



Statistical considerations on the application of Micropaleontology in order to reconstruct past environments: a diatom case study.

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The use of micropaleontology associations as proxies is commonly applied to reconstruct past environments in paleoceanography studies. The application of proxies is based on a simple assumption: the relationship between the microorganisms and the environmental conditions remain constant in time. Regardless of the type of microfossil, the proxy development needs to be calibrated under modern conditions. In particular, for microfossil associations the proxy development pass through the development of transfer functions. These mathematical equations are able to convert species relative abundance percentages into a measurable environmental property such as temperature for example. However, these reconstructions need to be independently evaluated and special attention needs to be given to two fundamental steps in transfer function development: the first one regarding which environmental variable is statistically significant and its modern calibration and the second one regarding the existence of past no analog fossil associations and how these affect the transfer function behavior. Here we present a case study where fossil diatom assemblages are used to develop transfer function for oceanic environmental properties in the northeast Pacific Ocean. In this study, different approaches for transfer function development (based on unimodal and artificial neural networks techniques) are compared and additional considerations are explained. Finally, reconstructions of oceanic primary productivity (a property that reflects a combination of specific oceanic environments) using diatom microfossil associations are shown for the past 30000 years (B.P.).