Summer 2015

ODU-European Collaborations on Climate Change and Sea Level Rise Reserach

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Original Publication Citation

Ezer, T. (2015). ODU-European collaborations on climate change and sea level rise reserach. *Circulation, 20*(3), 1-3.

SUMMER CCPO CIRCULATION

VOL. 20, NO. 3 SUMMER 2015

ODU-European Collaborations on Climate Change & Sea Level Rise Research

Dr. Tal Ezer

Less than five years ago, Old Dominion University started the Climate Change and Sea Level Rise Initiative (CCSLRI), which led to the recently established Mitigation and Adaptation Research Institute (MARI) and the Hampton Roads Sea Level Rise Preparedness & Resilience Intergovernmental Planning Pilot Project. This interdisciplinary area of research also has a long history in many European countries. Direct measurements of sea level started more than 200 years ago and flood mitigation measures have been in effect for a long time in London, the Netherlands and many other places. Today, reports on flooding in Norfolk, UK, by the BBC or reports on flooding in Norfolk, Va., USA, by the Washington Post, are eerily similar. Therefore, studies of sea level rise (SLR) and associated flooding must be a collaborative effort across oceanic boundaries.

As part of my research leave from ODU during the fall semester, 2014, I spent three months in Europe, visiting various research and academic institutions involved in climate change research. This article is a report on what I learned during those visits.

Steart Marshes in the background was a farmland that has been converted recently into a wetland nature reserve to mitigate sea level rise and flooding. Scientists from the National Oceanography Centre, Southampton, UK, conduct research in the marsh.

From left to right: *Ph.D. student Clementine Chirol, who is studying the marsh for her dissertation; Dr. Ivan Haigh, a lecturer in coastal oceanography and co-director of the Engineering in the Coastal Environment program at the University of Southampton, UK; and Tal Ezer, an oceanography professor at CCPO.*

I had two main goals in mind: First, introducing the European audience to the new research done at CCSLRI and MARI; this was achieved by giving six invited seminars in the UK, Germany and Italy, and participating in various workshops and discussions. Second, learning about the latest research and data sources and developing collaborations with European scientists. Of particular interest to my research is the international project named RAPID that has monitored the Atlantic Meridional Overturning Circulation (AMOC) since 2004 (I attended a workshop in London that celebrated and summarized the first 10 years of continuous observations). Periods with weakening AMOC have shown to be related to increased sea level rise and flooding along the U.S. East Coast (Ezer et al., 2013; Ezer and Atkinson, 2014; Ezer, 2015; Goddard et al., 2015), so I have used the RAPID data in my research to connect climatic changes in ocean circulation with coastal sea level issues. Numerical modeling of the climate system is also an area of great interest to me, and in particular, learning more about the European climate model NEMO, and its distinction from other climate models that are more common in the U.S.

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OLD DOMINION UNIVERSITY
Center for Coastal Physical Oceanography
IDEA FUSION

Letter from the Director

I am often struck by the international nature of ocean science. I take it for granted that I have friends and colleagues in many countries, while being surprised that my local friends and family do not have a similar global exposure. CCPO now has students from India and Korea, postdocs from Canada, UK and China, and faculty from Germany and Israel. CCPO is proud to have these international connections. Visits by CPPO faculty to other institutions keep these connections alive as do visits to CPPO by colleagues for collaboration and seminars.

Our outreach programs bring this international perspective to our local schools and organizations like the Boy Scouts and Girl Scouts of America. We talk to the students about ocean science and we share stories about our travel to various countries with different cultures, languages and attitudes. We hope to interest students of all ages in the global environment. The diversity of exposure gives us all a context to understand and appreciate our country and others.

John Klinck
Professor of Oceanography
Director, CCPO

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Learning from the European experience with SLR was enhanced by visits to Amsterdam, the Netherlands, and Venice, Italy, two cities that have felt the impact of SLR in the past and must prepare for the impact of future SLR, as we will need to do here at Norfolk, VA. I also visited Steart Marshes in Somerset, southern England (Fig. 1)- this £20M project is one of UK's largest man-made saltwater/freshwater wetland reserves. It was created from farmland as a mitigation action against sea level rise and flooding, whereas rising waters are tunneled into this marsh during high tide or storm surges to prevent flooding of surrounding villages and farms. It will also become a new nature reserve with habitats for birds and marine life. It is a large-scale engineering/environmental flood mitigation experiment (created not without controversy) that requires research on its environmental impact and final design.

While in Europe, I visited the following centers involved in climate change research:

1. The National Oceanography Centre (NOC) at the University of Southampton, UK. As a visiting professor there, I spent most of my time interacting with three research groups: (a) the coastal engineering and the environment group, (b) the RAPID observational group and (c) the climate modeling (NEMO) group. NOC in Southampton is the center for archiving the RAPID observations and the NOC branch in Liverpool is the center for archiving and maintaining the historical data of the Permanent Service for Mean Sea Level (PSMSL). These two data sets are vital for many climate studies.

2. Helmholtz Centre for Ocean Research (GEOMAR), which is affiliated with Kiel University, Germany. The institute leads research in oceanography and climate change. Their studies on numerical modeling of past and future climates are especially noted and relate to my own research.

3. Euro-Mediterranean Center for Climate Change (CMCC) is a research consortium consisting of several Italian research institutions, led by the "Istituto Nazionale di Geofisica e Vulcanologia" (INGV) and the University of Bologna, Italy. CMCC leads efforts to develop operational weather and climate models for the Mediterranean region as well as developing global ocean reanalysis system. Future collaboration with this center will connect my research on climate change in the Atlantic Ocean with climate variability in the Mediterranean region; data from the reanalysis system they developed have already been used in my research on AMOC reconstruction (Ezer, 2015). (*Cont'd. on next page)*

(Ezer Continued)

In summary, there are numerous opportunities for more collaboration between researchers at ODU's CCPO, CCSLRI and MARI and European research groups. For example, my research on the connection between ocean circulation and sea level rise along the U.S. coast (Ezer et al., 2013) has now been extended to the western European coasts (Ezer et al., 2015). The study shows that both sides of the Atlantic Ocean experience accelerated sea level, but with different dynamics. While variations of sea level on the U.S. East Coast are dominated by the Gulf Stream, sea level variations on European coasts are more complex and regional, affected by local coastal dynamics as well as large-scale influence from the North Atlantic Oscillations.

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Just Swimmingly: Top 3 Blog Posts of Spring

Stefanie Mack Presents: Tales of grad student life in oceanography. A mix of science and survival skills.

1.

When it comes to climate change, many people feel helpless - like they aren't making enough of a difference. Check out some suggestions on how to approach this problem, as an individual.

2. Always back up data, always!

Data storage is an issue for many graduate students. We often work with large sets of data, and even when we don't, our entire graduate lives can be compressed into a handful papers in progress. It is very important to properly back up your data as a graduate student. Any loss may set back your graduation by months, or even years. Use the tips I describe to make sure it doesn't happen to you.

3. Starting the job search early

As graduate students, we are often very focused on finishing our degrees, without much thought about what comes next. However, I've found that starting the job search early can make a grad student's life much easier. By slowly signing up for job boards and email lists, you avoid the frantic search for a job. Along the way, you get an instinctive idea of how long the job process will take, when to actually start applying, and what options are available in your field.

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