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# Long-period sea-level variations in the Mediterranean

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Since the beginning of its long-lasting lifetime, the Wegener initiative has devoted careful consideration to studying sea-level variations/changes across the Mediterranean Sea. Our study focuses on several long-period sea-level time series (from end of 1800 to 2012) acquired in the Mediterranean by tide gauge stations. In general, the analysis and interpretation of these data sets can provide an important contribution to research on climate change and its impacts. We have analyzed the centennial sea-level time series of six fairly well documented tide gauges. They are: Marseille, in France, Alicante in Spain, Genoa, Trieste, Venice and Marina di Ravenna (formerly Porto Corsini), in Italy. The data of the Italian stations of Marina di Ravenna and Venice clearly indicate that land subsidence is responsible for most of the observed rate of relative sea level rise. It is well known that, in the two areas, subsidence is caused by both natural processes and human activities. For these two stations, using levelling data of benchmarks at, and/or close to, the tide gauges, and for the recent years, also GPS and InSAR height time series, modelling of the long-period non-linear behavior of subsidence was successfully accomplished. After removing the land vertical motions, the estimate of the linear long-period sea-level rise at all six stations yielded remarkably consistent values, between +1,2 and +1,3 mm/yr, with associated errors ranging from $\pm$0,2 to $\pm$0,3 mm/yr (95% confidence interval), which also account for the statistical autocorrelation of the time series. These trends in the Mediterranean area are lower than the global mean rate of 1,7$\pm$0,2 mm/yr (1901-2010) presented by the IPCC in its 5th Assessment Report; however, they are in full agreement with a global mean sea-level rise estimate, over the period 1901-1990, recently published by Hay et al. (2015, doi:10.1038/nature14093) and obtained using probabilistic techniques that combine sea-level records with physics-based and model-derived geometries of the contributing processes. An EOF analysis (Empirical Orthogonal Functions) has also been carried out on the six sea-level time series to identify the dominant modes of variability.