



Ocean Wave Height Estimation in the Northeast Atlantic, Offshore Ireland, Using Terrestrial Microseism Data: A Comparison and Analysis of two Evolutionary Approaches

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Ocean generated microseism noise, in the secondary frequency band of 0.125-0.33 Hz, recorded on a terrestrial seismic network, can be used to invert for the causative ocean wave field parameters. Recent studies have focused on the determination of ocean wave parameters from seismic data, based on a priori knowledge of source location and source spectrum [Bromirski, 1999], [Ardhuin et al, 2012], but since this information is limited in our study area we must resort to evolutionary approaches. We aim to determine ocean wave heights in the Northeast Atlantic offshore Ireland using terrestrial microseism signals. To do this we train and test two methods; artificial neural networks, and grammatical evolution. These systems learn to interpret particular input patterns and corresponding outputs and access the often complex underlying relationship between them. They learn by example and are therefore entirely data driven so data selection is extremely important for the success of the method. Inputs are given as hourly microseism amplitude recorded at five seismic stations scattered throughout Ireland, and the output is in the form of significant ocean wave height measured at UK Met Office buoy K4, located off the Northwest coast of Ireland.

An analysis and comparison of the performance of these methods for a five month period in 2013 will be presented, highlighting the advantages and disadvantages of each.