

CCPO CIRCULATION

A publication of the Center for Coastal Physical Oceanography

Volume 25, No. 1 | Fall 2019



OLD DOMINION
UNIVERSITY

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THE INTERNATIONAL REACH OF CCPO IN OCEAN MODELING AND EDUCATION: Reflections from a recent trip to China

By Tal Ezer

The international nature of ocean modeling and the reach of CCPO in this field were on display during a trip I made in June 2019 to China (my 7th visit there since 2003). I attended two scientific endeavors: the 11th International Workshop on Modeling the Ocean (IWMO-2019), which was held in Wuxi (northwest of Shanghai) and the 9th UNESCO/IOC Training Course on Climate Dynamics and Air-Sea Interaction, in Qingdao (on the shores of the Yellow Sea). I have served as a member of the International Steering and Organizing Committee of IWMO since its founding in 2009 and as a lecturer in the training courses in Qingdao since 2011.

The IWMO meetings trace their origin to the Princeton Ocean Model (POM) users group meeting in Princeton in June 1996 (past and present CCPO scientists who attended this first meeting include Jerry Miller, Glen Wheless, and Tal Ezer). (Note that the POM web page supporting some 6000 users from 70 countries moved with me from Princeton to ODU and is now hosted at CCPO: <http://www.ccpo.edu.edu/POMWEB/>). Until 2003, users' meetings were held in the U.S., combining several coastal ocean modeling groups (including POM and ROMS). Users and developers met to discuss the latest code developments and coastal ocean applications. The expansion of ocean modeling beyond the U.S. and the development of many new community models led to the formation of the IWMO group at the inaugural meeting in Taipei in 2009. The scope of these meetings covers all types of ocean models and related research on issues such as data assimilation and data analysis, from local to global scales. The meetings encourage the participation of young international scientists who compete for the Outstanding Young Scientists Award. After each meeting, a special issue of peer-reviewed papers is published by *Ocean Dynamics* (for which I serve as co-editor), and so far over 100 published papers have resulted from the IWMO meetings. At each meeting, the next hosting country is chosen by the international committee, trying to choose a different continent than the previous meeting. The organizers (often participants

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Figure 1. A group picture, taken by a drone, of the participants of the IWMO-2019 meeting in Wuxi, China. In the background is Lake Taihu, one of the largest freshwater lakes in China, which includes some 90 islands and various tourist attractions.

REFLECTIONS | Cont.

in the previous IWMO) and hosting institutions are free to set the planning, scope, and funding sources of each meeting. Past hosting continents include Asia (Taiwan, China, Korea and Japan), Europe (Norway, Italy and Germany next year), North America (Canada and US), South America (Brazil), and Australia. The only meeting held in the U.S. so far was the 2nd IWMO, organized by myself and hosted by CCPO in Norfolk in 2010.

This year, the IWMO-2019 meeting was hosted by Tsinghua University - National Supercomputing Center in Wuxi, and included a tour of the Sunway TaihuLight supercomputer, named after the nearby Lake Taihu (Fig. 1). This Chinese-designed supercomputer has over 10 million CPU cores; it was the world's fastest supercomputer in 2016-2018, allowing high-resolution ocean-atmosphere global modeling, as well as other applications in physics, biology and engineering.

From Wuxi, I traveled for 6.5 hours on the high-speed train to Qingdao to teach at the summer course on climate dynamics and air-sea interaction. The Ocean Dynamics and Climate (ODC) center for regional training and research was established by the Intergovernmental Oceanographic Commission (IOC) of UNESCO and managed by the First Institute of Oceanography (FIO) of the State Oceanic Administration of China. Since 2011, ODC has provided annual training and education courses for selected young scientists, many of them from developing countries. Several leading international experts are invited to teach each year during the 2-week course, focusing on different topics such as regional ocean models, climate change, coupled ocean-atmosphere models, etc. This year's course focused on modeling air-sea interactions, at which my lectures (Fig. 2) included presentations of my research on simulations of tropical storms and hurricanes, as well as practical training with simple model codes that students ran on their own computers. Each day, trainees from different countries (including Bangladesh, Brazil, Cameroon, China, Ecuador, Korea, India, Indonesia, Malaysia, Nigeria, Philippines, Thailand, and Pakistan) learned how to work collaboratively on different projects, wrote reports on what they learned, and gave



Figure 2. Tal Ezer teaches air-sea interaction and ocean modeling at the 2019's UNESCO/IOC training course in Qingdao, China.

presentations on the research in their home countries. This course was a great learning experience for both the trainees and the lecturers, and I enjoyed the interaction with international young scientists eager to learn. I met past trainees who were oceanography students at ODU and others are asking about potential graduate studies here. Seeing the formation of friendships and collaborations between scientists of different backgrounds is a positive sign in a time when international conflicts and trade wars are on center stage. The closing ceremony was especially entertaining when students and lecturers (after too many glasses of the local Tsingtao Beer...) tried their talent in singing in a dozen different languages representing the traditions of their countries.

This report of my international experience this summer is only one of many such activities of research and education in which CCPO is involved. Previous issues of *CCPO Circulation* have highlighted some of the classes and workshops facilitated by CCPO personnel, and future issues will include more of our global reach.

WHERE MY BLUE MIND GOES

By Marufa Ishaque

Sometimes exciting stories start with uncertainty, until it reaches its climax. For me, the journey through my PhD is somehow like those stories. I could feel a part of me is changing gradually—becoming more focused, more creative, and more thoughtful. When I received an offer letter from ODU, I had mixed feelings of excitement, joy, fear, and worry. Flying across the Atlantic Ocean, I arrived at ODU from Bangladesh in fall 2018, leaving behind my family, friends, and also all the cultural barriers that discourage a woman to go for science education abroad. I stepped into a new culture, a new education system and an unknown country. It was my motivation, one of my dreams and goals to enroll as a physical oceanography PhD student in the Department of Ocean, Earth, and Atmospheric Sciences at ODU. Accomplishment of this goal made me more confident and encouraged me to walk through the steps of graduate studies. During my first year, while doing the oceanography core courses, I realized that not knowing anything is not shameful, but pretending to know – without knowing – is painful. With rainbow and butterfly ideas on mind, I started thinking of so many research ideas at the beginning of my graduate studies. Since the time is passing, I am trying to identify the most appealing door through which my brain wants to enter into the world of oceanography research.

After I successfully finished my spring semester, I got an opportunity to join in the South North Atlantic Training Transect (SoNoAT) cruise on board the RV *Polarstern*. This wonderful research icebreaker belongs to the Alfred Wegener Institute for Polar and Marine Research (AWI) and is mainly used for research in the Arctic and Antarctica. SoNoAT is a collaboration between AWI and the Partnership for the Observation of the Global Ocean (POGO), funded through the Nippon Foundation and ATLANTOS.

After receiving pre-cruise training in Punta Arenas, Chile from 30-31 May, I flew to the Falkland Islands. Our cruise, which lasted 2-29 June, started from Port Stanley in the Falkland Islands and ended in Bremerhaven, Germany. I was one of the 25 scholars from 23 different countries who were selected to participate from 800 applications from 88 countries.

From the very first day, we started our work in five different groups. Each group of five scholars had to deal with all five modules during the cruise on a rotating basis. The module topics were remote sensing; oceanography; marine technology, data crunching, and outreach; climate change; and microbiology. We had some great scientists on board with us from various renowned oceanographic institutions. They provided training on collection and analysis of



Chief Scientist Karen Wiltshire and SoNoAT scholar Marufa Ishaque. (Photos: E. Sauter, AWI).



oceanographic data, as well as the related theories and backgrounds. We learned to use XBT, CTD, BBE and bucket samples to understand the properties of different water masses in the Atlantic Ocean. We collected water samples from up to 6,000 meters depth. Moreover, we learned the process of HPLC, eDNA extraction from samples and about microplastics. There were hands-on exercises on SNAP, Hysplit and ODV. We used Hamamatsu and Ramses for radiation measurements, and we used a handheld radiometer called Microtopes to measure Aerosol Optical Depth (AOD). We also deployed ARGO floats as we passed different latitudes. On our way, we saw seaweeds and various sea creatures, such as jellyfish, schools of dolphin, flying fish, whales, sea turtles and a little free-floating hydrozoan, *Velella velella*, which is commonly known as “Sea Raft”. Finally, we had to work on small projects. I worked on analysis of the variation of AOD, collected from Microtopes along our ship track and I did the assessment of aerosol type. From the measurement of AOD, it is possible to estimate the level of atmospheric pollution for accurate retrieval of ocean surface properties.

One of the exciting parts of this cruise was crossing the equator. At 00°00 latitude when the portside of the ship was in the southern hemisphere and the starboard side was in the northern hemisphere, we had an amazing experience of having conversation with ESA astronaut, Alexander Gerst, who was visiting AWI in Bremerhaven. Moreover, we were graced by a visit from Neptune and his beautiful wife, Thetis. As I was crossing the equator for the first time, a new marine name, *Aphrodita aculeata*, was bestowed on me, and I received a beautiful certificate according to the seafaring tradition.

Apart from all the scientific works on board, this cruise made me understand the importance of communicating science with people, especially with kids – who are the future leaders. Every week we had Skype calls with various schools in different countries, and we tried to answer their questions related to ocean science. It was very motivating, not only for them but also for us.

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BLUE MIND | Cont.

The days when my morning started and nights ended with the Atlantic, I felt myself as just a little creature floating at the intersection of two mighty beauties. At night, the black sky covered us with its twinkling stars. From dawn to dusk, it seemed like a confused painter that tried different combinations of various shades of colors on the sky with the intention of impressing us. The facts and things that I have read in books, the data that I have

downloaded from webpages – now I realize how much dedication, motivation, and hard work is behind all these. The SoNoAT shipboard experience has greatly modified my thought and purpose of studying ocean science. Though there are country borders, cultural differences, and gender bias, the language of science has actually no barriers. The learning of oceanography is getting really exciting day by day as I am discovering new tools and techniques. Every day, I am growing as an oceanographer with more confidence and motivation.

OCEANOGRAPHER LIVING IN D.C.

By Alessandra Burgos

I came to CCPO in 2016 as a master's student studying sea level rise. After graduating this past December, I left to start a Sea Grant Knauss fellowship in Washington D.C. As sad as I was to leave Norfolk and my fellow graduate students, I was excited to start a new chapter in the policy world.

I was placed into the National Centers for Coastal Ocean Science (NCCOS) line office within NOAA. I was brought in to support NCCOS' work on coastal resiliency and develop congressional engagement strategies. What that actually entailed, however, I slowly learned over my first two months. NCCOS funds internal (NCCOS scientists) and external (academic researchers) scientists through grants to provide and support science solutions for coastal regions throughout the nation. These science solutions are directly aimed to help decision-making regarding a large range of topics, such as harmful algal blooms and sea level rise. In my position, I have been able to see how the grant management process works, and how to engage with congressional leaders on Capitol Hill. I now fully understand why everything takes so long with the government!

I have learned a lot about how the government works through this fellowship. One being that, because I work for an executive office, we are not allowed to lobby for ourselves and must support the current administration's goals/budget. I think that this aspect of government was very eye-opening for me. As a public citizen, though, I am learning many ways that the public can be involved, which is much more than I thought possible. One way is that anyone can go and sit in on briefings and hearings at senate buildings. Also, websites, like the Federal Register, lists pending bills, which are open to public comment. There are different ways for people's voices to be heard, but these avenues are generally not promoted. One of the main reasons I went into this fellowship was to learn how to communicate science to policy makers and see



Virginia Sea Grant fellows, ODU's Marla Valentine, VIMS' Kelley Uhlig, ODU's Ali Burgos, and VIMS' Chase Long, at the Consortium for Ocean Leadership Briefing (Photo: Christine Burns).

that science put into action. In a sense, I stumbled my way into this fellowship, but many of my experiences helped me more than I thought. Taking communication classes/workshops, being active in our graduate student organization, and seeking out environmental policy classes from different universities, all helped me slowly hone the skills that are useful and needed for understanding the intricacies of working in a political field.

The fellowship has allowed me to take part in a large range of personal development events, such as attending a marine spatial planning class in Nova Scotia in May, and facilitation and science communication trainings. For my job, I have had the opportunity to travel to Beaufort, NC and Gulf Shores, AL, with several more trips lined up throughout the year. Every day there is a little something new going on, so it keeps me busy. The Knauss fellowship has been amazing experience so far and I have met so many fascinating people. It has easily opened up the door for me, such as sitting in on briefings on the Hill or getting onto a NPR science podcast. I miss the Hampton Roads area, but I hope that my work can help the area out in the future.

CCPO Alumni Spotlight

JOHN HOLDZKOM, PH.D. '98

It is hard to believe it has been over 21 years since my graduation from CCPO. I started my studies in the Oceanography department just as CCPO was coming to fruition, when as an ODU undergraduate I was fortunate to meet Dr. Denny Kirwan (and his gracious wife, Dede) and begin studying in the Research Experience for Undergraduates program. After two years of undergraduate research (and one amazing trip to Vienna), I matriculated to graduate school under Denny's mentorship and focused my studies on analytical and numerical oceanographic modeling. My graduate research was also heavily influenced by Dr. Chet Grosch and accordingly included elements of computer science as well as oceanography, and a similar mix has continued throughout my career.

Upon graduation in 1998, I accepted a position in NOAA's Coastal Ocean Laboratory; however, after a short time, I left NOAA to join the private workforce during the technology boom of the late 1990s. After a quick stint developing software for GOES weather satellites, I joined fellow CCPO graduates, Cathy Lascara and Glenn Wheless, in a high-tech company they co-founded (Mechdyne). As a project scientist there, I worked with scientists at many universities and institutions including NRL, NASA, and EPA to analyze and visualize data using software we developed. Much of the work was focused on atmospheric modeling and measurements of air quality, and this gained a lot of visibility within NASA and EPA and eventually even special committees to the White House. I really enjoyed this role, which kept me at the crossroads of science and technology.

After 8 years at Mechdyne, I decided to make another change that brought me even closer to science, and I joined Atmospheric and Environmental Research (AER). At AER's Hampton Roads office, I managed an R&D program focused on integrating environmental data and effects into military training exercises. Over the last decade this program has supported dozens of exercises with tens of thousands of participants from the US and international military services. I found this work very fulfilling; however, something new and exciting eventually stole my interest, and that was the emergence of cloud computing, which I began exploring for AER programs in 2015. I quickly became enthralled with this developing technology, earned certification as a cloud solutions architect, and was appointed AER's first Director of Cloud Computing in 2017.

Very recently, my experience and passion for cloud computing has led me to a position at Verisk Analytics, the parent company of AER. I am now responsible



Although not practicing oceanography, John can often be found boating on the lower Chesapeake Bay.

for helping subsidiaries of the company migrate to the cloud and leverage its many capabilities, and I help to implement new cloud-native solutions for the company's data science pursuits. It's a very dynamic, challenging and rewarding role, and with the nature of cloud computing, it is inherently flexible—I can work from anywhere (usually home) but stay in constant communication with a global fusion of computing platforms, colleagues, and representatives from cloud vendors, such as Amazon and Google. I expect to be in this role for a very long time, unless the allure of research science pulls me one more time.

Hopefully my rambling above gives my CCPO 'family' a better idea of what I've been doing for the last 21 years and perhaps gives current CCPO students some idea of what life can look like on the other side of graduation. Best wishes to all and please keep in touch (I am easily found on LinkedIn).

JUST THE FACTS

Presentations

Ezer, T., On unusual shifts in “hotspots” of accelerated sea level rise along the U.S. East Coast, International Workshop on Modeling the Ocean, IWMO-2019, Wuxi, China, June 17, 2019.

Ezer, T., Air-sea interactions in ocean models, UNESCO/IOC Regional Training on Ocean Dynamics and Climate, First Institute of Oceanography, Qingdao, China, June 27, 2019.

Ezer, T., Simulations of hurricanes, typhoons, cyclones and tropical storms, UNESCO/IOC Regional Training on Ocean Dynamics and Climate, First Institute of Oceanography, Qingdao, China, June 28, 2019.

Ezer, T., The science of sea level rise and impact on flooding in Norfolk, Seminar for REU students, ODU, Norfolk, VA, July 11, 2019.

Hofmann, E.E., Numerical Modeling of High Latitude Systems (eight lectures), Austral Winter Institute, Universidad Austral de Chile, Valdivia, Chile, August 5-9, 2019.

Hofmann, E.E., E.N. Powell, **J.M. Klinck**, D. Munroe, R. Mann, D.B. Haidvogel, D. Narváez, X. Zhang, and K. Kuykendall, Factors Affecting Distribution of the Atlantic Surfclam (*Spisula solidissima*), A Continental Shelf Biomass Dominant, During a Period of Climate Change, IMBeR Open Science Conference (oral presentation), Brest, France, June 17-21, 2019.

Salmon, E., **E.E. Hofmann**, **M.S. Dinniman**, and W.O. Smith, Jr., Evaluation of iron sources and sea ice variability in the Ross Sea and implications for the phytoplankton seasonal cycle, IMBeR Open Science Conference (poster presentation), Brest, France, June 17-21, 2019.

Publications

Bender, M.A., T. Marchok, **R.E. Tuleya**, I. Ginis, V. Tallapragada, and S.J. Lord. 2019. Hurricane Model Development at GFDL: A Collaborative Success Story from an Historical Perspective, *Bulletin of the American Meteorological Society*, 100(9), <https://doi.org/10.1175/BAMS-D-18-01971.1>.

Dangendorf, S., C. Hay, F.M. Calafat, M. Marcos, C.G. Piecuch, K. Berk and J. Jensen. 2019. Persistent acceleration in global sea-level rise since the 1960s, *Nature Climate Change*, doi:10.1038/s41558-019-0531-8.

Ezer, T., 2019. Numerical modeling of the impact of hurricanes on ocean dynamics: sensitivity of the Gulf Stream response to storm’s track, *Ocean Dynamics*, 69, doi:10.1007/s10236-019-01289-9.

Han, W., D. Stammer, P. Thompson, **T. Ezer**, H. Palanisamy, X. Zhang, C. Domingues, L. Zhang, and D. Yuan. 2019. Impact of basin-scale climate modes on coastal sea level: a review, *Surveys in Geophysics*, doi:10.1007/s10712-019-09562-8.

Mack, S.L., **M.S. Dinniman**, **J.M. Klinck**, D.J. McGillicuddy, Jr., and L. Padman. 2019. Modeling ocean eddies on Antarctica’s cold water continental shelves and their effects on ice shelf basal melting, *Journal of Geophysical Research*, 124, 5067-5084, doi:10.1029/2018JC014688.

Ponte, R.M. et al. (**T. Ezer** and 53 co-authors). 2019. Towards comprehensive observing and forecasting systems for monitoring and predicting regional to coastal sea level, In: Oceanobs19: An Ocean of Opportunity, *Frontiers in Marine Science*, doi:10.3389/fmars.2019.00437.

Spotlight

JULIE MORGAN



The *Sith Lord* nameplate outside the office of Julie Morgan garners a lot of attention, including Secret Service agents doing a security sweep before a Secretary of State visit to a next-door building on campus. In her 28 years with CCPO, Julie has had a few different job titles, but being one of the original members of CCPO would have to be the most valued moniker. Currently, Julie is serving as a Program Manager, juggling responsibilities with Dr. Eileen Hofmann's very active research programs and also the priorities of the Center. As an Old Dominion University Research Foundation (ODURF) employee, she functions as a liaison between ODURF and the Center. Julie has served in various editorial capacities with the newsletter, *CCPO Circulation*, since it began production in 1993 and has coordinated logistics for the Fall and Spring Seminar Series for several years. A primary focus for Julie is the Center's educational outreach initiatives. Outreach has expanded significantly over the past 15 years to include a Boy Scout Oceanography Merit Badge program, a partnership with the Girl Scouts of the Colonial Coast, Old Dominion University's Big Blue Camp, and various ongoing activities with local schools.

Outside of CCPO, Julie has been active with dog therapy volunteering since 2007. Working with a Bernese Mountain Dog from 2007 to 2014 and a retired racer Greyhound (Bart) from 2015 to the present, she has participated in children's reading programs, university exam stress relief events, and an assortment of special engagements with local medical and educational institutions. She and Bart are members of the Children's Hospital of the King's Daughters' (CHKD) Buddy Brigade and the USO of Hampton Roads and Central Virginia's Canine Comfort Crew at the Norfolk International Airport. She hopes to get her Great Pyrenees, Lily, certified soon for therapy work, as well.

Julie has stayed in touch with numerous former CCPO professors, staff, and students. She has many wonderful memories of times shared at both Crittenton Hall and the current location in the University Village. Julie is thankful for the enduring friendships she still has with folks she has met over the years at the Center and is happy to be part of the group as it moves toward its upcoming third decade.

Letter from the Director



I am always encouraged by the global reach of folks at CCPO; how present and past members influence widely dispersed and, perhaps, surprising activities. We continue to engage in teaching that goes beyond the standard university classes. Examples are the workshops by Tal in China and other countries. Others at CCPO participate in such expanded teaching as indicated in past, and anticipated future, articles. We are proud of Ali for her Knauss Fellowship which allows her to influence the US government. Scientists have been told to express their opinions to government and society in general. Ali is an example of how this can be done.

Oceanography is an international activity and we continue to be visible on the global stage. Marufa is our latest ambassador, participating in a cruise on a German research vessel and meeting a number of her contemporaries. We even have the occasional effect on processes not involving oceanography, as exemplified by John who is moving his company's computing into the cloud.

While Julie tends to keep to the background, she is an indispensable member of CCPO. She keeps all of us on track, helps produce information (like this newsletter) for public consumption and organizes outreach. Outreach may seem to be local, but I hope that these casual interactions with young, curious students lead them to a better appreciation of the natural world.

— Dr. John Klinck, Director of CCPO & Professor of Oceanography

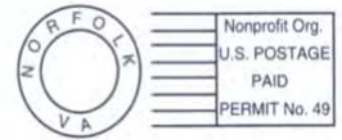


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Center For Coastal Physical Oceanography (CCPO) and ODU Resilience Collaborative (ODURC) Seminar Series

FALL 2019 SEMINAR SCHEDULE

9 September	George Hagerman , <i>CCPO</i>
16 September	James Keck , <i>Virginia Commonwealth University</i>
23 September	Charles Humphrey , <i>East Carolina University</i>
30 September	Inia Soto Ramos , <i>NASA Goddard Space Flight Center</i>
7 October	Daniel Sternlicht , <i>Naval Surface Warfare Center, Panama City</i>
21 October	Pierre St-Laurent , <i>CCPO/VIMS</i>
28 October	Lawrence Agbemabiese , <i>University of Delaware</i>
4 November	Jennifer Whytlaw , <i>Dept. of Political Science & Geography, ODU</i>
11 November	Brynn Pecher , <i>CCPO</i>
18 November	Francesco Ferretti , <i>Virginia Tech</i>
25 November	Alan Blumberg , <i>Jupiter</i>

MONDAYS at 3:30 PM

Reception at 3:00 PM

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Info and web streaming:

[www.ccpo.odu.edu/
seminar.html](http://www.ccpo.odu.edu/seminar.html)

"A bird's-eye view of a massive algal bloom growing in James River near its mouth in the Chesapeake Bay." Photo by Wolfgang K. Vogelbein/Virginia Institute of Marine Science (<https://bit.ly/2K7hC3N>).