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Modern decrease of $\delta^{18}O$ in Mediterranean sediments over the last 150 y: anthropogenic forcing and natural variability

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Our previous work (Taricco et al., 2009) has documented a high-resolution record of foraminiferal $\delta^{18}O$ isotopic ratio that covers the last two millennia. This record was obtained from a shallow-water sediment core drilled in the Central Mediterranean (Gallipoli Terrace in the Gulf of Taranto, Ionian Sea), and dated with high accuracy by tephroanalysis and radiometric measurements. The $\delta^{18}O$ series so obtained spans the last 2200 years and shows a steep decrease during the Industrial Era.

We use here pre-industrial $\delta^{18}O$ variations to design and tune algorithms able to forecast the natural variability in the $\delta^{18}O$ series over the last 150 y (Alessio et al., 2012). Autoregressive (AR) models and feed-forward neural networks are applied to the highly significant components revealed by Singular Spectrum Analysis (SSA). Comparison between the forecast and the actual $\delta^{18}O$ signal during the Industrial Era shows that the natural contribution to the modern $\delta^{18}O$ variation decreased gradually, until it reached roughly 40% as early as the end of the 1970s.

References

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