



Holocene sea-level database from the Atlantic coast of Europe

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We have developed a Holocene relative sea-level (RSL) database for the Atlantic coast of Europe (ACE). We estimated rates of RSL change from the ACE database using a spatiotemporal empirical hierarchical model. The database contains 214 index points, which precisely locate the RSL position in space and time, and 126 limiting dates, which can constrain RSL to above or below a certain elevation. The temporal distribution extends to ~ 9 ka BP, with only 20% index points older than 7 ka BP. The spatial distribution spans 1700 km from French Flanders (France) to Algarve (Portugal), but more than 50% of the index points are from the French coast. We subdivided the database into 13 regions based on distance from the British-Irish and Fennoscandian Ice Sheets.

The ACE database shows RSL was below present during the Holocene. Rates of RSL change were highest during the early Holocene and have decreased over time, due, primarily, to the diminishing rate of glacial isostatic adjustment and reduction of meltwater input. For example, in the Coast of Vendée (France), where there are 32 index points, RSL was -14.0 ± 0.8 m at 9 ka BP and rose to -1.1 ± 0.4 at 4 ka BP. The rate of RSL rise decreases from 1.7 ± 0.4 mm/yr between 8 ka BP and 4 ka BP to 0.5 ± 0.4 mm/yr, after 4 ka BP. Comparison of the data to output from a glacial isostatic adjustment model indicates that deglaciation of the British-Irish and Fennoscandian Ice Sheets dominate the large-scale variability captured by the ACE database. The maximum rate of late Holocene RSL rise occurred in West Brittany (Northwest France) with rates of 0.9 ± 0.4 mm/yr. The rate of rise decreased from the Northwest to Southeast ACE coastline, which reflects the increasing distance from the former ice sheets, and reflects a decreasing influence of the collapsing peripheral forebulge.