Quantile-based clustering of Sea Surface Temperature in the equatorial Pacific

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Sea surface temperature (SST), the temperature of the water close to the sea's surface, is a key climate variable, influencing both processes in the ocean and in the atmosphere above. In particular the temporal variability and spatial structure of SST plays a fundamental role in the El Niño/Southern Oscillation (ENSO) phenomenon in the equatorial Pacific. This work addresses the classification of SST time series from the Tropical Atmosphere Ocean (TAO) monitoring array in the equatorial Pacific using a new quantile-based classification approach. The method considers a pair-wise dissimilarity measure based on Quantile AutoCovariance Functions (Q-ACF). Q-ACF provides a powerful tool to examine, for instance, serial dependence in non-Gaussian and/or nonlinear time series exhibiting features such as time-irreversibility or tail dependence. The classification results are consistent and spatially-coherent, with a clear separation between the SST observations from buoys in the western, central and eastern Pacific.