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Contributions to sea level variability along the coast of Norway during the past 60 years

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Global sea level has been rising by about 20cm during the last century and is expected to rise in the 21st century. The rise and variability is spatially non-uniform. To project local changes in sea level it is important to identify the processes that govern regional sea level variability.
In this study we assess the importance of different contributions to sea level variability along the coast of Norway. By using hydrographic stations at the coast, sea level pressure and observed vertical land movement, we compute sea level changes due to thermal expansion and haline contraction, the inverted barometer effect and land uplift caused by glacial isostatic adjustment.
The combination of these different contributions is compared to sea level variability observed with tidegauges.
Due to land uplift, the local sea level rise is weaker or even negative along the Norwegian coast. On monthly timescales the reconstructed sea level explains 50-85% of the observed variability. The inverted barometer effect is responsible for more than half of the explained variability. On longer timescales thermal expansion dominates the variance explained by the reconstruction. On these time scales the reconstruction accounts for only 30-70% indicating that other processes are important.
The residuals (observed - reconstructed) are related to the wind forcing through Ekman transports towards the coast. In addition the residuals show a positive trend which appears to increase during the last 10 years of the record. It is speculated that the reason for this is a global increase of mass in the ocean due to melting of land based ice.