



Sea level rise and storminess for the south-west of England

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The results are presented of research into the use of tide gauge data as a record for climate change over the past 100 years for south-west England. This study utilises the longest continuous observed tidal gauge record for the UK (Newlyn-95 year record) and a shorter reconstructed dataset at the nearby Devonport (40 year record) tide gauge station.

The research analysed hourly tidal gauge data for the period 1915-1990 (Newlyn), 1961 to 1990 (Devonport) and 15 minute interval data for the period 1991 to present day (Newlyn and Plymouth). The analysis found that sea levels over the period 1915 to present day have risen at a rate of 1.7 mm/yr, with the rate confirmed by both the Newlyn and Devonport records. A further analysis of the positive surge component of the tide gauge record found that over the period 1915 to present day positive surges ($> 0.3\text{m}$) have increased at a rate of 0.065%/yr (approximately 1.9 mm/yr), comparable to the rate of sea level rise over the same period. Larger positive surges ($> 0.6\text{m}$) over the same period show a slight decrease in frequency. The tide gauge data was further scrutinised to identify independent storm surge events (separated by 24 hours). This found that independent storm surge events over the same period were decreasing.

The results for sea level rise calculated within this study are comparable to previous research conducted for the south-west of England. The rate of 1.7 mm/yr is significantly less than the average rate for the UK. The fact that the positive surge component of the tide gauge data provides a similar signal of sea level change, potentially indicates that negative surges, although decreasing are not decreasing as quickly in the region compared to the rest of the UK. Furthermore, the research conducted identified that large independent storm surges have been decreasing in frequency over the past century.

The findings of this research have significant implications for climate science in both the south-west of England and the UK.