A multi-centennial time series of well-constrained ∆R values for the Irish Sea derived using absolutely-dated shell samples from the mollusc Arctica islandica

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Determinations of the local correction (∆R) to the globally averaged marine radiocarbon reservoir age are often isolated in space and time, derived from heterogeneous sources and constrained by significant uncertainties. Although time series of ∆R at single sites can be obtained from sediment cores, these are subject to multiple uncertainties related to sedimentation rates, bioturbation and interspecific variations in the source of radiocarbon in the analysed samples. Coral records provide better resolution, but these are available only for tropical locations. It is shown here that it is possible to use the shell of the long-lived bivalve mollusc Arctica islandica as a source of high resolution time series of absolutely-dated marine radiocarbon determinations for the shelf seas surrounding the North Atlantic ocean. Annual growth increments in the shell can be crossdated and chronologies can be constructed in a precise analogue with the use of tree-rings. Because the calendar dates of the samples are known, ∆R can be determined with high precision and accuracy and because all the samples are from the same species, the time series of ∆R values possesses a high degree of internal consistency. Presented here is a multi-centennial (AD 1593 – AD 1933) time series of 31 ∆R values for a site in the Irish Sea close to the Isle of Man. The mean value of ∆R (-62 14C yrs) does not change significantly during this period but increased variability is apparent before AD 1750.