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Coherency of Sea Level Across Oceanic Basins derived from Tide Gauge Records

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Sea level monitoring is important as sea level rise is an indicator of global change and one of the most important parameters for coastal protection. Sea level variability is determined by several factors including large scale atmospheric forcing, changes in the thermohaline circulation as well as thermosteric effects.

In this analysis we use forty-two regional sea level indices derived from tide gauges records representing three oceanic basins (Pacific, Atlantic and Indian Oceans) and the European Seas (Baltic and Mediterranean Sea). The sea level indices are determined by extracting the first Empirical Orthogonal Function (EOF) from regions where tide gauges have a coherent sea level signal. Here, we explore the existence of teleconnections by cross-correlating these regional sea level indices with the aim of identifying possible teleconnections across ocean basins. In addition we explore the relationship between the sea level indices and five regional climatic indices, which include, the North Atlantic Oscillation (NAO), Southern Oscillation Index (SOI), Pacific Decadal Oscillation (PDO), Mediterranean Oscillation Index (MOI) and the Trans-Polar Index (TPI). The analysis was performed, both with and without atmospheric pressure correction. This work reveals teleconnections in sea level both within and between oceanic basins.