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## Spurious Behaviour in Networks from Spatio-temporal Data

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Network-based analyses of dynamical systems have become increasingly popular in climate science. Instead of focussing on the chaotic systems aspect, we come from a statistical perspective and highlight the often ignored fact that the calculated correlation values are only empirical estimates. We find that already the uncertainty stemming from the estimation procedure has major impact on network characteristics. Using isotropic random fields on the sphere, we observe spurious behaviour in commonly constructed networks from finite samples. When the data has locally coherent correlation structure, even spurious link-bundle teleconnections have to be expected. We reevaluate the outcome and robustness of existing studies based on their design choices and null hypotheses.