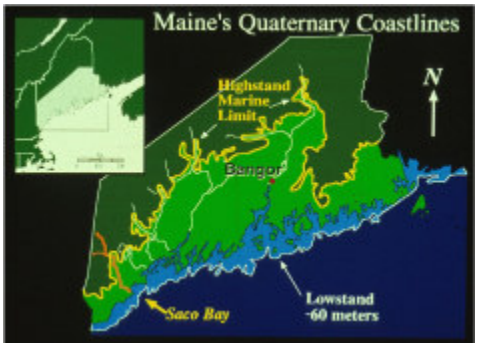
CLIMATE CHANGE
INSTITUTE

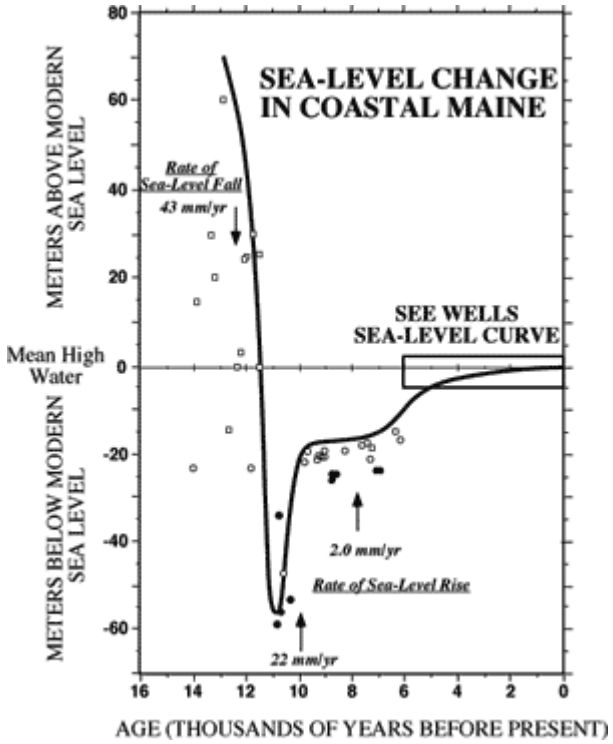
The Response of Shorelines (and People) to Quaternary Changes in Relative Sea Level

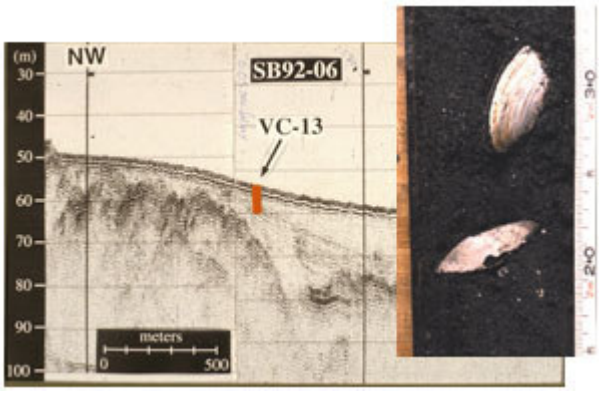
Shoreline response to sea-level rise



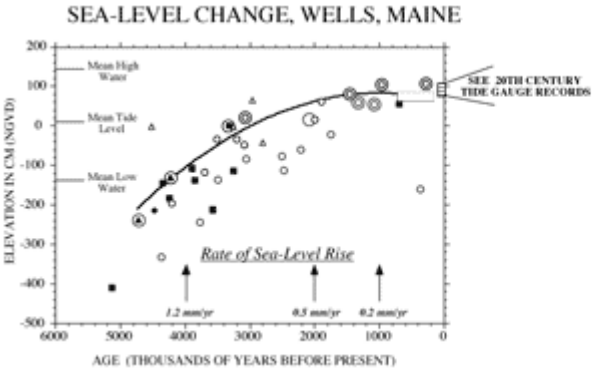
As the glaciers retreated from Maine, their weight depressed the level of the land and caused flooding as far inland as Millinocket (above left). Deltas made of sand from melting glaciers, such as Columbia Falls (below left), are now blueberry barrens high about sea level. After the ice melted, the land rebounded and local sea level fell to a depth of 60 m below present sea level (below).

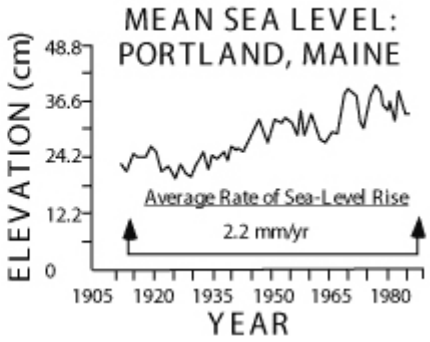
Using remote sensing devices like seismic reflection profilers, we can image through the seafloor to find evidence of lower-than-present sea-level positions (below right). Cores collected in deltas from that time, but now submerged, allow us to date fossils to establish a sea-level history for coastal Maine that is unlike most places (below).





Sea level slowed down its rate of rise during the past 5,000 years to less than 1 mm/yr, and allowed beaches and salt marshes to develop. Salt marshes (right) grow upward at the same rate as sea level rises and have proven useful to measure sea-level rise for the past thousands years. Cores through the marsh allow us to plot the rise of sea level for the past few thousand years (below left).





Modern sea-level rise is measured at tide gauges, which indicate a rate of rise between 2 and 3 mm/yr, faster than any time in the past few thousand years (above). The shoreline is responding by retreating. Bluffs of 13,000 year old marine mud erode rapidly, placing houses at risk. Beaches also migrate landward in response to sea-level rise, leaving homeowners at risk (left).

Selected References:

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