Sea level rise of semi-enclosed basins: deviation of Adriatic and Baltic sea level from the mean global value.

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Future sea level rise (SL), which represents today one of the major threats that are caused by climate change, will not be uniform. Regional differences are crucial for 40% of the world population, which is located in the coastal zone. To explore the mechanisms linking regional SL to climate variables is very important in order to provide reliable future projections.

This study focuses on two semi-enclosed basins, the Adriatic and Baltic Sea and investigates the deviation of their SL from the mean global value. In fact, past deviations of the SL of these two basins from the global value have been observed and can be attributed to large scale factors (such as teleconnections) and regional factors, such as the inverse barometric effect, the wind stress, the thermosteric and halosteric effects.

The final goal of this work is to assess to which extent the Adriatic and Baltic SL will depart from the mean global value in the next decades and at the end of 21st century. This is achieved by analyzing deviations of the mean SL of the Baltic and Adriatic Sea from the global mean SL during the 20th century and investigating which factors can explain such deviations. A multivariate linear regression model is built and used to describe the link between three large scale climate variables which are used as predictors (mean sea level pressure, surface air temperature and precipitation), and the regional SL deviation (the predictand), computed as the difference between the regional and the global SL. At monthly scale this linear regression model provides a good reconstruction of the past variability in the cold season during which it explains 60%-70% of the variance. Summer reconstruction is substantially less successful and it represents presently the main limit of the model skill. This linear regression model, forced by predictors extracted from CMIP5 multi-model simulations, is used to provide projections of SL in the Adriatic and Baltic Sea. On the basis of the projections until 2100, the Baltic Sea will rise faster than the global SL. Adriatic SL, on the contrary, shows a substantial agreement with the global trend.

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