



An empirical approach to improving tidal predictions using recent real-time tide gauge data

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Classical harmonic methods of tidal prediction are often problematic in estuarine environments due to the distortion of tidal fluctuations in shallow water, which results in a disparity between predicted and observed sea levels. This is of particular concern in the Bristol Channel, where the error associated with tidal predictions is potentially greater due to an unusually large tidal range of around 12m. As such predictions are fundamental to the short-term forecasting of High Water (HW) extremes, it is vital that alternative solutions are found. In a pilot study, using a year-long observational sea level record from the Port of Avonmouth in the Bristol Channel, the UK National Tidal and Sea Level Facility (NTSLF) tested the potential for reducing tidal prediction errors, using three alternatives to the Harmonic Method of tidal prediction. The three methods evaluated were (1) the use of Artificial Neural Network (ANN) models, (2) the Species Concordance technique and (3) a simple empirical procedure for correcting Harmonic Method High Water predictions based upon a few recent observations (referred to as the Empirical Correction Method). This latter method was then successfully applied to sea level records from an additional 42 of the 45 tide gauges that comprise the UK Tide Gauge Network. Consequently, it is to be incorporated into the operational systems of the UK Coastal Monitoring and Forecasting Partnership in order to improve short-term sea level predictions for the UK and in particular, the accurate estimation of HW extremes.