



The backbone of climate networks

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We propose a method to reconstruct and analyze a complex network from data generated by a spatio-temporal dynamical system, relying on the nonlinear mutual information of time series analysis and betweenness centrality of complex network theory. We show, that this approach reveals a rich internal structure in complex climate networks constructed from reanalysis and model surface air temperature data. Our novel method uncovers peculiar wave-like structures of high energy and information flow, that we relate to global surface ocean currents. This points to a major role of the oceanic surface circulation in coupling and stabilizing the global temperature field in the long term mean (140 years for the model run and 60 years for reanalysis data). We find that these results cannot be obtained using classical linear methods of multivariate data analysis, and have ensured their robustness by intensive significance testing.