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Visual Analytics of Climate Networks

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In the last few years, network construction from climate data has developed to a promising analysis method. Here, the similarities of time series from grid or station based climate data are transfered into a network structure of nodes and edges. Then, this structure is being analyzed using network measures (e.g. betweenness, centrality) and visualization techniques. Major challenges for the visualization of such networks are their size, their geo-reference and the multi-variate information coming with the nodes and edges:

- The size results from the typical grid sizes (e.g. 720x360 in longitude, latitude and often as well with z-levels) or the number of measurement stations and the time dependency of the underlying climate data sets.
- The geo-reference information is of high importance interpreting the underlying physical processes of network structures, thus, network layout techniques are often inadequate, and edge clutter can not be easily avoided. Considering network comparison, which is of increasing importance in climate network analyses, this clutter problem becomes even worse.
- The multi-variate information in climate networks results from both underlying data and node and edge measures, and can not be easily presented in the visualization.

Facing these challenges, the talk will introduce strategies for the interactive visual analysis of large, climate networks. This includes the discussion of different network visualization techniques and state-of-the art visual analytics tools, including first solutions for 3D networks and for a visual comparison of climate networks.