

**The Coastal Ocean Environment Summer School in Ghana  
(COESSING; <https://coessing.org>)**

**Project Information:**

**Project title:** The Coastal Ocean Environment Summer School in Ghana

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**Project location:** University of Ghana and Regional Maritime University, Accra, Ghana

**Scientific focus:** Oceanographic/coastal environmental education and capacity development

**Timeline:** The school has met for one week every year, in August since 2015. In 2020 the school was virtual.

**Budget:** Our current budget of about \$65,000 USD per year allows about 15 US/European scientists/instructors and about 100 African participants to meet for one week of in-person participation. The success of our 2020 online school during the pandemic bodes well for a hybrid in-person/online approach in future years, in order to reach a greater number of participants.

**Description:**

The Coastal Ocean Environment Summer School in Ghana (<https://coessing.org>) is an international effort to develop capacity in the ocean sciences in West Africa. The need for such a school is clear. Africa has a fast-growing population, and experiences a number of significant ocean challenges, port development in support of fast-growing economies, overfishing, offshore oil drilling, sea-level rise and associated coastal erosion, pollution, piracy, and others. We have been running the school for one week in August every year since 2015. The hosting institution in Ghana alternates between Regional Maritime University (RMU), which trains students for careers in maritime industries such as shipping and port management, and University of Ghana (UG), which has a Department of Marine and Fisheries Sciences. Due to the COVID-19 pandemic, the school was run virtually in 2020.



**Laboratory exercises at the 2016 summer school.**

*This is a part of an international effort to define priorities for ocean science capacity development. To learn more information please visit, [equisea.org](http://equisea.org)*

## EquiSea Project

Beginning in 2016, when the size of the school increased dramatically, we have had about 100 participants per year from Ghana and neighboring West African countries; in recent years, about half of the African participants have come from Nigeria, Africa's most populous country. The African participants come from a broad range of backgrounds; they include undergraduate and graduate students, university faculty, and a small but important contingent of private sector and government employees. Beginning in 2016, we also have brought at least 8 faculty members, postdocs, and research scientists, mostly from the US, but also from Europe, to participate as resource persons for the school, alongside Ghanaian faculty. The number of resource persons greatly increased in 2020, due to the relative ease of participating across the internet. A total of about 40 people have served as resource persons for the school over the years, and the number continues to increase. Six undergraduates from the University of Michigan, one undergraduate from Hampton University, and 11 graduate students from 5 different institutions have also participated in the school. The testimonials page of our website, <https://coessing.org/testimonials/>, attests to the value and impact of the school, on both African and US participants.



**Deployment of a drifter during the 2017 summer school.**

The school curriculum continues to expand, and now covers physical, chemical, and biogeochemical oceanography, as well as environmental science, and atmospheric science. More such expansion is likely—the school has been highlighted in one submitted and one

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soon-to-be-submitted US National Science Foundation (NSF) proposal, focusing on weather and climate prediction, and marine geology/paleoceanography respectively. The school includes lectures, hands-on lab exercises, field trips to the beach and port, and a short oceanographic cruise featuring instrument deployments. In recent years, about 20% of the school participants have worked on research projects with our resource persons, and have presented their projects to the entire school on the last day. For some school participants, the PowerPoint presentations were the first they had ever done in their careers.

Success stories of the school include:

- 1) Repeat participation from many US resource persons and Africans, demonstrating the value of the school.
- 2) Leadership roles of a small core of about four early-career US resource persons. The 2020 online school was set up primarily by these early-career scientists, who also did much of the set-up work underlying the 2018 and 2019 schools.
- 3) An Oregon State University MS degree on the impacts of the school, and a paper, stemming from the MS thesis, now in-press for a peer-reviewed social science journal.
- 4) Support of a UG PhD student, who is researching upwelling in the Gulf of Guinea, in collaboration with his UG advisor and two US scientists, all 3 of which are resource persons for the school.
- 5) Enrollment of a Ghanaian student, a co-organizer of the 2017 school at RMU, in the hydrography program at University of Southern Mississippi (USM).
- 6) The beginnings of a discussion on forming a hydrography program at RMU, with collaboration from one of our resource persons at USM.
- 7) Support for one of our regular school participants to attend the 2020 Ocean Sciences meeting and present on the terrible problem of plastics in the ocean near Ghana.
- 8) Python workshops that attract a substantial fraction of our participants. Python is a free, open-source programming language that is continually being developed through community involvement, and as such it is very attractive for African participants. Learning Python has enabled many participants to enhance their own research and teaching efforts. One participant, for instance, obtained a permanent position in part because he had learned Python from us, and a Python-controlled Raspberry PI also allowed him to run his research instrumentation with much lower power costs, a crucial consideration in an under-resourced region.

An NSF CAREER grant provided full funding for the 2015 school, a “scouting trip” made in 2014, and partial funding for the school expansion in 2016-2017. The 2016-2017 expansion was primarily funded by grants from various sources at the University of Michigan (see our website for details), while the 2018/2019 schools were funded by a supplement to the CAREER grant, and a new NSF grant, respectively. The International Centre for Theoretical Physics (ICTP) provided substantial funding for the 2018 school, and funding from various sources within Ghana has been provided every year that we held the school. For future schools, we are currently seeking funding from the two NSF proposals described above, from the US Navy, and from other sources (to be determined) connected to the UN Decade of Ocean Science.

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**Group picture taken during trip to the beach for the 2018 summer school.**

Provided that more funding could be procured, schools like the one we run in Ghana could be run in many other countries. We have given short presentations on the Ghana school at several conference venues, and longer presentations at several institutions. The number of US and European scientists who would like to join our efforts is very long, and there is a growing list of collaborators around the world who would like to host similar schools. Our vision is for a network of summer schools around the world, serving as a conduit for increasing collaborations between scientists in better-resourced and under-resourced countries. Increased funding would also allow several improvements to the approach we have taken thus far at the school. For instance, we could strive to have more regular contact between the annual schools, offer small salary supplements for the co-organizers in the under-resourced countries and for US graduate students, and include a budget for low-cost instrumentation to be left behind when the schools end and used by our global south collaborators.

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