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ENSO reflections on the climate network : variabilities on top of an 80% robust background

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The global temperature anomaly field within an isobar, $\mathbf{T}(t)$, can be regarded as a multidimensional vector. Small regional portions of it may be usefully analyzed in isolation, and show typical robustness of pattern, i.e. few preferred directions in hyper-space. However,when viewed in its entirety, $\mathbf{T}(t)$ acts almost randomly. The field of cross covariances between each pair of coordinates of $\mathbf{T}(t)$ composes a network of links, which show a much more robust behavior. Each of the components of this climate network typically vary by 10 to 30%, and the connectivity structure in its entirety, when represented by a direction in the multi-dimensional vector space, vary by 10 to 15%.

On top of this robust backbone, we follow the dynamics of the most pronounced autonomous cluster, using pattern recognition. This cluster is confined to the equatorial pacific region, which broadens as a function of altitude. The autonomous property is quantified as a function of time, and is found to strongly depend on the magnitude of the event. The two extremes of the spatial reminiscent patterns of an event, the cold tongue and the warm pool patterns, are shown to influence the connectivity of the autonomous cluster in a significantly different manner.