Temporal Cluster Analysis of Ocean Variables

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Abstract

This study applies cluster analysis techniques to temporal snapshots of oceanic variableskinetic energy and potential temperaturewith the primary aim of establishing a comprehensive methodology for comparing insights from different dimensionality reduction techniques, specifically Principal Component Analysis (PCA), alongside three clustering methods: Self-Organizing Map (SOM), K-means, and InfoMap. By applying these clustering algorithms, we identify meaningful patterns and structures within the data, which facilitate a comparative analysis of these methodologies. The inclusion of InfoMap, a network-based clustering approach, provides additional insight into the hierarchical community structures within oceanic data. This comparative analysis seeks to deepen our understanding of the spatiotemporal dynamics of oceanic variables and their implications for environmental research and management.