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# What Causes the North Sea Level to Rise Faster over the Last Decade ?

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We combined tide gauge records (PSMSL) and satellite altimetry data (TOPEX/POSEIDON-JASON 1-2) to reconstruct the mean level of the North Sea and the Norwegian Sea Shelf (NS-NSS) over 1950-2012. The reconstructed NS-NSS mean sea level fluctuations reveal a pronounced interannual variability and a strong sea level acceleration since the mid-1990's. In order to understand the causes of this acceleration, the NS-NSS mean sea level was cross-correlated with the North Atlantic Oscillation and Arctic Oscillation indices. While the interannual variability of the mean sea level correlates well with the NAO/AO indices, the observed acceleration in the NS-NSS mean level is not linked linearly to the NAO/AO fluctuations. On the other hand, the Empirical Orthogonal Functions (EOF) analysis of steric sea level variations in the eastern North Atlantic gives a dominant EOF pattern (55% of variance explained) that varies on a decadal scale very closely to the NS-NSS mean level flcutuations. Also, the amplification in the temporal amplitude of the dominant steric sea level EOF corresponds to the acceleration observed in the NS-NSS mean sea level signal. This suggests that decadal variations in the mean level of the North Sea - the Norwegian Sea Shelf reflect changes in the Subpolar Front currents (Rossby, 1996).