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A diatom inferred palaeosalinity history of the Aral Sea for the last 2000 years.

P. Austin

Environmental Change Research Centre, Department of Geography, University College London, UK. partick.austin@ucl.ac.uk

The water chemistry of terminal and hydrologically closed lakes in arid and semi arid regions responds rapidly to changes in moisture balance. A reduction in hydrological inputs and subsequent lake level regression results in increased salinity while the opposite is true for high lake level phases. The within-lake diatom composition is highly correlated with salinity and estimates of lake level may be further determined by the proportions of planktonic and benthic species within an assemblage. As such the incorporation of their siliceous remains into lake sediments enables the determination of former salinity and consequently episodes of high and low lake level stands which may then be attributed to either climatic change or anthropogenic activity.

As part of the INTAS funded CLIMAN project into Holocene climatic variability and the evolution of human settlement in the Aral Sea basin, fossil diatoms contained within an 11 m sediment core obtained from the Aral Sea, once the world's fourth largest waterbody by area but now the subject of severe desiccation, have been examined in order to reconstruct salinity changes and lake level over the last two thousand years. Initial mesosaline planktonic and tychoplanktonic species representative of the current regression such as *Cyclotella choctawhatcheeana* and *Nitzschia fonticola* dominate the top of the profile being replaced by predominantly benthic freshwater and oligosaline taxa in particular small *Amphora pediculus* and *Opephora krumbeinii*. These in turn are replaced by assemblages similar to that of the present day which similarly overlie a flora indicative of fresh and oligosaline conditions. The base of the profile is once again dominated by mesosaline planktonic and tychoplanktonic species notably *C. choctawhatcheeana* and *Thalassiosira proschkinae*.

Palaeosalinity has been derived using the EDDI diatom-conductivity transfer func-

tion (an amalgamation of training sets developed for Africa, Spain and the Caspian region) based on 604 species from 387 lakes. Weighted averaging (WA) with inverse deshrinking was seen to perform best (r^2 = 0.767, RMSEP = 0.469). Results indicate a waterbody that fluctuates between fresh and oligosaline conditions and which has been punctuated by three phases of elevated conductivity, all within the mesosaline range and corresponding low lake levels; that of the present day and two earlier episodes correlated with historical records and earlier published material providing ^{14}C radiocarbon dates. The first at ca. 1000 yr BP coincides with the destruction of irrigation systems by the Mongols while that at the base of the core would appear to be concordant with the earlier destruction of irrigation facilities by the Huns ca. 1600 yr BP.

Diatoms, both qualitatively and quantitatively, are thus seen to provide a reliable indication of former lake levels of the Aral Sea, the bathymetry of which is such that high lake level stands result in large areas of shallow water providing a suitable habitat for benthic species. Conversely a regressive phase sees the loss of these habitats and an increase in the proportion of planktonic species. The diatom inferred conductivity reconstruction suggests that the two major regressions determined were at least as severe as that occurring today.