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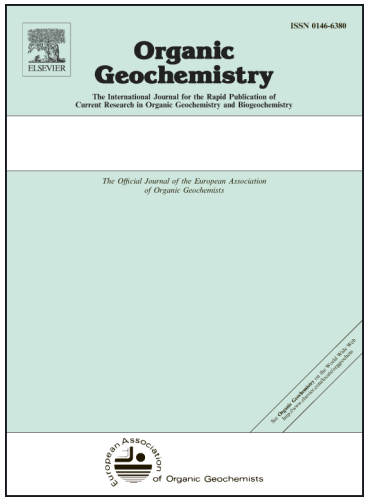

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Salinity variations in the northern Coorong Lagoon, South Australia: Significant changes in the Ecosystem following human alteration to the natural water regime

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Abstract

European settlement and drought have significantly impacted the hydrology of the Coorong a shallow coastal lagoon complex in South Australia, which is part of a terminal wetland at the mouth of the River Murray. An increased salinity associated with lower water levels and progressive isolation from ocean flushes contributed to a severe decline in ecological diversity over the past decades. Here we have conducted a molecular and stable isotopic study of a sedimentary core from the northern Coorong Lagoon spanning more than 5000 years to investigate the recent palaeoenvironmental history of the ecosystem. Major alterations were evident in many biogeochemical parameters in sediments deposited after the 1950s coinciding with the beginning of intensified water regulations. The most prominent shift occurred in $\delta^{13}C$ profiles of C_{21}-C_{33} *n*-alkanes from average values of -23.5‰ to an average of -28.2‰. Further changes included decreases in carbon preference index (CPI) and average chain length (ACL) of the *n*-alkane series as well as significant increases in algal (e.g. C_{20}HBI, long chain alkenes and C_{29}-alkadiene) and bacterial (e.g. ^{13}C depleted short chain *n*-alkanes and hopanoids, $\delta^{13}C$: -35.9‰ to -30.1‰) derived hydrocarbons. Long chain *n*-alkanes with a strong odd/even predominance as observed here are typically attributed to terrigenous plants. In the Coorong however, terrigenous input to sedimentary OM is only minor. Therefore changes in the before mentioned parameters were