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Complex Network modelling on Atlantic Multidecadal Oscillation

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A mechanistic understanding of Atlantic Multidecadal Oscillation (AMO) is important, and the minimal primitive equation (MPE) model is a promising candidate, which brought out the westward propagation of the SST anomalies pattern as one crucial characteristics. However, up to now this characteristics hasn't been detected from observed SST data. Here we implement complex network modeling to investigate the existence of the westward propagation both in the MPE model and observations, by constructing two different types of climate networks for AMO - Pearson Correlation Climate Network (PCCN) which is based on a linear correlation measurement for the time series of the SST anomalies, and Mutual Information Climate Network (MICN) which provides a nonlinear approach based on probabilities. By analyzing the topological properties of these networks, our results show that PCCN could detect the westward propagation from the MPE model with obvious signs of phase transitions, while MICN is capable to indicate that the westward propagation exists in observations.