Geophysical Research Abstracts
Vol. 18, EGU2016-8725, 2016
EGU General Assembly 2016

Sea-level in the U.S. mid-Atlantic coast during the Common Era

Timothy Shaw (1), Ane García-Artola (1), Simon Engelhart (2), Andrew Kemp (3), Niamh Cahill (4), Daria Nikitina (5), Reide Corbett (6), Matthew Brain (7), Christopher Vane (8), Jennifer Walker (1), Jessica Pilarczyk (9), Jennifer Clear (1), and Benjamin Horton (1)

(1) Department of Marine and Coastal Science, Rutgers University, New Brunswick, NJ, USA, (2) Department of Geosciences, University of Rhode Island, Kingston, RI, USA, (3) Department of Earth and Ocean Sciences, Tufts University, Medford, MA, USA, (4) School of Mathematical Sciences (Statistics), University College Dublin, Dublin, Ireland, (5) Geology and Astronomy, West Chester University of Pennsylvania, West Chester, PA, USA, (6) Department of Geological Sciences, East Carolina University, Greenville, NC, USA, (7) Department of Geography, Durham University, Durham, UK, (8) British Geological Survey, Center for Environmental Geochemistry, Keyworth, Nottingham, UK, (9) Department of Marine Science, The University of Southern Mississippi, Stennis Space Center, MS, USA

Understanding of Common Era sea-level change is fragmentary compared to understanding of temperature variability, for which several global syntheses have been generated. This limitation prevents accurate assessment of the Common Era relationship between temperature and global mean sea level (GMSL), including the sea-level response to climate phases such as the Medieval Climate Anomaly (MCA) and the Little Ice Age (LIA). Previous records of relative sea-level (RSL) change along the U.S. Atlantic coast during the Common Era have revealed spatial and temporal variability that reflects differences in the static-equilibrium effects of land ice changes and/or to ocean dynamic effects. Here we present two new RSL records spanning the Common Era from saltmarsh sites in the Delaware Bay and Chesapeake Bay. Motivation for this work stems from discrepancies in the timing and magnitude of sea-level changes for the mid-Atlantic coast. This region also experiences some of the highest rates of 20th century RSL change (up to ∼5 mm/yr) along the U.S. Atlantic Coast.

At Delaware Bay and Chesapeake Bay, extensive stratigraphic surveys revealed thick sequences of salt-marsh peat ideally suited to proxy-based RSL reconstructions utilizing foraminifera. Estimates of paleo marsh elevation were provided through contemporary training sets incorporating modern analogues from the full range of intertidal environments and subtracted from surveyed altitudes to provide RSL trends. Temporal constraints on sea-level changes were incorporated into a Bayesian framework using a composite chronology composed of AMS radiocarbon dating, short-lived radionuclides, regional pollution histories and pollen chronohorizons documenting land clearance events. The reconstructions showed a similar pre-instrumental RSL rise of ∼1.1 – 1.6 mm/yr in Delaware Bay and Chesapeake Bay, respectively. The rate of RSL rise in both regions during the past ∼130 years coincides with the increased rate observed in instrumental data from by nearby tide-gauge stations at ∼3 mm/yr. Newly developed statistical techniques were employed to assess the timing of changing rates in RSL and compared with previous records from the U.S. Atlantic Coast.