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ECU Faculty, Student Research Informs Global Audience of Past, Future Sea-Level Rise

GREENVILLE, N.C. (Jan. 17, 2014) — “The likely increase in rate of sea-level rise over the next century – and it will most likely continue long after that – is of great concern to countries around the world, given the number of cities and people, and the amount of infrastructural fabric of civilization that have coastal locations,” said Dr. Stephen Culver, chair and professor of geological sciences at East Carolina University. “One of, if not the best record of sea-level rise over the past 2,000 years, is from North Carolina.”

This record of sea-level rise was constructed over the past several years by a team of researchers led by ECU geology faculty members including Culver, Dr. D. Reide Corbett, Dr. David Mallinson and Dr. Stanley R. Riggs, along with fellow colleagues from the University of Pennsylvania, Dr. Andrew Kemp and Dr. Benjamin Horton. Their research, published in 2009 in the peer-reviewed journal Geology, became an important component of a 2010 report ordered by the North Carolina Coastal Resources Commission’s Science Panel on Coastal Hazards.

The report from the Science Panel, which included members of the ECU team, found that a one-meter rise in sea level was likely to occur by the year 2100. However, a new law passed in North Carolina in 2012 requires no consideration of sea-level rise in coastal planning and asked the Science Panel to prepare a new report on sea-level rise by 2015.

“The NC sea-level curve is influencing approaches to coastal management around the world. For example, the 2013 IPCC Fifth Assessment report refers to the NC sea level data. The report states (p. 13.13), ‘The most robust signal captured in the sea level records from both the northern and southern hemispheres support the AR4 conclusion for high confidence in an acceleration that is widely interpreted to mark the transition from relatively low rates of change…to modern rates.’ The NC sea-level curve is then the single data set that is highlighted to support this statement,” said Culver.

Novel techniques are being used to communicate scientific findings on sea-level rise to the general public and other scientists around the world. During the summer of 2012, the ECU/U Penn team organized a NOAA-funded field program and workshop at the North Carolina coast. Twenty faculty members, staff and graduate students from eight institutions and five countries (US, England, Germany, the Basque Country and Canada) were involved in the fieldwork.

A workshop delegate from the Potsdam Institute for Climate Impact Research, Stefan Rahmstorf, also a member of the German Advisory Council on Global Change and coauthor of a far-reaching 400-page report on environmental sustainability, wanted to understand how the NC sea-level record was constructed. Therefore, he joined the ECU/U
Penn team in their fieldwork on the peat marshes of Roanoke Island.

Rahmstorf and colleagues then translated that experience into the story line for a comic book, the purpose of which is to explain to the general public how scientists do their work, and how their projection for future rise of sea level is based upon hard, scientific data. In this imaginative approach to demystifying science, the ECU research vessel “Stanley R. Riggs” is clearly visible in a number of the graphics, along with Rahmstorf and two former ECU geological sciences graduate students, Hanna Thornberg and Ray Tichenor.

Today, research on NC’s record of sea-level rise is continuing at ECU. A National Science Foundation grant awarded to Horton (now at Rutgers), Kemp (now at Tufts) and Culver (ECU) is supporting research by ECU geological sciences graduate student, Jessica Kegel, on the marshes of Sand Hill Point, Cedar Island. Kegel is continuing the work of ECU graduate student Anna Lee Woodson, who first demonstrated the potential of this study site to increase the length of the NC sea level record, perhaps back to 4,000 years before present. Preliminary results indicate that this is likely.

A second NSF grant, led by Mallinson (working with ECU geological sciences colleagues Dr. Eduardo Leorri, Dr. Siddhartha Mitra, Culver and Riggs), and supporting graduate students Caitlin Lauback, Jeff Minnehan, Kelli Moran, Caroline Smith and Nick Zaremba, is funding research that examines how variations in storm strength and frequency and the rate of sea-level rise through time might affect the Inner and Outer Banks regions in the future. A description of their project is located online at www.ecu.edu/geology/CHaNGE.

“The geologic record of the Outer Banks and Pamlico Sound region over the past several thousand years reminds us of the dynamic nature of our coast and of coasts around the world,” said Culver. “Faculty members and students of ECU’s Department of Geological Sciences have communicated their findings to the scientific community through peer-reviewed scientific journals. But the coastal managers, state politicians and the general public must also be informed, if we are to manage our incredibly valuable natural coastal resources wisely.”

The 2011 book, “The Battle for North Carolina’s Coast,” authored by ECU faculty Riggs, Dorothea V. Ames, Culver and Mallinson, began this outreach effort. More modern means of communication, including graphic novels (comics) available via the Internet, are expanding the outreach and influence of research by ECU faculty members and students.

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