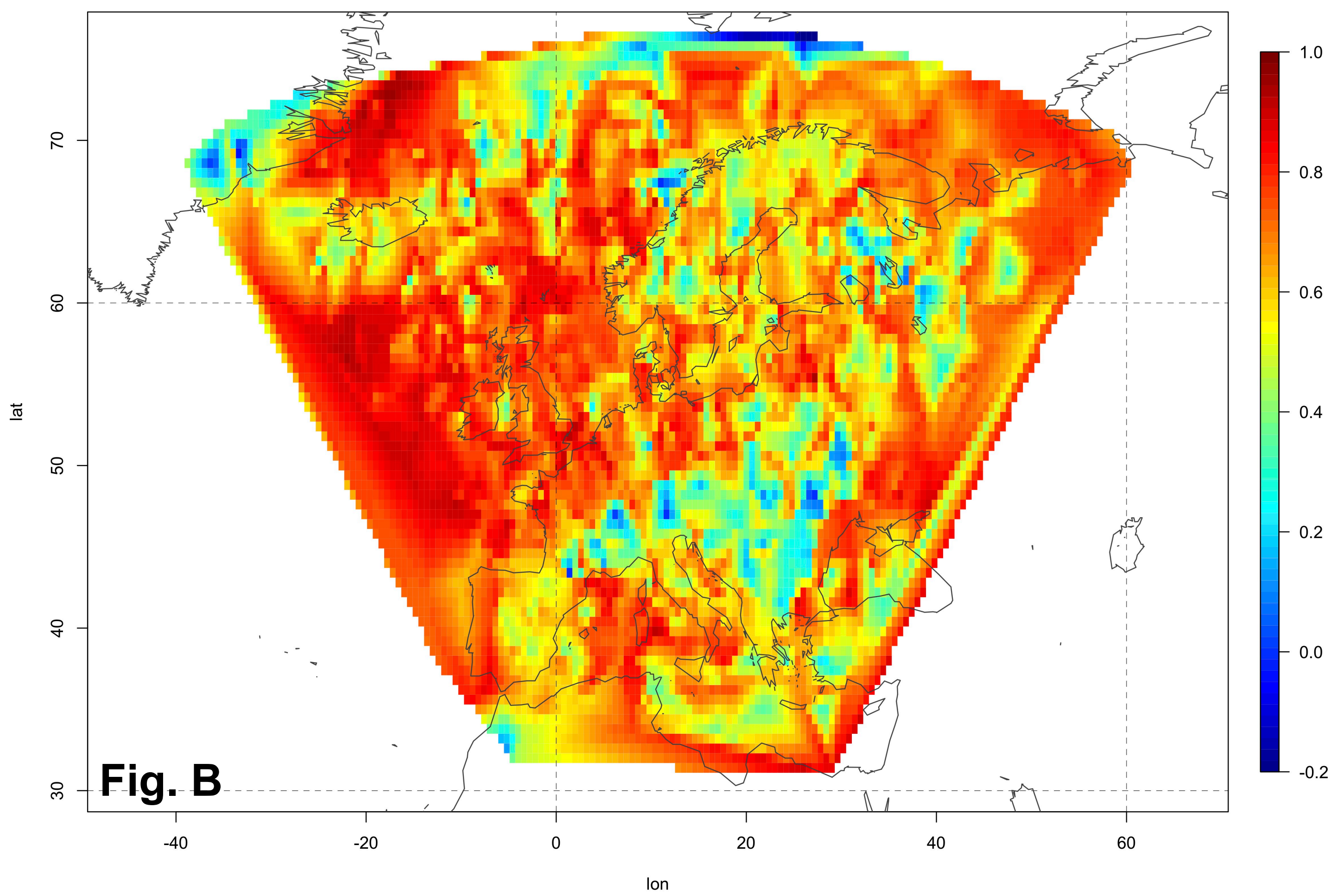
## How do size and surface conditions influence the description of storm activity?

differences in mean correlations between...	median wind speeds	90th %ile wind speeds	95th %ile wind speeds	99th %ile wind speeds
...small and large triangles	0.488	0.352	0.348	0.315
...sea and land triangles	0.179	0.136	0.182	0.128

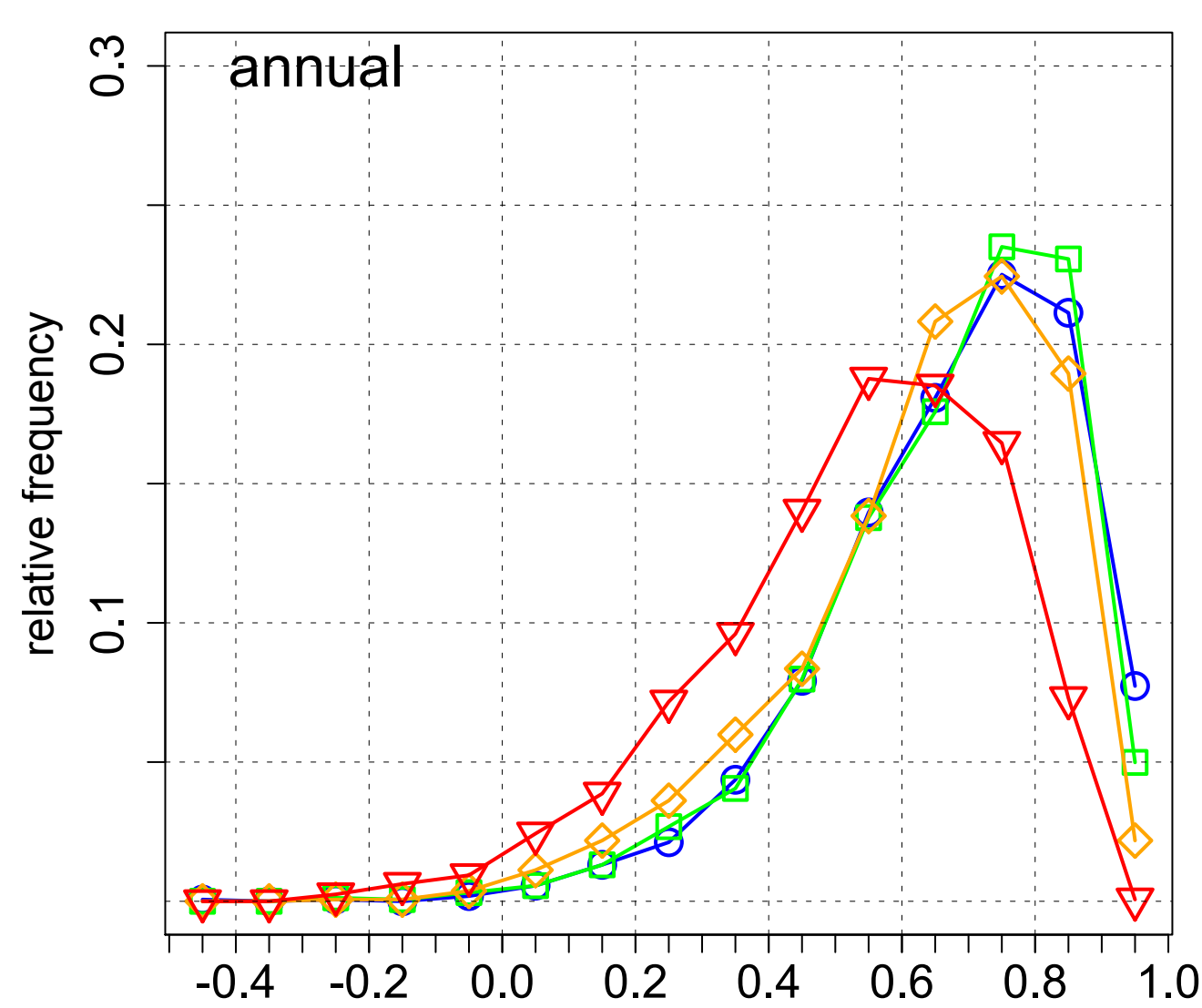


▶ **Fig. A:** Group means of correlations between 95th percentile wind speed time series for land and sea triangles, and small, medium and large sized triangles.

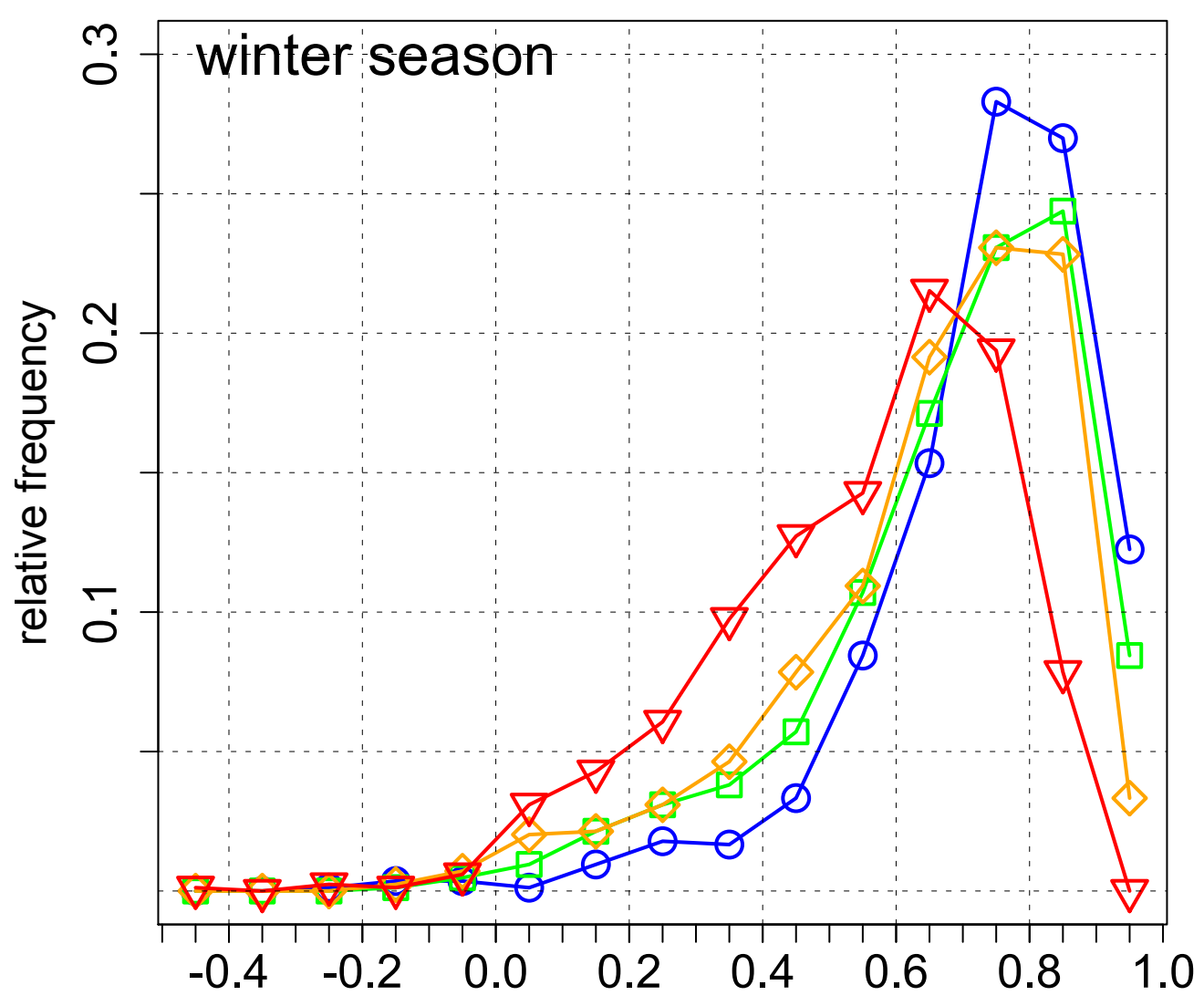
▶ **Fig B:** Map of correlations between 95th percentiles of geostrophic and area maximum wind speeds.



## Are percentiles of geostrophic wind and atmospheric wind linearly related?



correlations between annual...	0.05-quantile	median
...median wind speeds	0.328	0.710
...90th %ile wind speeds	0.300	0.710
...95th %ile wind speeds	0.240	0.672
...99th %ile wind speeds	0.120	0.561



correlations between winter...	0.05-quantile	median
...median wind speeds	0.384	0.769
...90th %ile wind speeds	0.247	0.723
...95th %ile wind speeds	0.195	0.694
...99th %ile wind speeds	0.109	0.592

correlation between...

- ...median wind speeds (blue circles)
- ...90th %ile wind speeds (green squares)
- ...95th %ile wind speeds (orange diamonds)
- ...99th %ile wind speeds (red triangles)

## Conclusion

- ➔ The variation of strong geostrophic wind speed statistics describes the variation of ground level wind speed statistics.
- ➔ Annual and seasonal quantiles of geostrophic wind speed and of atmospheric wind speed are linearly related.
- ➔ Geostrophic wind from sea triangles reflects storm activity better than geostrophic wind from land triangles.

### References

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