Global wind-solar complementarity assessment

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Introduction

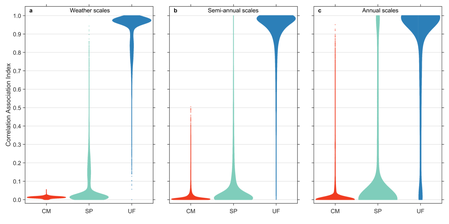
- Wind and solar energy are subject to considerable spatio-temporal variability
- Exploitation of complementarity to improve renewable energy reliability

Methods

1. Hourly mean wind and solar capacity factors (CF)
2. Wavelet spectra analysis
3. Correlation analysis, based on phase and amplitude

Results

The association between analyzed regions is mostly undefined.

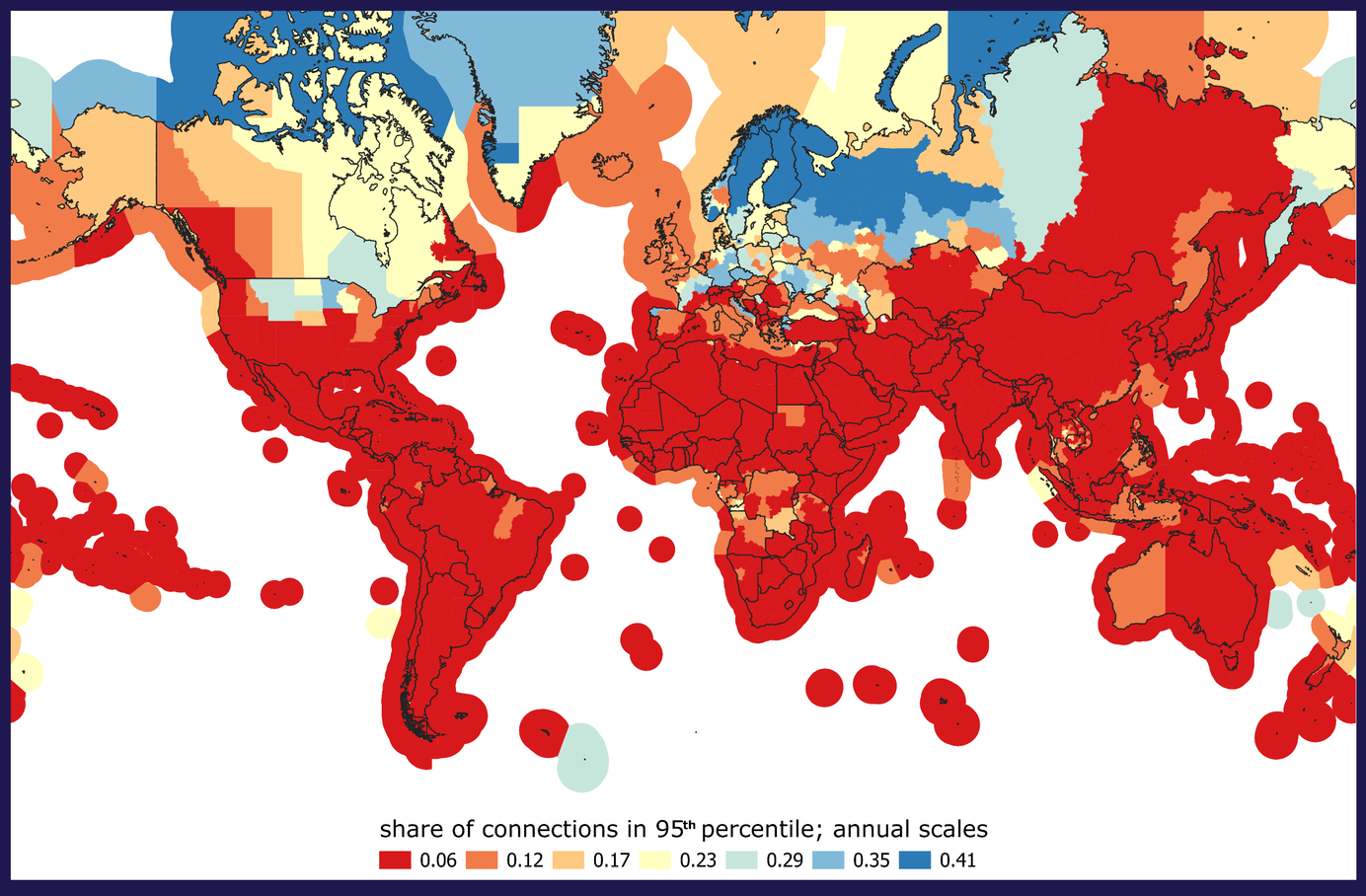


Correlation Association Index assigning values for complementarity (CM), supplementarity (SP), and undefined (UF) components

Discussion

Results are not easily comparable to Kendall-score based quantification of complementarity.

Wind-solar complementarity **at** annual **time scale exhibits the highest potential.**



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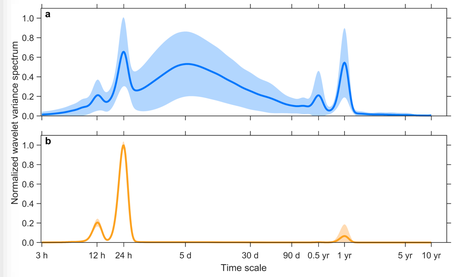
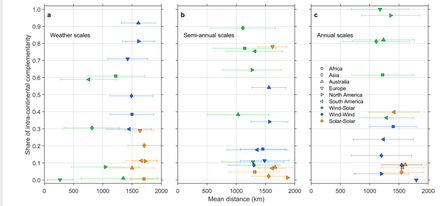
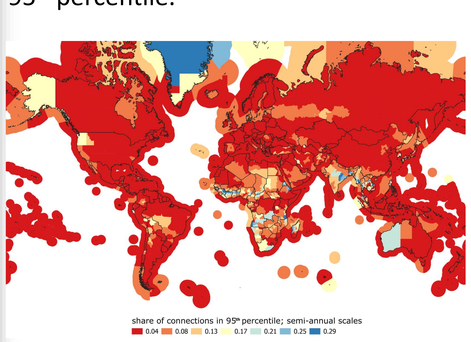
Additional info



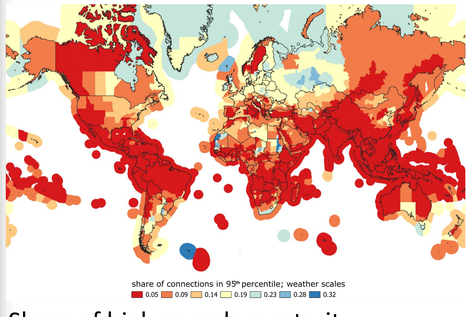
Normalized wavelet variance spectra for (a) wind energy CF and (b) solar energy CF.



Continent wise share of wind-wind, wind-solar and solar-solar complementarity and mean distance of connections in the 95th percentile.



Share of high complementarity connections for semi-annual scales.



Share of high complementarity connections for weather scales.