



SPRING 2014 SEMINAR SERIES

DEPARTMENT OF OCEAN, EARTH, AND ATMOSPHERIC SCIENCES
3PM – ROOM 200 IN THE OCEANOGRAPHY/PHYSICS BUILDING
THURSDAY MARCH 20th, 2014

“HOW SENSITIVE WAS SEA LEVEL TO CLIMATE VARIABILITY DURING THE COMMON ERA.”

Professor Benjamin Horton

Rutgers University

ABSTRACT

Understanding of Common Era sea-level change is fragmentary compared to understanding of temperature variability, characterized by the “hockey-stick curve.” This limitation prevents accurate assessment of the Common Era relationship between temperature mean global sea level change and the sea-level response to climate phases such as the Medieval Climate Anomaly and the Little Ice Age.

We will use geological proxies to reconstruct Common Era relative sea-level variability along the U.S. Atlantic coast (Massachusetts, Connecticut, New Jersey and North Carolina and Florida) at $\pm < 0.2\text{m}$ vertical resolution and decadal-to-centennial temporal resolution. To estimate global sea level change and the spatiotemporal field of U.S. Atlantic coast sea levels, the proxies will be combined with tide gauge measurements in an empirical Bayesian statistical framework. The data and statistical model will be used to test the following hypotheses: (1) The rate of sea-level rise since ~ 1850 CE in eastern North America is greater than any other centennial trend during the previous two millennia; (2) Sea level along the U.S. Atlantic coast varied as a direct consequence of a warmer climate during the Medieval Climate Anomaly and cooler climate during the Little Ice Age; (3) Spatial variability of sea level during the Common Era can be attributed to static equilibrium (gravitational, elastic, and rotational) effects of land ice changes and/or ocean dynamics; and (4) Common Era global sea-level changes are correlated with global temperature.

The proxy sea-level data already collected exposes regional variability due to glacial isostatic adjustment (GIA) of the solid Earth. In New Jersey, Massachusetts and Connecticut GIA corrected sea level was stable from at least BC 200 until 500 CE. Sea level then increased at a rate of less than 1 mm/yr resulting from/associated with the Medieval Climate Anomaly. In North Carolina the rise in sea level began slightly later at 950 CE. All records show stable or falling sea level between 1400 CE and the late 19th century at the time of the Little Ice Age. Since then, sea level has risen at greater than 2 mm/yr, representing the steepest century-scale increase of the past two millennia.

AFTER THE SEMINAR, PLEASE JOIN US IN ROOM 404, THE ZANEVELD CONFERENCE ROOM, FOR COFFEE AND COOKIES, AND TO MEET WITH THE SEMINAR SPEAKER.