



# CCPO CIRCULATION

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OLD DOMINION UNIVERSITY

Center for Coastal Physical Oceanography

IDEA FUSION

## Connecting Science to Stakeholders for Community Resilience

DR. MICHELLE COVI | PGS. 1, 4

People who live in coastal Virginia know that sea level rise is having an impact on our communities now. We don't need a direct hit from a hurricane to experience major disruptions in our daily routines and some neighborhoods experience frequent flooding, sometimes even on sunny days. The combination of warmer waters, greater ocean volume due to the melting of land ice, changes in ocean currents and land subsidence have combined to make the region a "hot spot" for sea level rise and its impacts. Several CCPO scientists have helped us understand the underlying reasons for much of the flooding including looking at the contribution of currents and the Gulf Stream by **Dr. Tal Ezer** and the regional variations in subsidence by **Dr. Ben Hamlington**. Responding to the impacts of sea level rise in the region is a complex challenge that requires not just understanding the causes of sea level rise in order to make better projections of the future, but also reaching out to communities that use the science and helping them understand the community context.

CCPO faculty have been reaching out to the community to share their science for decades. In 2012, **Dr. Larry Atkinson** joined the Virginia Sea Grant and the Hampton Roads Planning District Commission to launch a series of forums to share the latest science of sea level rise with regional stakeholders. Over the past five years we have developed a group of over 70 professionals,

planners, engineers and scientists who share the latest science and lessons learned in dealing with flooding and sea level rise. The quarterly forums are attended by staff from the cities in Hampton Roads, professionals from engineering firms, scientists from federal and state agencies and academics, staff from non-profits and others. While the forums focus on flood adaptation, the topic varies each quarter, from science to engineering to public engagement and policy.

What is the goal of sea level rise adaptation? Several communities in the region have described this goal as Community Resilience – the capacity to respond to changing conditions and withstand and recover from disruptions, such as severe weather conditions. In order to make the changes in the community needed to respond to a changing climate, residents also need to understand the problem and participate in planned responses. The City of Virginia Beach has been working with scientists and consultants on the *Comprehensive Sea Level Rise and Recurrent Flooding Analysis and Planning Study* that assesses current flood risk in each part of the city and projects future flood hazard.

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# Letter from the **DIRECTOR**

Dear Readers,

Scientists often tend to be cloistered working on the problems that interest them in isolation from society at large. Sometimes we forget that other people in society would like to benefit from our research and understand what we can gain from that effort.

The Old Dominion University Resilience Collaborative (ODURC) is truly a collaboration of various people from multiple disciplines joining forces to apply their understanding of rising sea level and more frequent storms to the local area and drafting solutions that reflect more than one point of view. Most of this region is about one average human height above mean sea level; some areas are a human infant above mean sea level.

Resilience implies a toughness or an ability to recover from a difficult experience. Resilience is as much a state of mind as it is an understanding of events and a preparedness for anticipated difficulties. The focus here is on a resilient community, meaning that it is ready to learn about and prepare for storms and flooding. This implies that the social fabric, political system and citizens are strong and empathetic enough to understand and help each other. Empathy and collaboration require that we see each other as humans in spite of our differences of language, wealth, education, national origin or ethnic/racial background and work toward solutions for issues that affect our community as a whole.

The Resilience Collaborative is an effort to connect across all of these barriers to create a sustainable community in the face of changing environmental conditions. I'm proud that the Center for Coastal Physical Oceanography has partnered with the ODU Resilience Collaborative to host our spring and fall

seminar series to present discussions focused on aspects our changing climate. Check out the Spring 2018 CCPO & ODURC seminar series schedule in this issue. You'll find that we have a diverse lineup of speakers who contribute research and solutions to our collaborative efforts.

As a postscript, it is with great sadness that I report that Professor Emeritus **Chester Grosch**, age 84, passed away on Sunday, January 14, 2018. Chet retired in 2016 after a long and productive career as a physicist, fluid dynamicist, and numerical model creator. We knew him mostly for his quietly competent advice on a range of questions and his entertaining stories at cookie time. For all of us who had a chance to know Chet, we will never forget him, and we will sorely miss him. Please check out a special *Just the Facts* dedicated to Dr. Grosch on page three. To see his full curriculum vitae, please visit, [http://www.ccpo.odu.edu/Facstaff/faculty/Grosch\\_Vita\\_2017.pdf](http://www.ccpo.odu.edu/Facstaff/faculty/Grosch_Vita_2017.pdf).

Best Wishes,



**Dr. John Klinck**  
Director, CCPO  
Professor of Oceanography

**Pictured Right: Professor Emeritus Chester Grosch and John Klinck** listening to a presentation at the Dr. Grosch Symposium held at the Barry M. Kornblau Alumni Center on October 14, 2016. | Photo by David B. Hollingsworth





# Just the Facts: **DR. GROSCH**

M.E. | 1956 | Stevens Institute of Technology | Engineering  
M.S. | 1959 | Stevens Institute of Technology | Applied Mathematics  
Ph.D | 1967 | Stevens Institute of Technology | Physics-Fluid Dynamics

**\$ 4,182,895**  
TOTAL GRANTS  
AWARDED SINCE 1973

**27** REFERED BOOK  
CHAPTERS

**10 Ph.D | 3 M.S.**  
STUDENTS ADVISED

**95** PRESENTATIONS AT  
PROFESSIONAL MEETINGS

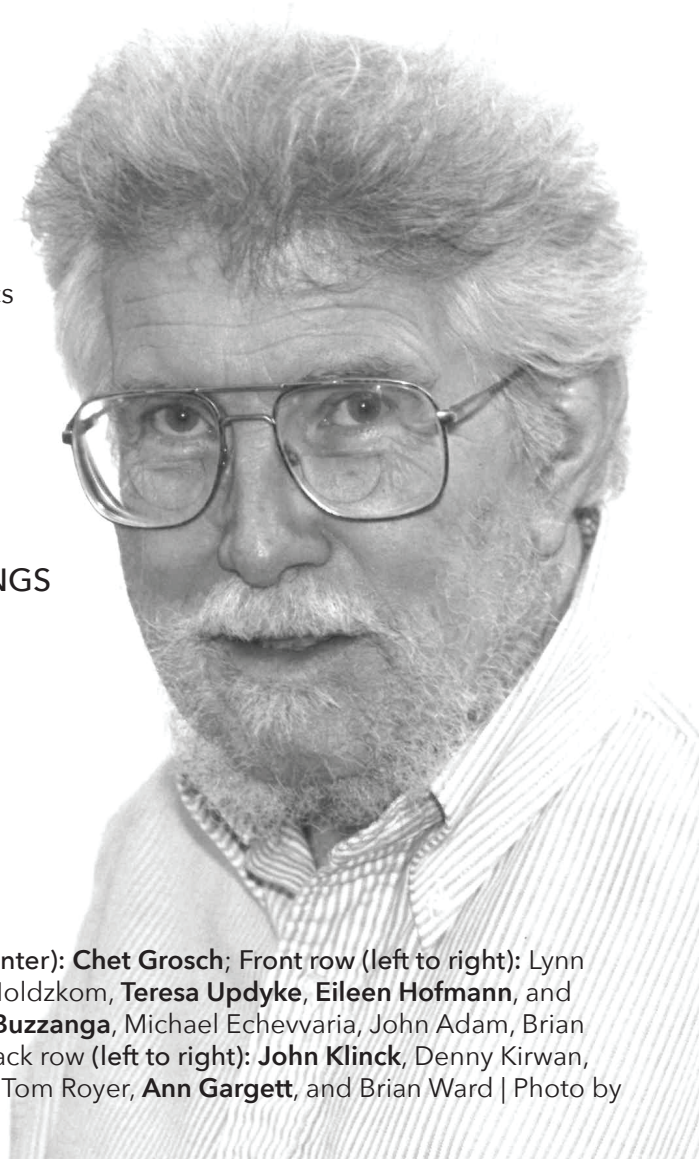
**78** JOURNAL ARTICLES  
PUBLISHED

**49** TECHNICAL  
REPORTS


**Pictured Right:** *Professor Chet Grosch circa 1995* | Photo by Chuck Thomas

**37** PUBLISHED  
ABSTRACTS

**Pictured Below:** Dr. Chet Grosch Symposium Participants (2016) - Front (center): **Chet Grosch**; Front row (left to right): Lynn Price, **Praveen Kumar**, Cynthia Jones, **Lauren Sommers**, Ajoy Kumar, John Holdzkom, **Teresa Updyke**, **Eileen Hofmann**, and Nandita Sarkar; Middle row (left to right): **Pierre St-Laurent**, **Tal Ezer**, **Brett Buzzanga**, Michael Echevvaria, John Adam, Brian Collister, **Brynn Davis**, Mike Gaster, Fred Dobbs, and Hannah Aichelman; Back row (left to right): **John Klinck**, Denny Kirwan, **Ben Hamlington**, John Kroll, Dick Zimmerman, Matt Weiss, Paul Moersdorf, Tom Royer, **Ann Gargett**, and Brian Ward | Photo by Julie Morgan





A photograph showing Professor Wie Yusuf, a man in a blue shirt, interacting with a sign at a community outreach event. The sign features the ODU Resilience Collaborative logo and the text 'What's your tolerance for flooding?' along with images of flooded streets.

## Connecting Science to Stakeholders for Community Resilience

**DR. MICHELLE COVI | CONT'D.**

*Photo Above: Professor Wie Yusuf conducting a survey at the ASERT community outreach event held at W.T Cooke Elementary School in Virginia Beach, VA on December 11, 2017 | Photo by Afi Anuar*



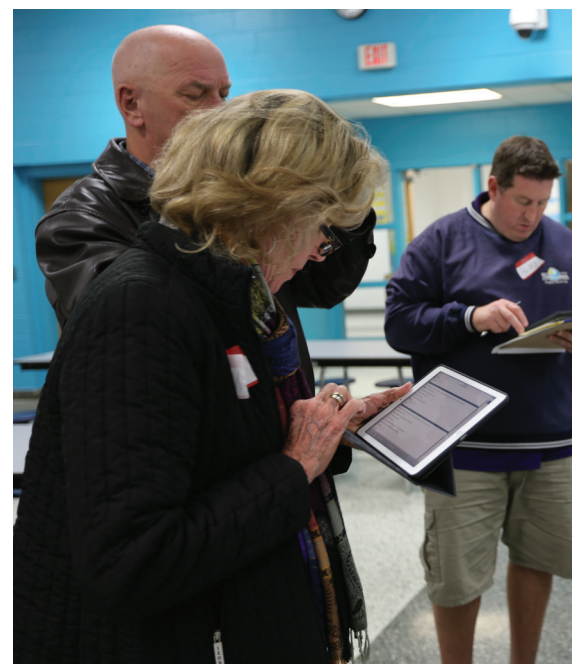
**Photo Above: Dr. Michelle Covi** joined the faculty of Old Dominion University's Department of Ocean, Earth & Atmospheric Sciences in February 2014 | Photo courtesy of ODU

The city has teamed up with faculty from Old Dominion University's Resilience Collaborative to create and provide interactive public engagement meetings.

### Community Engagement

We assembled a group of ODU faculty members from across disciplines. I am from the Sciences, Dr. Carol Considine is from Engineering, and Dr. Wie Yusuf and Dr. Gail Nicula are from Public Service. Our group developed and validated a methodology called the ASERT (Action-Oriented Stakeholder Engagement for a Resilient Tomorrow) Framework in 2016. We have used ASERT to present a series of Flood Resilience Game nights to engage residents of Virginia Beach neighborhoods in December 2017 and January 2018. We hope to attract families and other folks who don't usually attend public meetings and use interactive activities to get their perspectives and experiences on flooding in their neighborhood. We also ask how they would like to see the city respond.

In my role over the past four years as the faculty of practice in climate adaptation and resilience for Old Dominion University and Virginia Sea Grant, I have sought ways to engage many different kinds of stakeholders in the science of sea level rise adaptation and resilience. Engaging residents in resilience may be the one of the more challenging kinds of stakeholders to reach, but to become a truly resilient community, it is one of the most important.





## CCPO Student **SPOTLIGHT:** **ALI BURGOS**

My time at ODU has been a blur—already I have finished a year and a half and I only have a few

months left. When I joined the CCPO crew in August 2016 I was nervous and unsure of my skills. As soon as I got here I was thrown into research where I quickly learned how to code in Matlab, learned about new studies, and met amazing people. I never thought that my small attempts at making figures for research in my first weeks here would now lead to a scientific journal submission with my advisor, **Ben Hamlington**. Over the past year, we have worked on creating a regional trend map of sea level rise over the 20th century. The results look promising, and what started as a seemingly small project has grown into hours of hard work, a poster presentation at the AGU conference this past December, an upcoming oral presentation at the Ocean Science Meeting this

February in Portland, and hopefully an accepted paper in the *Journal of Geophysical Research*. I have always been interested in the oceans and how we are affecting them, and I'm excited to take this research a step forward and finish my Master's thesis. In the coming months I plan to take the past regional sea level trends that we found and project them into the future into the year 2050 along the East and West coasts of the United States. Hopefully, this will lead to some insight into how we can expect our seas to change over the coming years. On top of this, I will be looking into how nuisance flooding will change in the future here in Norfolk.

Not only has research been an exciting and rewarding experience, but I have loved being able to teach as well. Just this past fall semester I was able to teach the lab section to the Understanding Global Climate Change class, along with helping teach the course Introduction to Meteorology, in which I received my graduate degree.

*Cont'd. on page 8*

**Photo Below:** Virginia Beach residents participating in an ASERT community outreach survey assessing options for flooding mitigation | Photo by Afi Anuar

**Pictured Right:** Residents are mapping flood locations in their community using the interactive computer interface, otherwise known as the weTable | Photo by Afi Anuar



# Just the PUBLICATIONS & FACTS: PRESENTATIONS

## PUBLICATIONS:

Ashford, J., **M. Dinniman**, and C. Brooks, Opinion Paper - Physical-Biological Interactions Influencing Large Toothfish Over the Ross Sea Shelf, *Antarctic Science*, 29, 487-494, doi:10.1017/S0954102017000359, 2017.

Cavanagh, R.D., E.J. Murphy, T.J. Bracegirdle, J. Turner, C.A. Knowland, S.P. Corney, W.O. Smith, C.M. Waluda, N.M. Johnston, R.G.J. Bellerby, A.J. Constable, D.P. Costa, **E.E. Hofmann**, J.A. Jackson, I.J. Staniland, D. Wolf-Gladrow, and J.C. Xavier, A Synergistic Approach for Evaluating Climate Model Output for Ecological Applications, *Frontiers in Marine Science*, doi:10.3389/fmars.2017.00308, 2017.



Brynn Davis,  
ODU '16 Alumna

**Davis, L.B., E.E. Hofmann, J.M. Klinck**, and **M.S. Dinniman**, A. Piñones, Distributions of *Euphausia superba*, *Euphausia crystallorophias*, and *Pleuragramma antarcticum* with Correlations to Environmental Features in the Western Ross Sea, Antarctica, *Marine Ecology Progress Series*, doi: 10.3354/meps12347, 2017.

**Dinniman, M.S., J.M. Klinck, E.E. Hofmann**, and W.O. Smith, Jr., Effects of Projected Changes in Wind, Atmospheric Temperature and Freshwater Inflow on the Ross Sea, *Journal of Climate*, doi/10.1175/JCLI-D-17-0351.1, 2017.

**Ezer, T., L. P. Atkinson** and **R. Tuleya**, Observations and Operational Model Simulations Reveal the Impact of Hurricane Matthew (2016) on the Gulf Stream and Coastal Sea Level, *Dynamics of Atmospheres & Oceans*, 80, 124-138, doi:10.1016/j.dynatmoce.2017.10.006, 2017.

**Ezer, T.**, L.-Y. Oey, H. Xue, M. Zavatarelli, G. Sannino, and R. de Camargo, Editorial - The 8th International Workshop on Modeling the Ocean (IWMO 2016),

Bologna, Italy, June 7-10, 2016, *Ocean Dynamics*, doi:10.1007/s10236-017-1123-7, 2017.

Lawson, G., M. Sosonkina, **T. Ezer** and Y. Shen, Applying EMD/HHT Analysis to Power Traces of Applications Executed on Systems with Intel Xeon Phi, *International Journal of High Performance Computing Applications*, doi:10.1177/1094342017731612, 2017.

Oey, L.-Y., X.-H. Wang, **T. Ezer**, Y. Noh, and A. Hogg, Editorial - The 7th International Workshop on Modeling the Ocean (IWMO 2015), *Ocean Dynamics*, 67(12), 1645-1647, doi:10.1007/s10236-017-1103-y, 2017.

**St-Laurent, P.**, M.A.M. Friedrichs, R.G. Najjar, D.K. Martins, M. Herrmann, S.K. Miller and J. Wilkin, Impacts of Atmospheric Nitrogen Deposition on Surface Waters of the Western North Atlantic Mitigated by Multiple Feedbacks, *Journal of Geophysical Research Oceans*, 122, doi:10.1002/2017jc013072, 2017.

## PRESENTATIONS:

**Hofmann, E.E.**, "Models of the Ross Sea and Its Linkages to the Southern Ocean," Southern Ocean Observing System, Ross Sea Regional Workshop, Shanghai, China, September 10-13, 2017.

**Hofmann, E.E.**, "Factors Affecting Distribution of the Atlantic Surfclam (*Spisula solidissima*), A Continental Shelf Biomass Dominant, During a Period of Climate Change," IMBeR IMBIZO V, Woods Hole Oceanographic Institution, Woods Hole, MA, October 2-6, 2017.

**Hofmann, E.E.**, "USECoS: Seasonal and Interannual Variability of Nitrogen Fluxes Along the Middle Atlantic Bight," BioSci Seminar, Virginia Institute of Marine Science, Gloucester Point, VA, November 27, 2017.

**Hofmann, E.E.**, "Transport and Fate of Nutrients Along the U.S. East Coast," Fall AGU Meeting, New Orleans, LA, December 11-15, 2017.



**PRESENTATIONS, CONT'D.**

Kaufman, D.E., M.A.M. Friedrichs, W.O. Smith, **E.E. Hofmann, M.S. Dinniman**, and J.C.P. Hemmings, Combining bio-optical glider observations and biogeochemical modeling to assess Ross Sea phytoplankton changes in the 21st Century, IMBeR IMBI-ZO meeting, Woods Hole, MA, October 2017.

Mack, S., **M. Dinniman**, and **J. Klinck**, "How Well Do We Resolve Eddies in Regional Ocean Models?" 24th Annual WAIS Workshop, Coupeville, WA, October 8-11, 2017.

Pan, C., **M. Dinniman**, P. Fitzgerald, Y.H. Lau, M.K. Cambazoglu, S.M. Parra, **E. Hofmann**, B. Dzwonkowski, S. Warner, S. O'Brien, S. Dykstra, and J. Wiggert, Exploring the circulation dynamics of Mississippi Sound and Bight using the CONCORDE synthesis model, Fall AGU Meeting, New Orleans, LA, December 11-15, 2017.

Schwans, E., B. Parizek, M. Morlighem, R.B. Alley, D. Pollard, R.T. Walker, P. Lin, **P. St-Laurent**, T. LaBirt and H. Seroussi, "Simulating Ice Dynamics in the Amundsen Sea Sector," 2017 AGU Fall Meeting, New Orleans, LA, December 11-15, 2017.

Wiggert, J., C. Pan, **M. Dinniman**, Y. Lau, P. Fitzgerald, S. O'Brien, C. Bouchard, L. Quas, T. Miles, M.K. Cambazoglu, S. Dykstra, B. Dzwonkowski, G. Jacobs, I. Church, and **E. Hofmann**, "Impacts of Suspended Sediment and Estuarine-Shelf Exchange Pathways on Shelf Ecosystem Dynamics in the Northern Gulf of Mexico," Fall AGU Meeting, New Orleans, December 11-15, 2017.

Yager, P., **P. St-Laurent**, R. Sherrell, **M. Dinniman**, and S. Stammerjohn, "Meltwater pump" Mechanism Directly Links the Extreme Amundsen Sea Phytoplankton Bloom to the Melting Ice Shelf," 24th Annual WAIS Workshop, Coupeville, WA, October 8-11, 2017.

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Physical Oceanography & The  
ODU Resilience Collaborative  
presents the

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FEB. 26 | Shimon Wdowinski, Florida International University

MAR. 12 | Jamie Kruse, East Carolina University

MAR. 19 | Matthew Oliver, University of Delaware

MAR. 26 | Thomas Crawford, Virginia Tech

APR. 2 | Ali Burgos, Old Dominion University

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Miasia Osbey, Chief Editor  
Julie Morgan, Content Editor



*On April 2, 1018, **Ali Burgos** will give a seminar on regional sea level rise trends in the 20th century for the Spring CCPO & ODURC Seminar Series | Photo courtesy of Ali Burgos*

## CCPO STUDENT SPOTLIGHT: **ALI BURGOS, CONT'D.**

Teaching has been challenging, but I love working with the students, and getting to share with them the knowledge that I have gained over the years has been enriching. I'm excited to continue to help with the meteorology course over this spring semester.

My entire time here at ODU has helped me understand what I might actually want to do with my degrees. I have already applied to several fellowships, and even a job, dealing with coastal management and marine policy. I believe it is crucial to take my and other's research a step forward into the policy realm so evidence-based policy can be implemented to protect coastal cities in the future from sea level rise and other aspects of climate change. I am excited to be (hopefully) moving into the next chapter of my life in the summer or fall, but I will miss everything about ODU and all the people whom I have met that have helped me along the way.