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Modeling salinity profiles from temperature using cluster analysis and neural networks derived from Argo data

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Argo data are used to derive empirical nonlinear models for retrieving salinity profiles from temperature data in the north eastern Atlantic Ocean from 2001 through 2006. The original Argo profiles are interpolated to the same set of vertical levels and a cluster analysis step is used to separate these profiles between the different water masses present in the region (The Azores Current, the Portugal Current, the Canary Upwelling Current, and the North Atlantic Central Waters). Upon each different water mass, neural networks are used to build nonlinear regression models in order to infer the vertical structure of salinity. The performance and robustness of the nonlinear regression is compared against linear regression models obtained from the same data. Our results show a significant improvement of nonlinear regression with respect to linear techniques and the practical ability of obtaining salinity information from temperature alone at a regional scale.