European Geosciences Union General Assembly 2016
Vienna, Austria, 17 – 22 April 2016
HS7.9/AS1.30/CL2.21/NH1.12/NP3.8:
Precipitation variability: spatio-temporal scales and hydrometeorologic extremes (co-organized); Hydroclimatic and hydrometeorologic stochastics: Extremes, scales, probabilities

Stochastic similarities between hydroclimatic processes for variability characterization

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Tests to identify the stochastic structure of each process

Source: Dimitriadis et al., 2016.

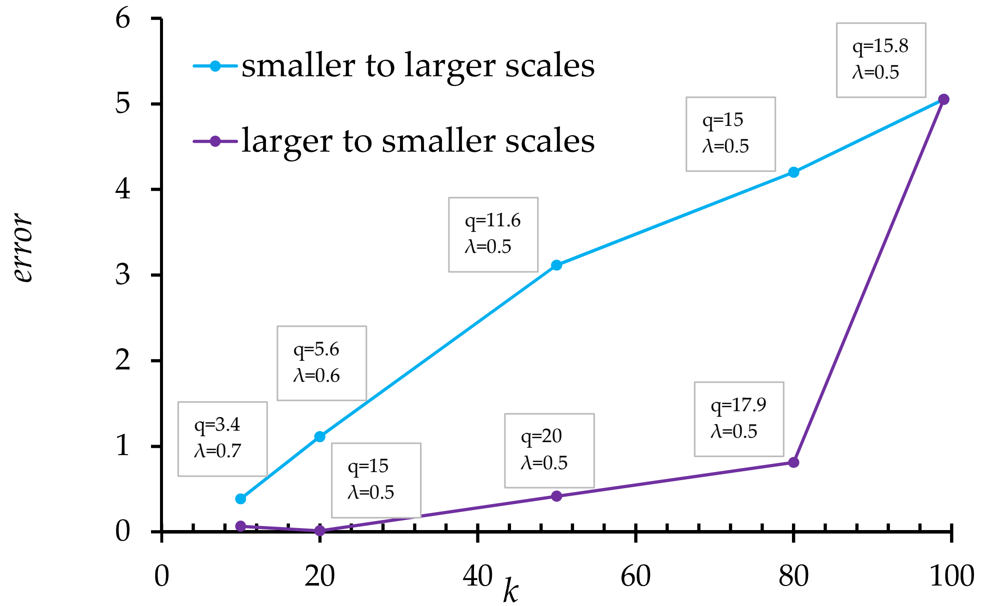


Figure 1: Fitting errors between various Markov processes and an HK process (H=0.9).

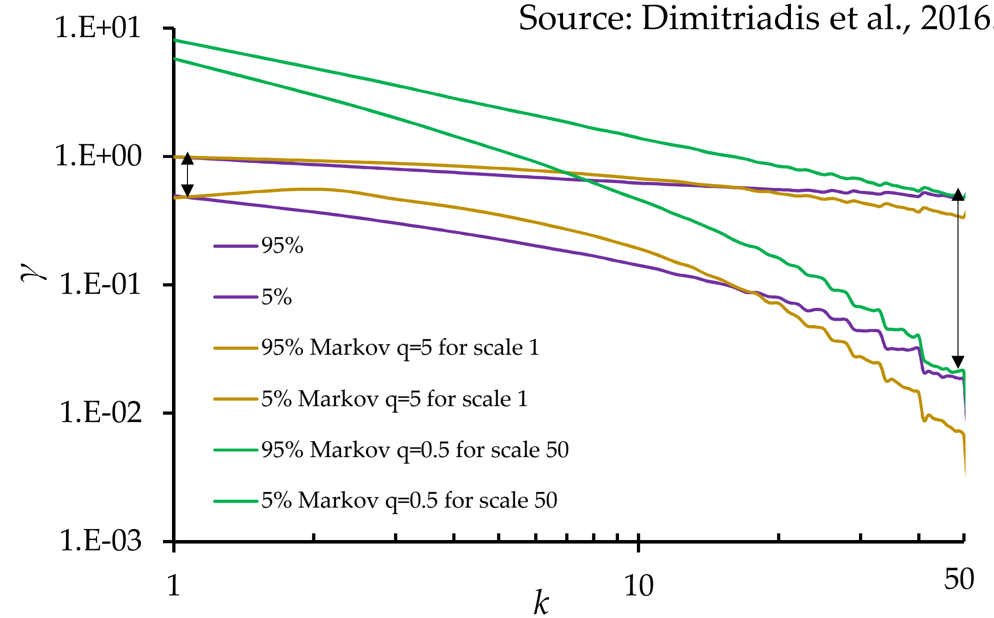


Figure 2: Comparison between ranges of confidence intervals of various Markov processes and an HK process (H=0.9).

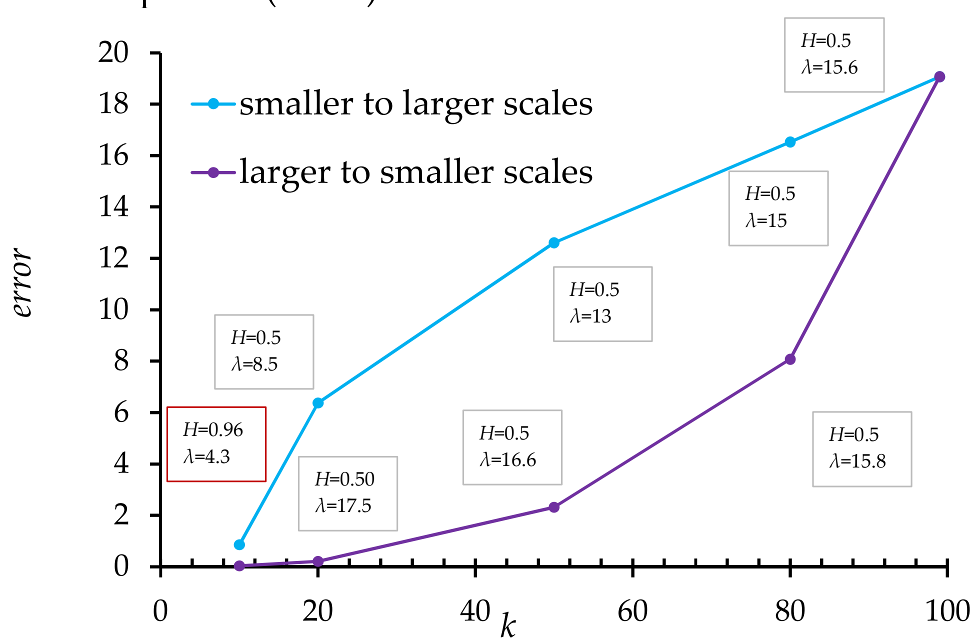


Figure 3: Fitting errors between various HK processes and a Markov process (ρ=0.9).

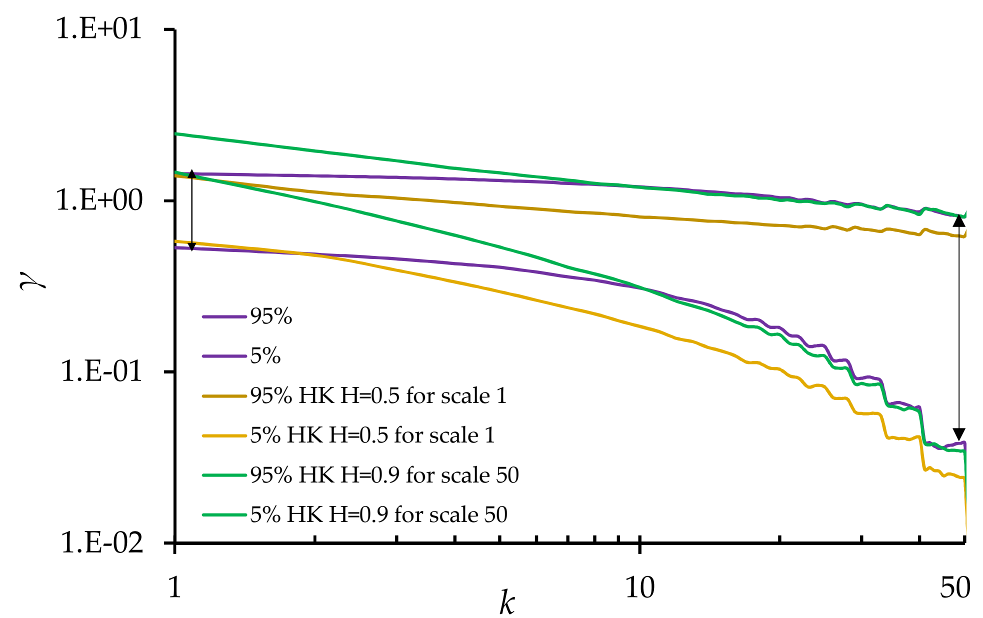
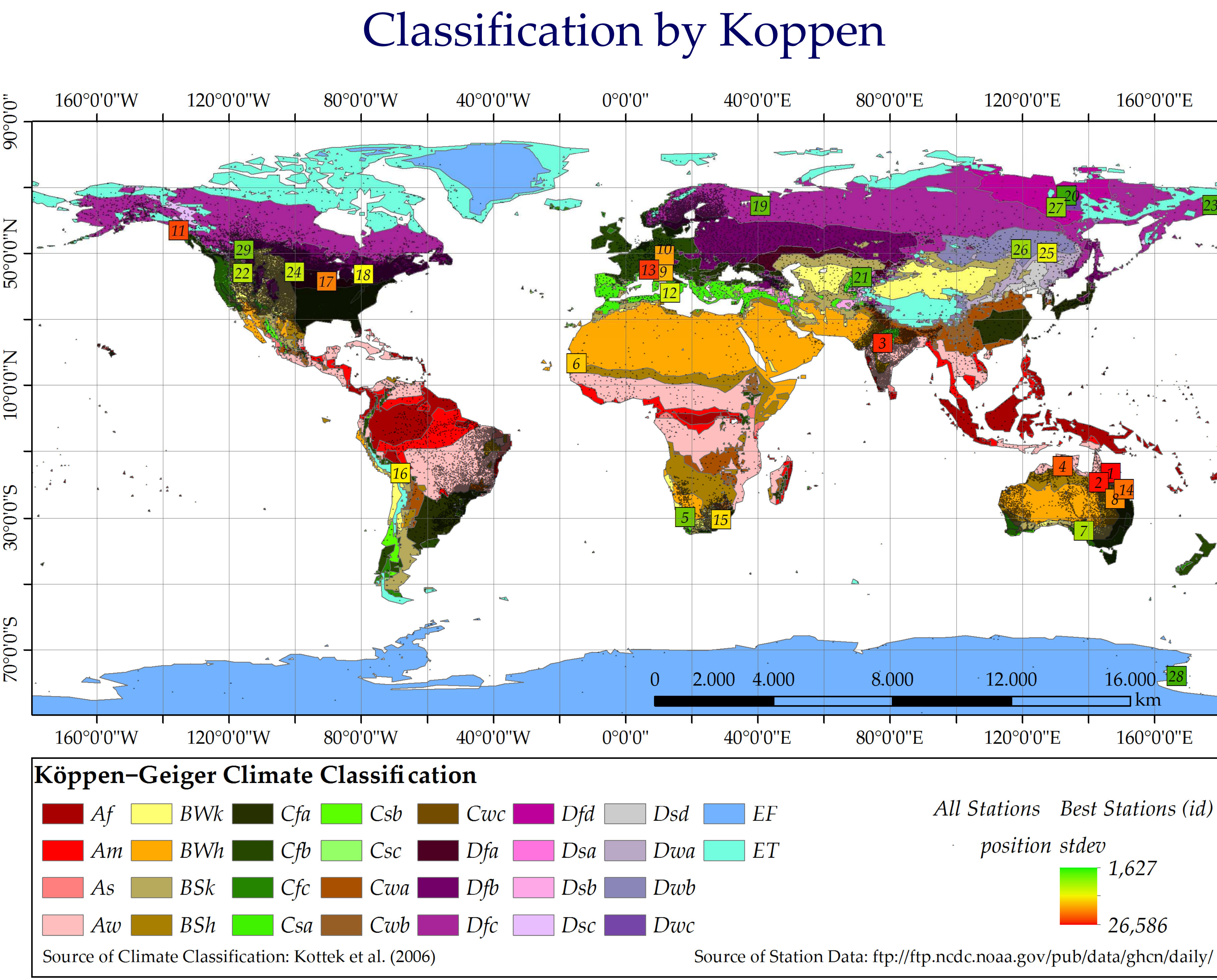
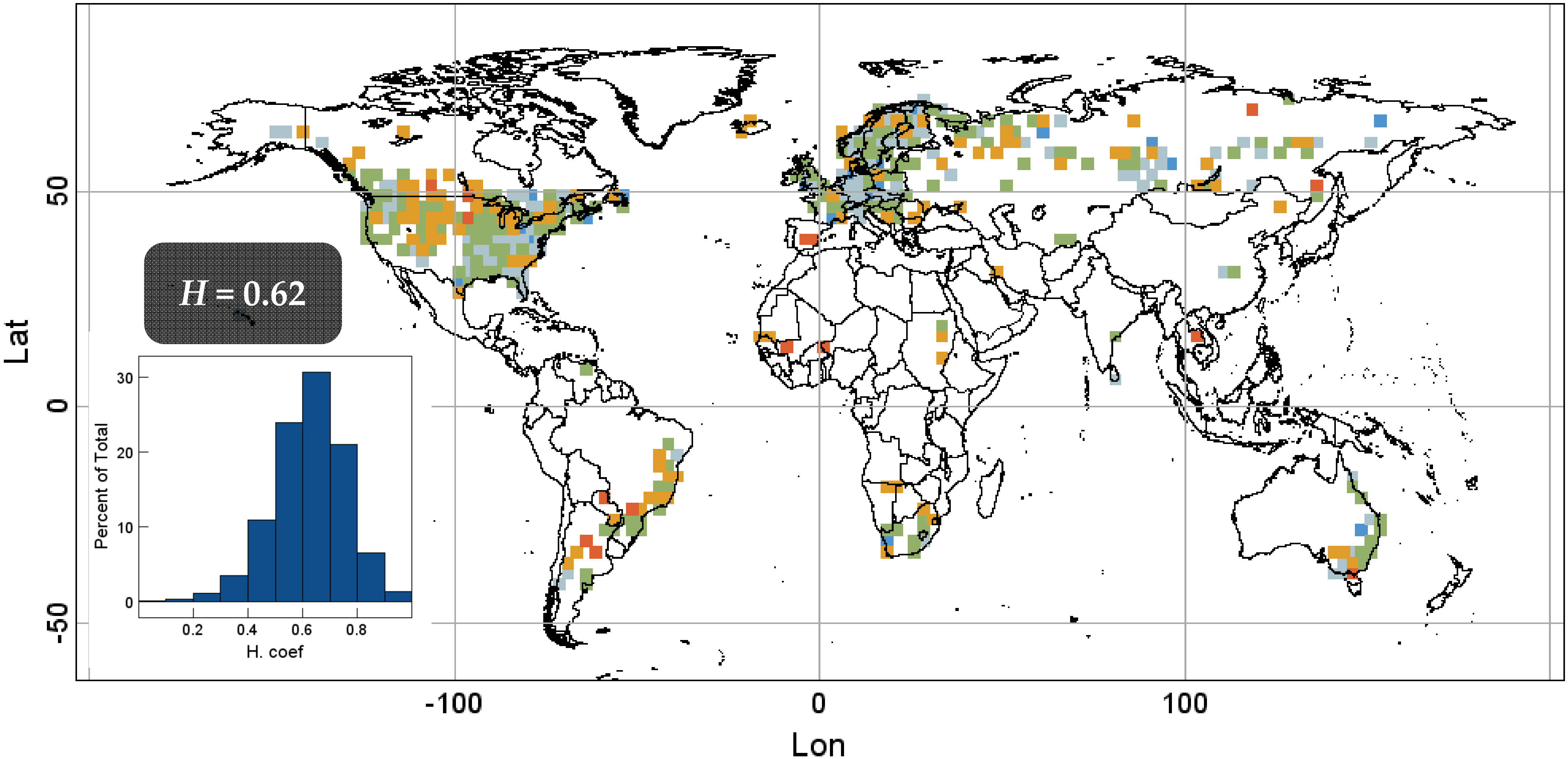


Figure 4: Comparison between ranges of confidence intervals of various HK processes and a Markov process (ρ=0.9).



Map 1: Classification of stations by Koppen and selection of the highest quality station for each class and sub-class (Source: Sotiriadou et al., 2016).

An example of the river discharge process



Map 2: Spatial distribution of river discharge stations and estimation of Hurst coefficient (Source: Markonis et al., 2016).

Examples of stations around the globe with high quality-data

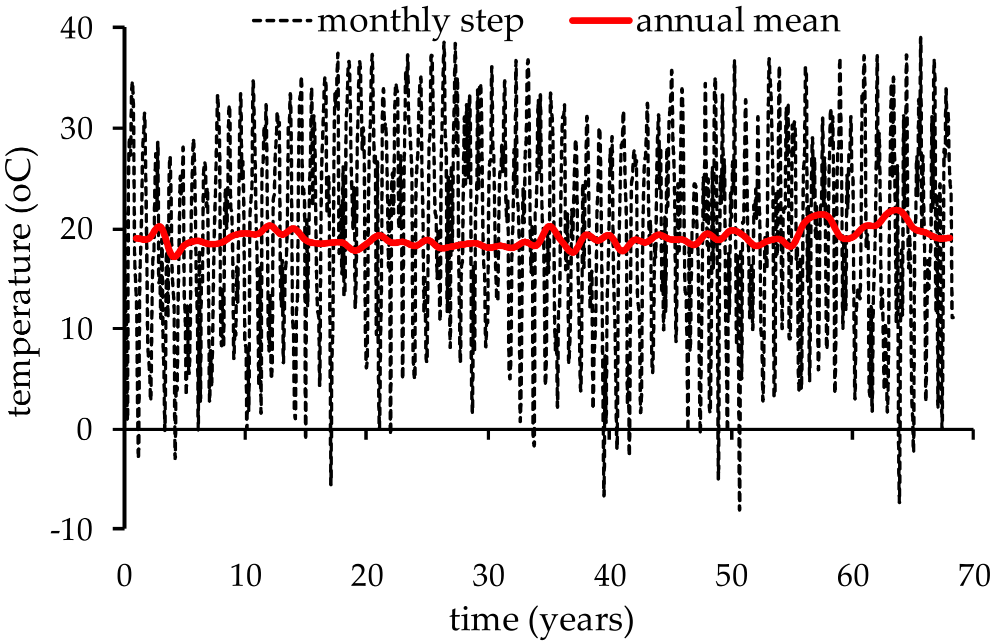


Figure 5: Temperature records from station located in Dallas, USA (Source: Lerias et al., 2016)

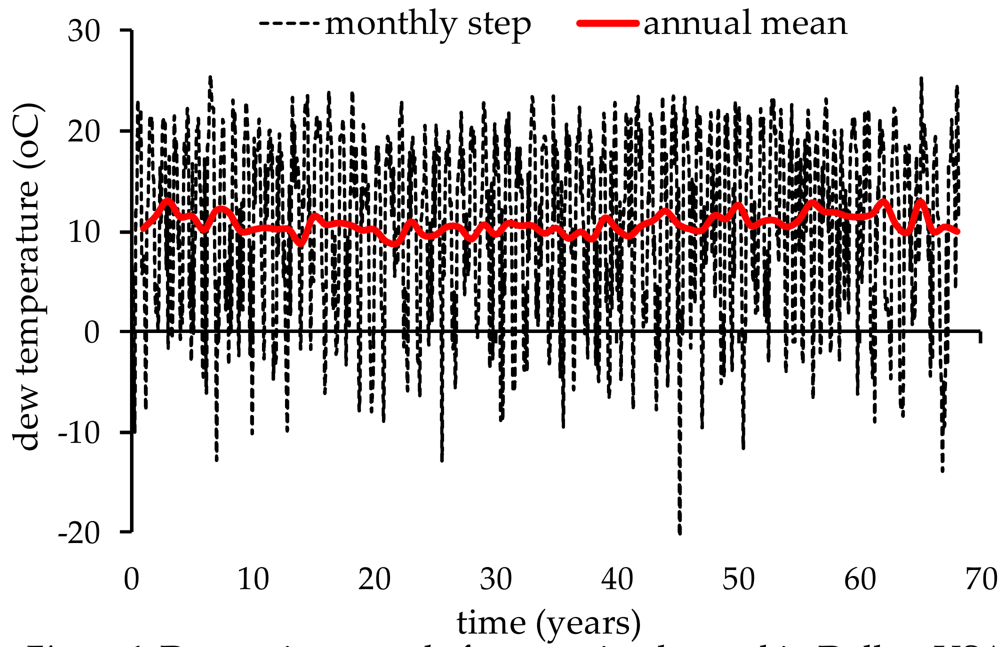


Figure 6: Dew point records from station located in Dallas, USA (Source: Lerias et al., 2016).

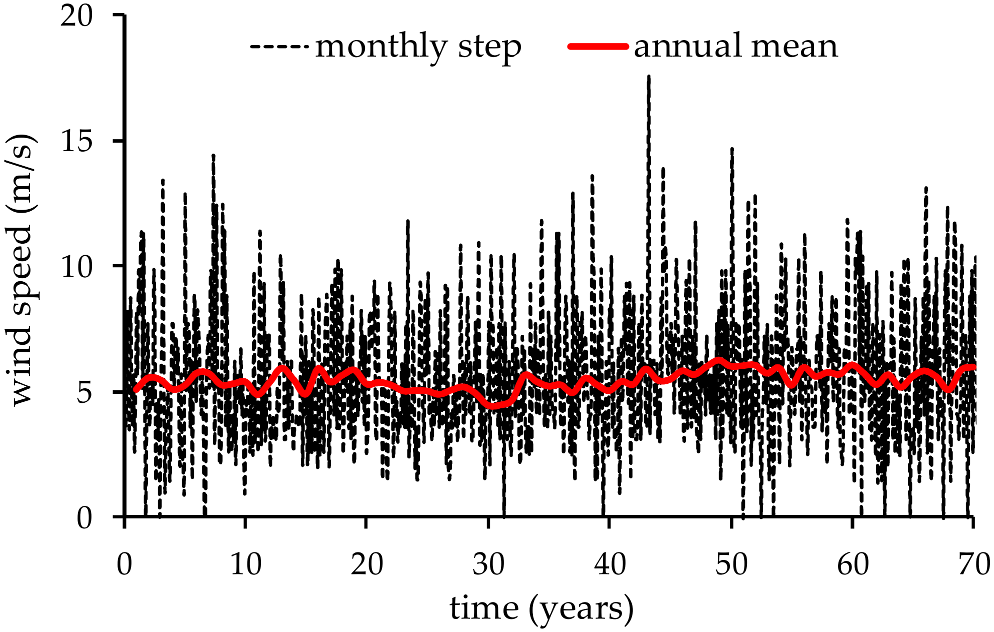


Figure 7: Wind speed records from station located in Winter Trail, Alaska (Source: Deligiannis et al,, 2016).

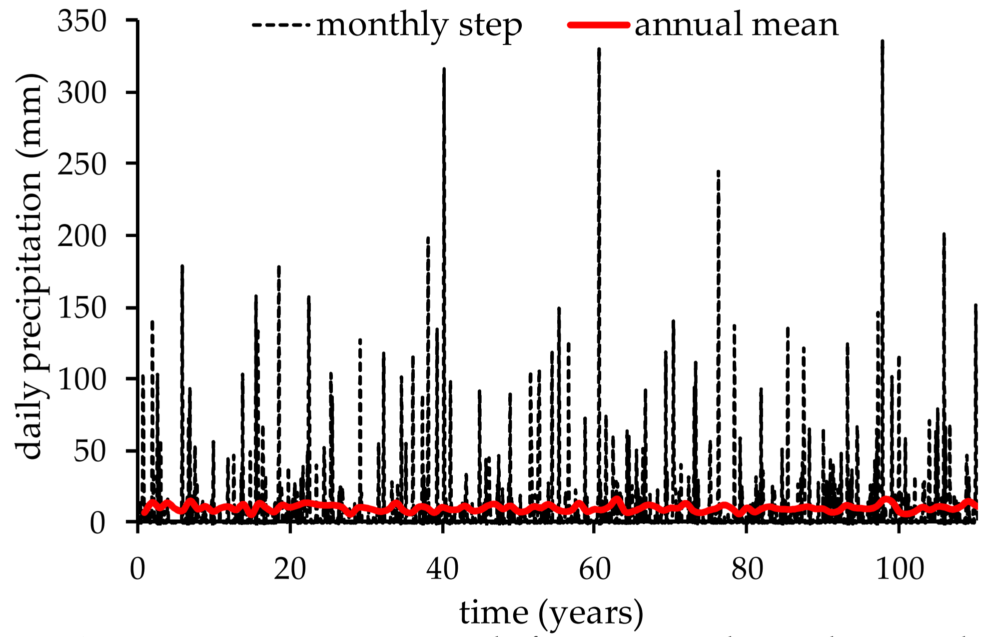
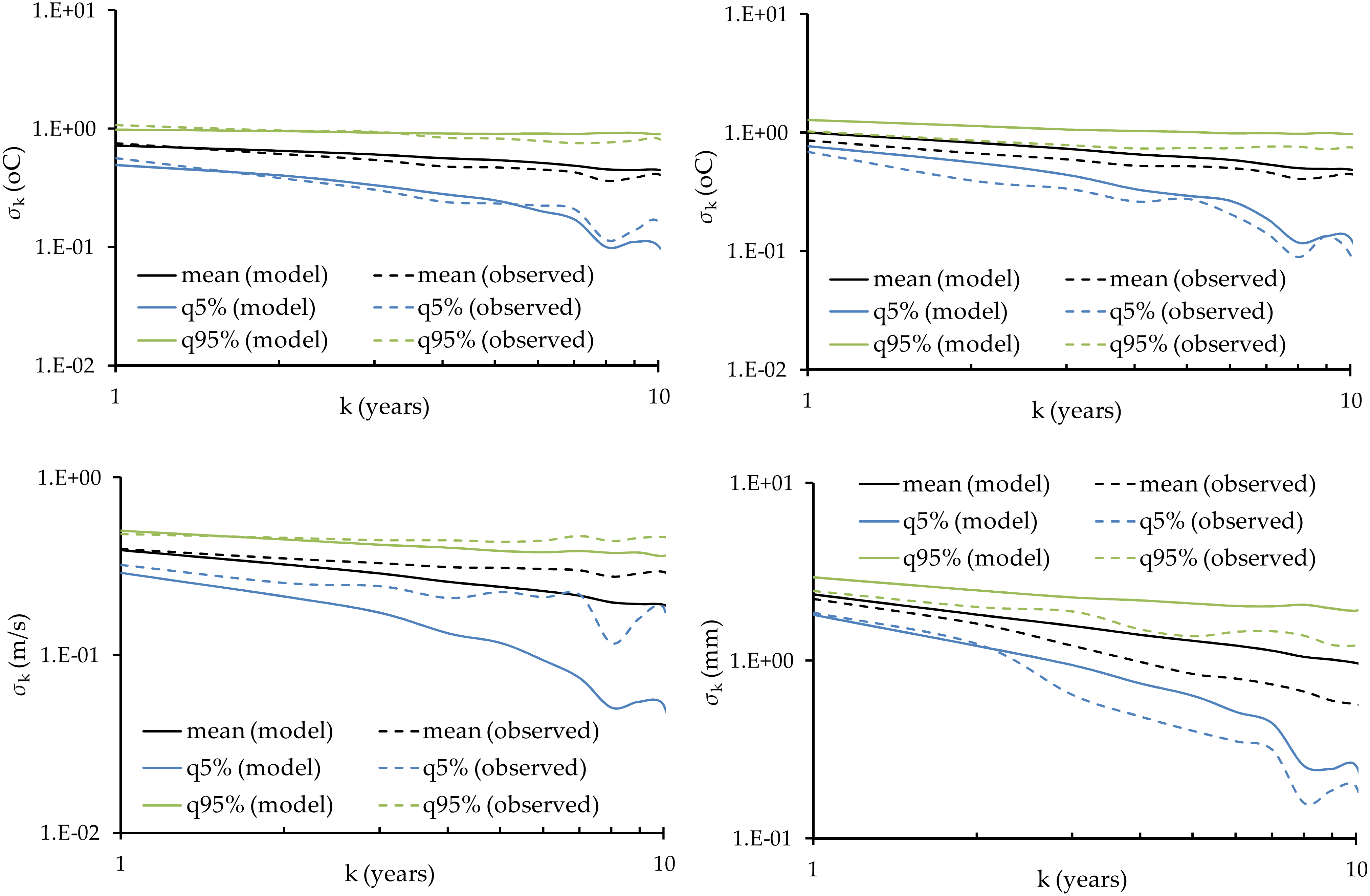


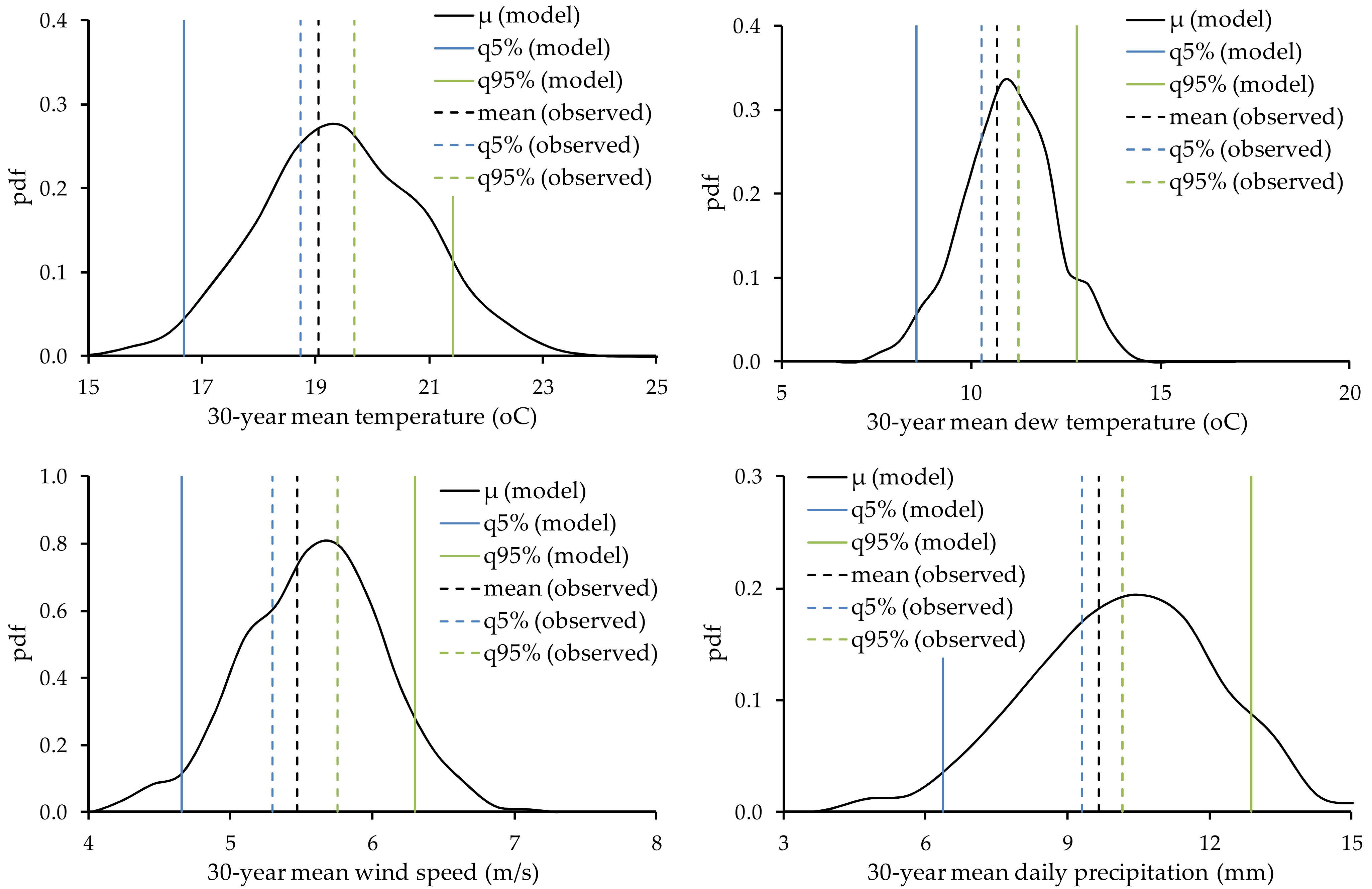
Figure 8: Precipitation records from station located in North-East Australia (Source: Sotiriadou et al., 2016).

HK stochastic structure for examined stations



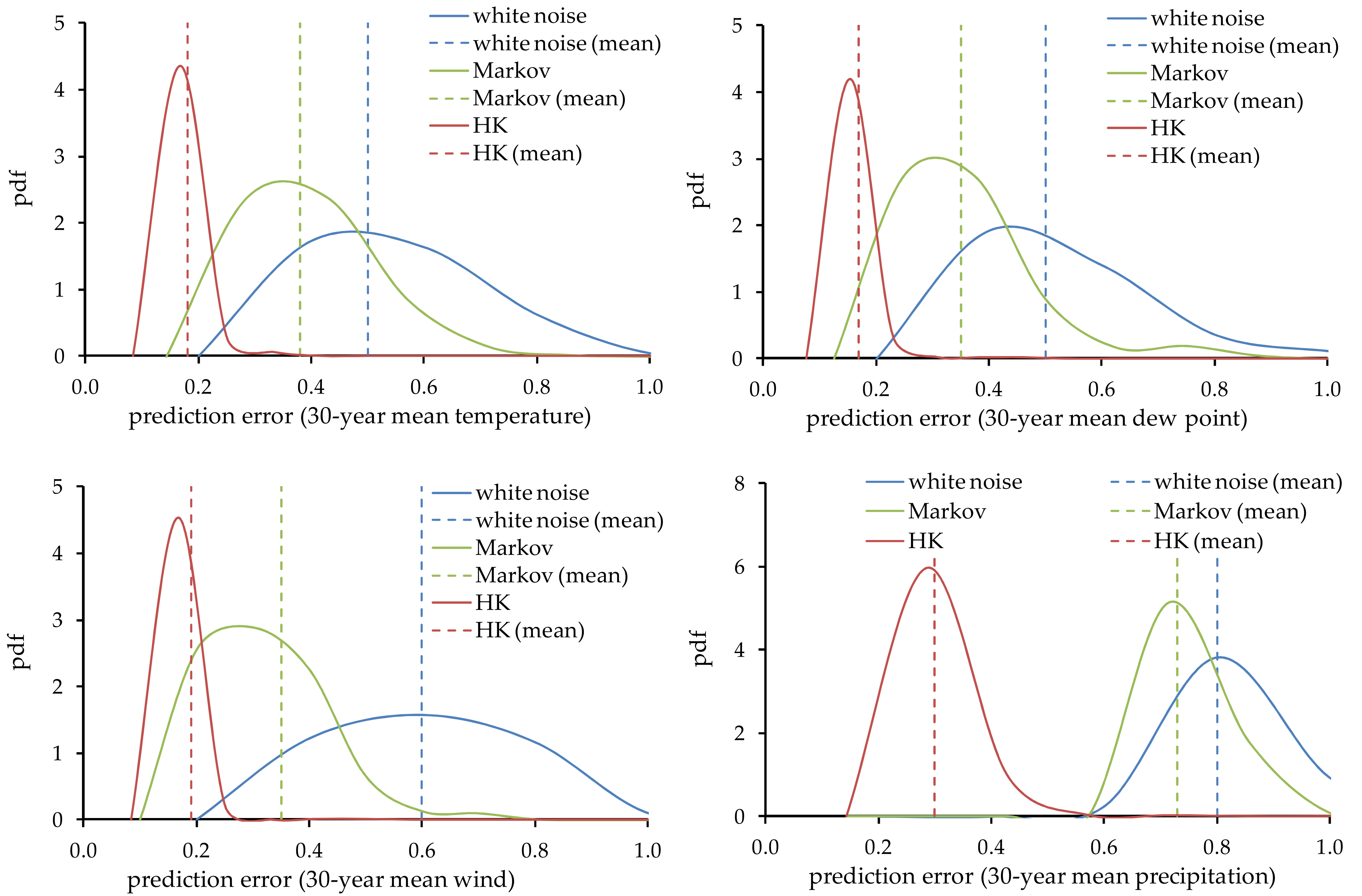
Figures 9-12: Empirical and modelled HK process for the examined stations of previous section, respectively for each process.

Predictions intervals for the 30-year mean of examined stations



Figures 13-16: Prediction intervals of the 30-year mean for the examined stations of previous sections, respectively for each process.

Predictions errors for the 30-year mean (overall)



Figures 17-20: Overall prediction errors of the 30-year mean for each examined process and for a white noise, Markov and HK model.

Comments and Conclusions

The main quest of our work is to investigate the long-term persistence of the examined processes and in what degree we can describe the climatic variability of these processes in annual scale, using just three parameters, these are the mean, standard deviation and Hurst coefficient and with the (over safety) assumption that the 30-year scaled process is normally distributed and stationary.

Overall, we estimate that for the :

- Temperature process (H≈0.75), the prediction error for **73%** of stations is lower than **10%**.
- Dew point process (H≈0.7, the prediction error for **80%** of stations is lower than **10%**.
- Wind process (H≈0.73), the prediction error for **71%** of stations is lower than **10%**.
- Precipitation process (H≈0.67) and river discharges (H≈0.62), the prediction error for **86%** of stations is lower than **20%**.

For more details about the analysis and further discussion on the climatic variability and long-term persistence please visit our poster session HS7.4 (Change in climate, hydrology and society) on Friday 22 Apr., 17:30–19:00 / Hall A (posters A-127 to A-131).

References

Deligiannis I., V. Tyrogiannis, O. Daskalou, P. Dimitriadis, Y. Markonis, T. Iliopoulou and D. Koutsoyiannis, Stochastic investigation of wind process for climatic variability identification, *European Geosciences Union General Assembly 2016, Geophysical Research Abstracts*, Vol. 18, Vienna, EGU2016-14946, European Geosciences Union, 2016.

Dimitriadis P., N. Gournari and D. Koutsoyiannis, Markov vs. Hurst-Kolmogorov behaviour identification in hydroclimatic processes, *European Geosciences Union General Assembly 2016, Geophysical Research Abstracts*, Vol. 18, Vienna, EGU2016-14577, European Geosciences Union, 2016.

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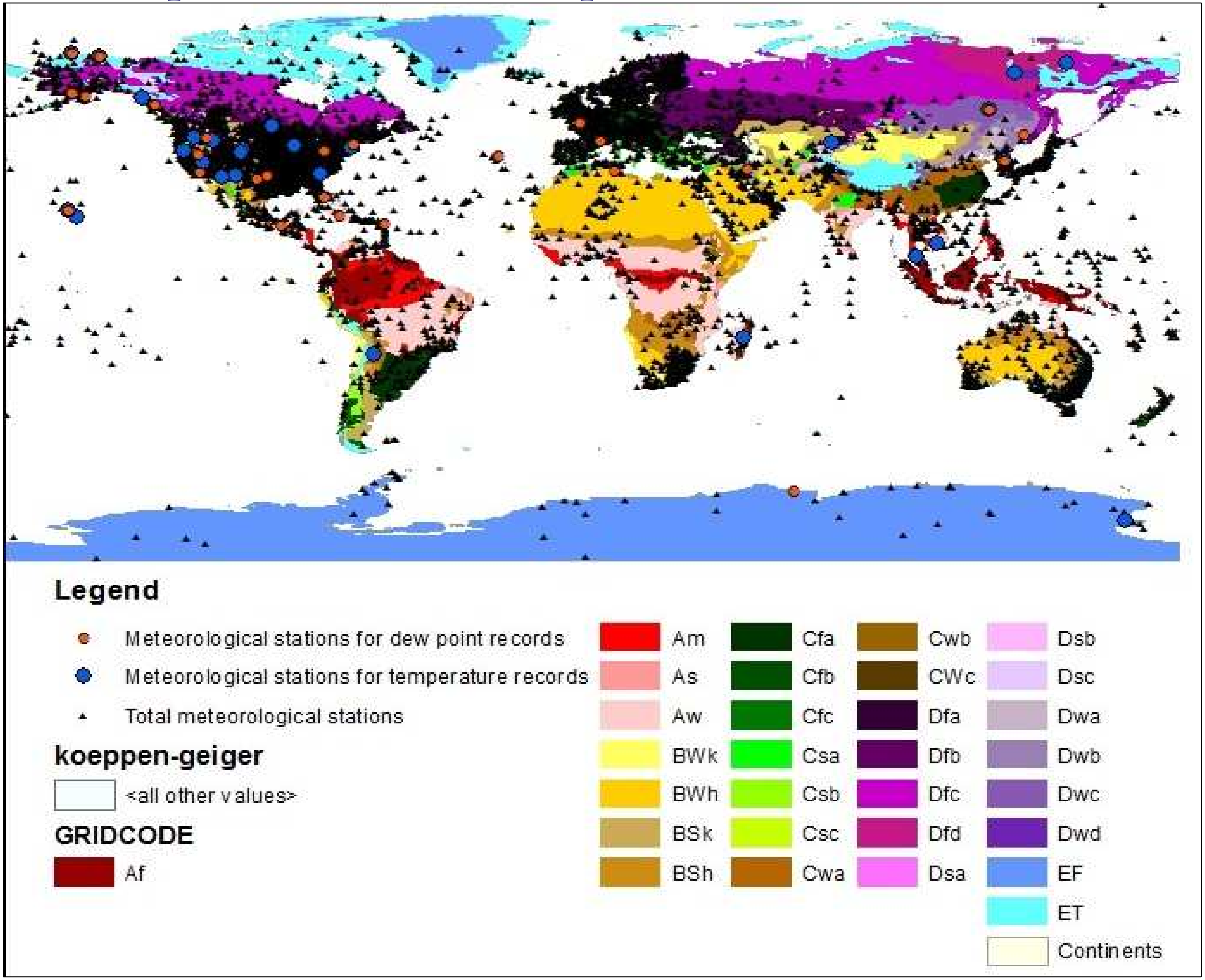
Markonis Y., C. Nasika, Y. Moustakis, A. Markopoulos, P. Dimitriadis and D. Koutsoyiannis, Global investigation of Hurst-Kolmogorov behaviour in river runoff, *European Geosciences Union General Assembly 2016, Geophysical Research Abstracts*, Vol. 18, Vienna, EGU2016-17491, European Geosciences Union, 2016.

Sotiriadou A., A. Petsiou, E. Feloni, P. Kastis, T. Iliopoulou, Y. Markonis, H. Tyralis, P. Dimitriadis, and D. Koutsoyiannis, Stochastic investigation of precipitation process for climatic variability identification, *European Geosciences Union General Assembly 2016, Geophysical Research Abstracts*, Vol. 18, Vienna, EGU2016-15137, European Geosciences Union, 2016.

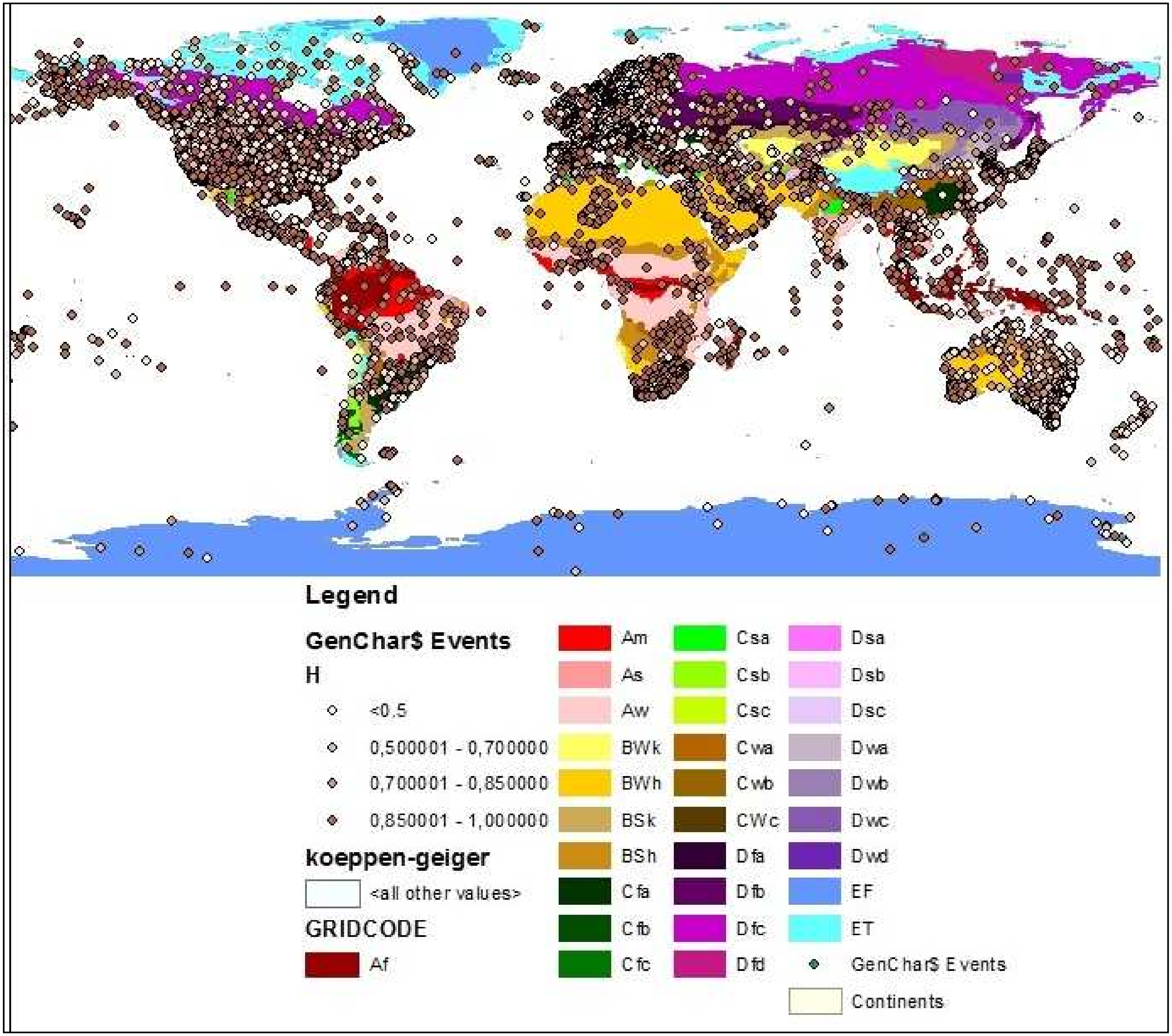
Supplementary material

Temperature and dew point (selected stations)



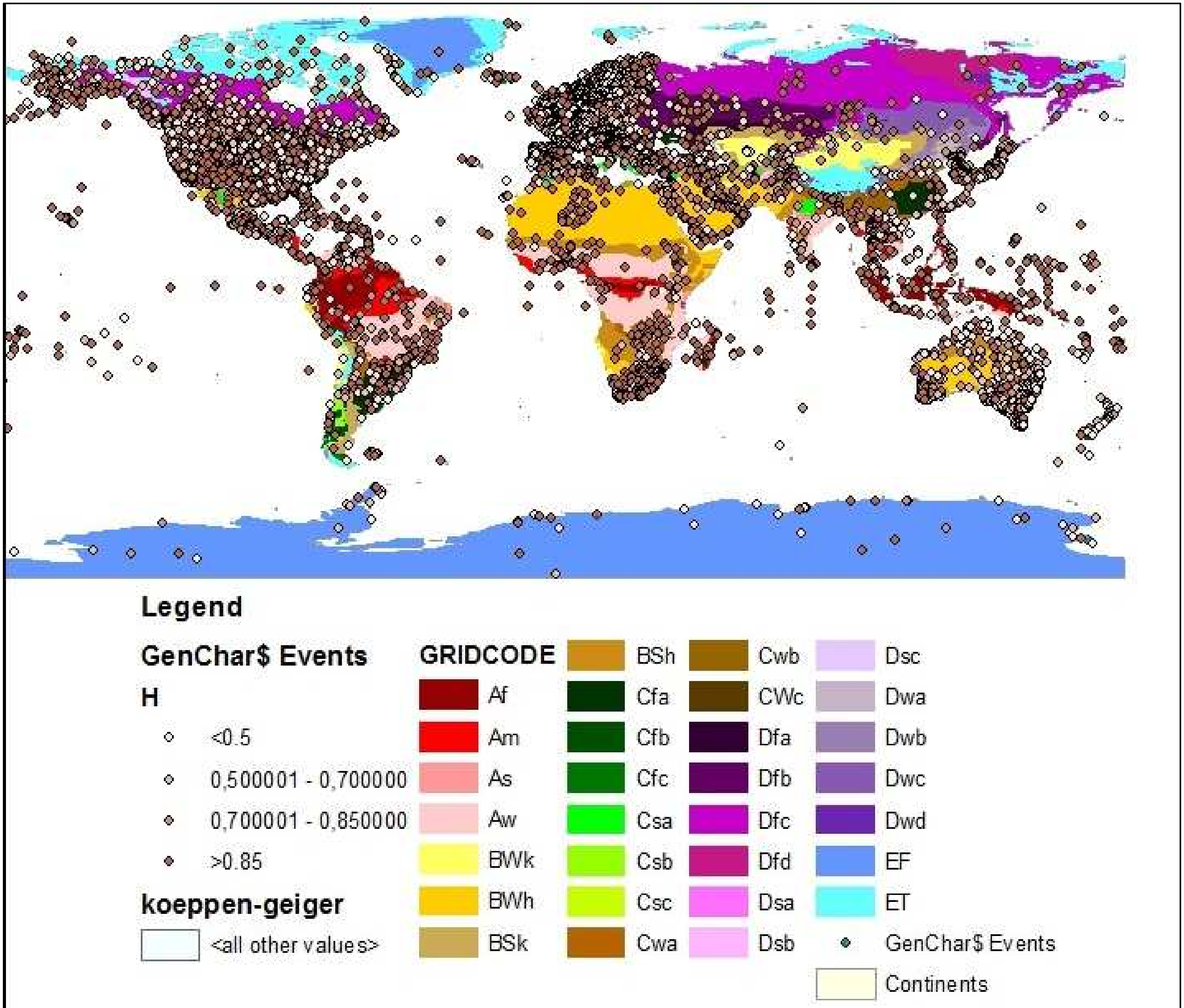
Source: Lerias et al., 2016.

Temperature (empirical Hurst coefficient)



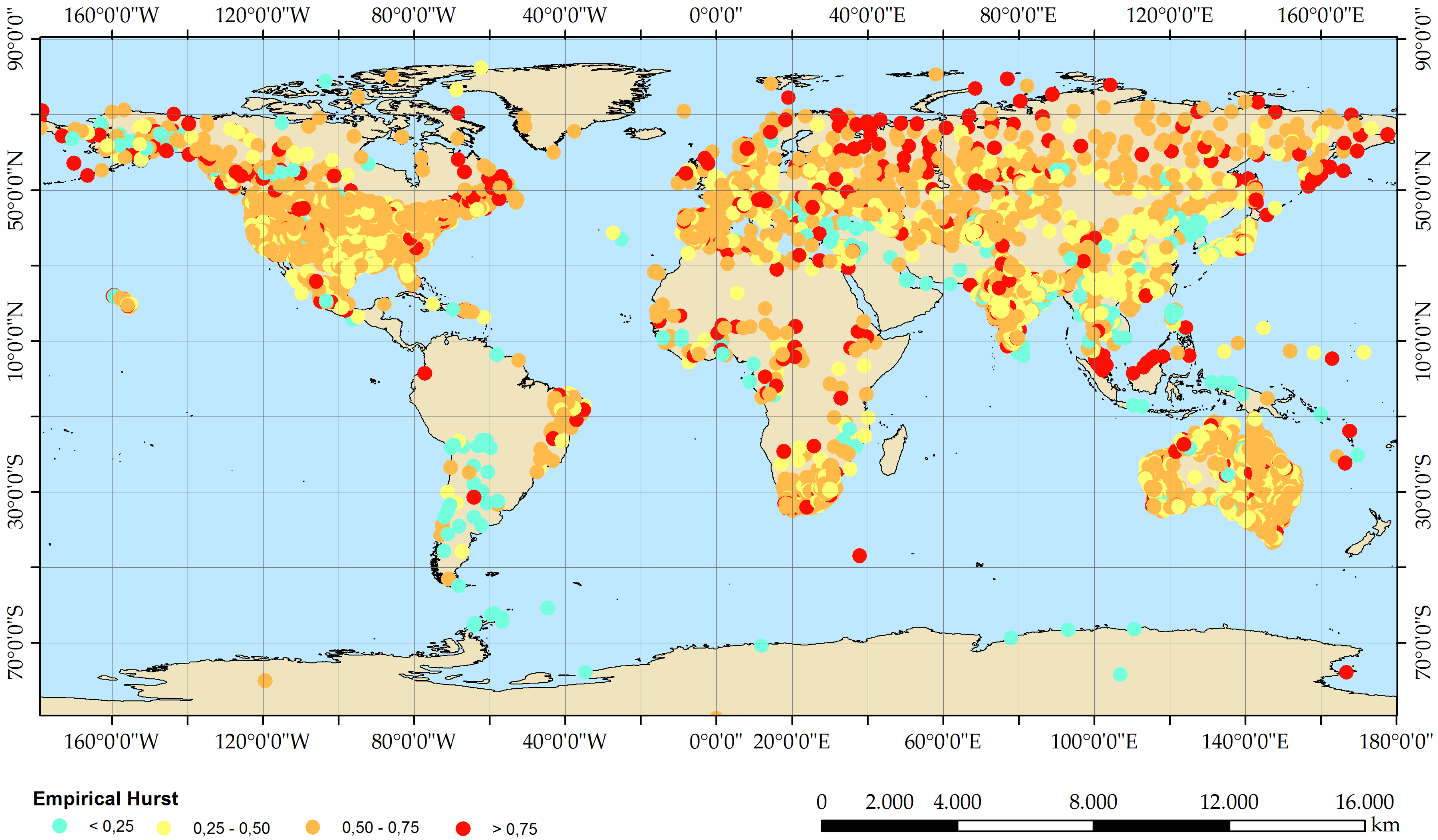
Source: Lerias et al., 2016.

Dew point (empirical Hurst coefficient)



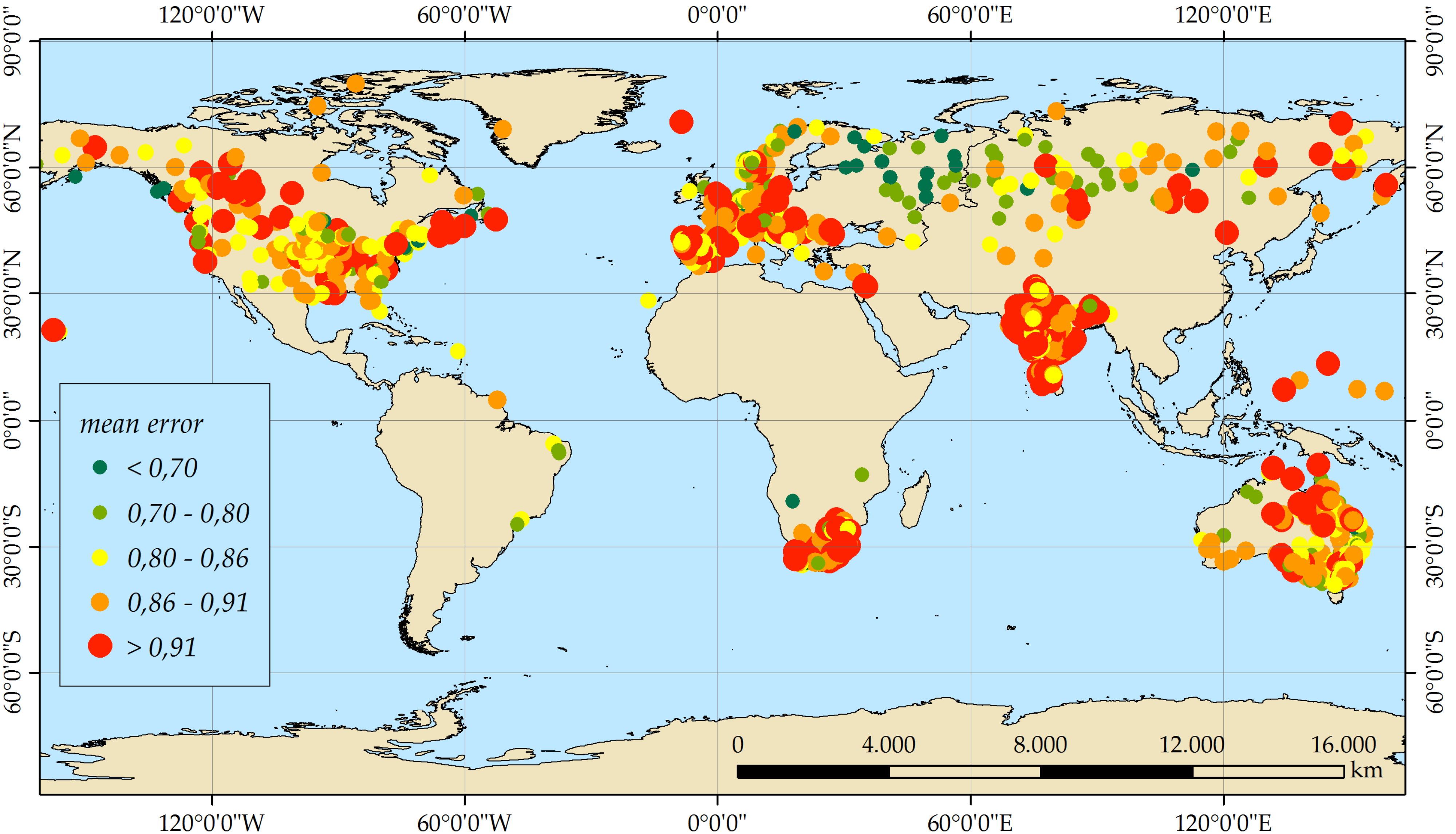
Source: Lerias et al., 2016.

Precipitation (empirical Hurst coefficient)



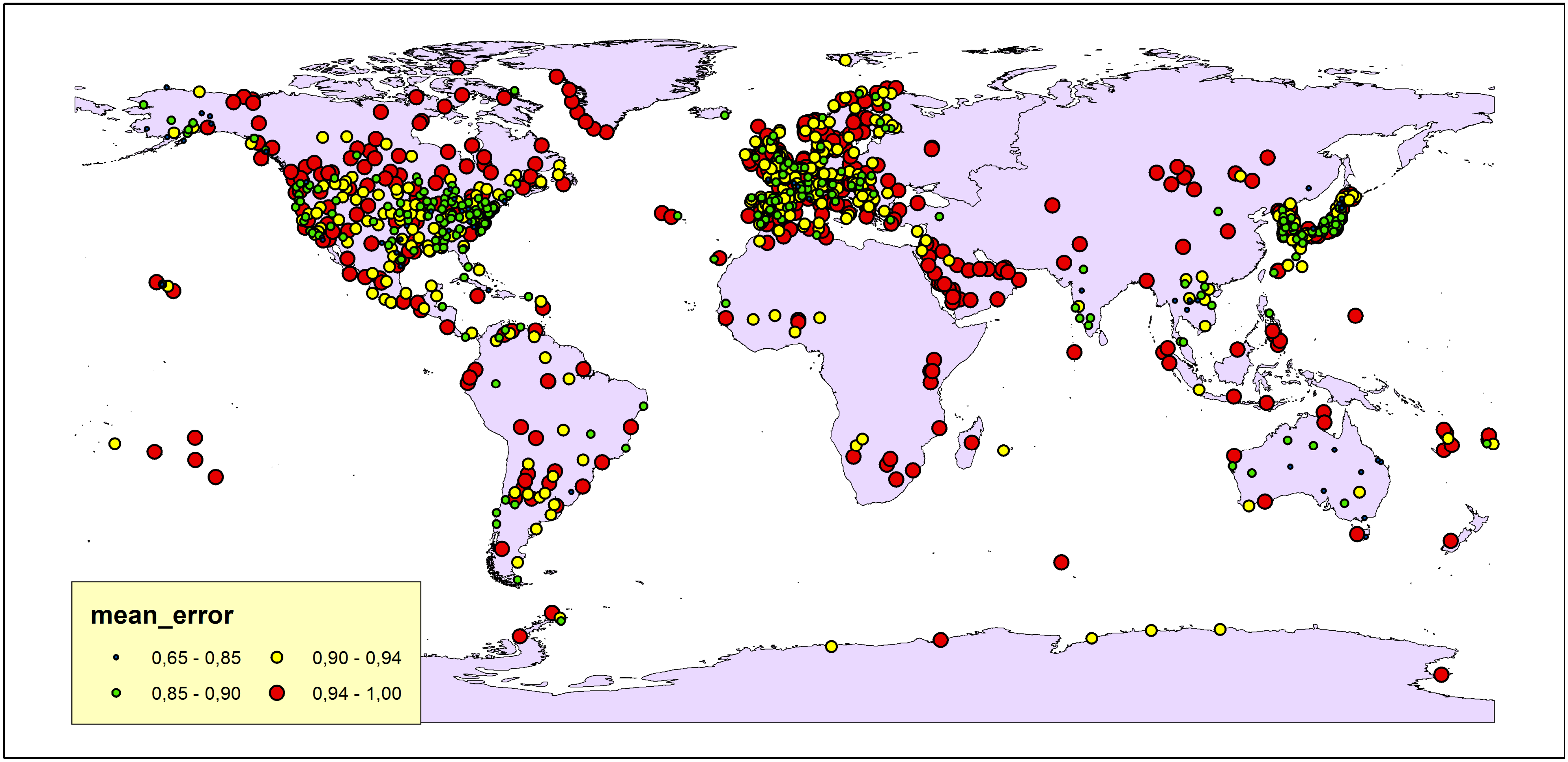
Source: Sotiriadou et al., 2016.

Precipitation (prediction intervals)



Source: Sotiriadou et al., 2016.

Wind (prediction intervals)



Source: Deligiannis et al., 2016.