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# Structural Interrelationship in the Ecosystem Network Using Method of Complex Networks

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Complex Networks have been recently successfully applied to problems in climate science. They have been used as an alternative method to reveal persistent structural features in the climate system based on observed and model simulated fields of temperature, precipitation and other meteorological fields. CCN provide information on the topology, dynamics and stability characteristic features in the climate system and help to e.g. identify regions with large importance for teleconnections.
The present paper uses climate networks to analyze results from the Earth System Model of the Max-Planck-Institute for Meteorology, conducted in the frame of the Coupled Model Intercomparison Project Phase 5 (CMIP5). By analyzing local and global measures such as centralities and link distance the climate and especially terrestrial teleconnection patterns are revealed and investigated. To construct the network the 30- year time-series (1979-2009) of evaporation flux, gross and net primary production were retrieved from the two experimental setups of the MPI-ESM using either a full coupled climate model (ocean, atmosphere, land) or prescribed sea surface temperature fields (atmosphere, land only).
The major teleconnection patterns discovered were associated with climate related energy information flow and material cycling functionality within the Earth system. Non-local spatial linkages to the main teleconnection patterns, like NAO and ENSO were analyzed, as well as spatial-temporal structures obtained by the community detection method were established.
An outlook of using complex networks as an alternative tool for the evaluation of coupled Earth System models will be given.