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Reot: an R package for Empirical Orthogonal Teleconnection analysis

Tim Appelhans, Florian Detsch, and Thomas Nauss
Philipps Universität Marburg, Geographie, Umweltinformatik, Marburg, Germany (tim.appelhans@staff.uni-marburg.de)

In climate science, teleconnection analysis has a long standing history as a means for describing regions that exhibit above average capability of explaining variance over time within a certain spatial domain (e. g. global). The most prominent example of a global coupled ocean-atmosphere teleconnection is the El Nino Southern Oscillation (ENSO). There are numerous signal decomposition methods for identifying such regions, the most widely used of which is (rotated) empirical orthogonal functions (EOF). First introduced by van den Dool 2000, empirical orthogonal teleconnections (EOT) denote a regression based approach that allows for straight-forward interpretation of the extracted modes. In this paper we present the R implementation of the original algorithm in the Reot package. To highlight its usefulness, we provide 3 examples of potential use-case scenarios for the method including the replication of one of the original examples from van den Dool 2000. Furthermore, we highlight the algorithm's use for cross correlations between two different geographic fields (identifying SST drivers for precipitation), as well as statistical downscaling from coarse to fine grids (using NDVI fields).