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## Estimating ocean dynamic sea level along the coast of the Netherlands using the regional ocean modelling system (ROMS) to seamlessly connect the observational period to projections for the 21st century.

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For sea-level projections along the coast of the Netherlands, ocean dynamic sea level (ODSL) is one of the most important contributors to sea-level rise in the 21<sup>st</sup> century. The ODSL output from the latest coupled model intercomparison projects (CMIP5 and CMIP6) is used for these projections. These CMIP models overwhelmingly use ocean models with a spatial resolution of 1° and a vertical z-level coordinate. Using these CMIP models for projections does not provide a seamless connection between observations and projections, this study aims to improve on that. To do so, we use a configuration of the Regional Ocean Modelling System (ROMS) for the North Sea with a resolution of 0.25° to downscale the spatial resolution of CMIP6 models and interpolate the vertical coordinate to topography-following sigma levels to improve the projections for the Netherlands.

First, we use ROMS to reconstruct the ODSL along the coast of the Netherlands for the observational period. The regional model is forced using an atmospheric dataset constructed from ERA-interim and ERA-5 surface data and different ocean reanalysis datasets. It is not straightforward to compare the ODSL from different ocean reanalyses, as some datasets assimilate satellite altimetry data, whereas others do not. The ODSL from the reanalysis datasets that assimilate altimetry data are corrected for land ice and terrestrial water storage contributions to correct these differences.

Then, we use ROMS to obtain new projections of ODSL for the coast of the Netherlands that seamlessly connect to the estimate of ODSL from ocean reanalysis data. We extend the forcing datasets for the regional ocean model of the observational period using the anomalies of CMIP6 variables. Using this new method, we obtain improved projections along the coast of the Netherlands.