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A new generation of climatic proxies required to complement instrumental records

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A challenge for the next paleoscience investigations will be to decipher natural climatic variability and anthropogenically induced changes on timescales that are relevant for society. Up to now, we have still a poor understanding of the workings of climate system over this time frame and model simulations used to predict future climatic conditions are not entirely realistic. In order to improve models, we need more accurate records of the past climate mode provided by natural archives which are able to complement instrumental records.

For many years, coral skeleton is regarded as a fruitful tool to reconstruct tropical conditions suspected to play a predominant role in the global climate system. However, no quantitative seasurface temperature and salinity time series, really complementing instrumental data, have been independently derived from coral proxies. Such reconstructions may be obtained by understanding the skeleton deposit and the successive growth steps. Geochemical analyzes at micrometer size scale allow to identify the main growth process governing skeleton formation and to show the non-linearity of the proxy records.

Based on these evidences, I propose a new approach of the interpretation of multi proxies derived from coral colonies. By applying neural network on seven proxies, stable isotopic oxygen ratio, trace elements and density, measured on a *Porites* colony collected in Fiji archipelago, seasurface temperature and salinity have been separately assessed over the last 90 years. This method allows the ENSO (El Niño Southern Oscillation) and SPCZ (South Pacific Convergence Zone) interactions to be revealed in this part of Warm Pool, prior to instrumental data.

This is a good illustration of the new generation of paleo-reconstruction provided by a non-empirical approach of multi-proxies records, which is required for the under-

standing of the future environmental changes.