



Debunking the lunar nodal tide in sea level data from the Northwest European shelf

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In a recent study (Hansen, et al, 2015. Sea-Level Forcing by Synchronization of 56- and 74-Year Oscillations with the Moon's Nodal Tide on the Northwest European Shelf (Eastern North Sea to Central Baltic Sea). *Journal of Coastal Research*, 31(5), 1041 - 1056, hereafter 'HAK'), the existence of an 18.6 year lunar nodal tide signal of considerable strength and other periodic signals in the North Sea – Baltic Sea area is claimed. We criticize important aspects of the analysis presented in HAK and thereby cast doubt on their conclusions.

HAK claim that 18.6 year variations in sea level are predicted by tidal theory, but this is not the case in general and therefore the existence of such variations must be explicitly shown. We calculate the amplitude spectrum of the annual sea level by harmonic analysis and find no significant peaks at the periods claimed by HAK.

Next, we used the results given by HAK to reconstruct their decomposition, and formed the residuals by subtracting the decomposition from the original data. We found that a strong variability near 18.6 years in the residuals, showing that the decomposition by HAK overrepresents the variability at this period.

This motivated us to redo HAK's analysis following their prescription and we found a seven times lower amplitude for the 18.6 year periodicity than claimed by HAK.

Finally, we discuss HAK's mode selection-criteria, based on correlation coefficients of trending series and find them invalid. Therefore, we perform a significance test based on a Monte Carlo technique and conclude that none of the modes identified by HAK are statistically significant.