

# Climate and Ocean Science Builds for the Future

Second WCRP/CLIVAR Open Science Conference: Charting the Course for Climate and Ocean Research; Qingdao, China, 18–25 September 2016



Paddleboaters enjoy a sunny day in Qingdao, China. Last September, more than 600 scientists gathered in Qingdao to mark the 20th anniversary of the World Climate Research Programme's Climate and Ocean: Variability, Predictability, and Change project at the second WCRP/CLIVAR Open Science Conference. Credit: [Bridgit Coila](#); CC BY-SA 2.0

By [Detlef Stammer](#), [Annalisa Bracco](#), and [Valery Detemmerman](#) © 9 June 2017

Twenty years ago, the World Climate Research Programme (WCRP) established Climate and Ocean:

Variability, Predictability, and Change (CLIVAR) as one of its four core projects. CLIVAR's mission is to increase understanding of the dynamics, interaction, and predictability of the ocean-atmosphere system and of the Earth's climate system for the benefit of society and the environment.

To mark the 20th anniversary of CLIVAR (<http://www.clivar.org/>), more than 600 scientists from 50 countries gathered in China last September for the second WCRP/CLIVAR Open Science Conference (<http://www.clivar2016.org/>).

For 5 days, scientists showcased major advances in climate and ocean research and discussed several critical issues, including the following:

regional variations in ocean and climate warming, pinpointing, for example, the interplay between the El Niño–Southern Oscillation (<https://eos.org/articles/el-nino-will-increase-atmospheric-carbon-to-historic-levels>) and global warming on multiple timescales

the respective contributions of thermal expansion and melting ice to sea level rise, with novel estimates of potential regional impacts

A 3-day symposium actively promoted critical thinking about challenges facing climate science, the connections between the ocean and the global water and energy cycles, including the potential of using sea surface salinity (<https://eos.org/meeting-reports/salinity-monitoring-gives-insight-into-the-global-water-cycle>) to forecast seasonal precipitation in key agricultural, economic, and biodiversity regions the changes taking place deep in the ocean and the key role of abyssal mixing (<https://eos.org/project-updates/deep-cabled-observatory-biology-physics-abyss>)

the consequences of excess carbon on sea life

The conference organizers emphasized cross-disciplinary integration and international cooperation throughout the conference. More than one third of the participants were early-career scientists (<https://eos.org/opinions/creating-community-for-early-career-geoscientists>) who presented their work through posters and oral and plenary presentations. In addition to helping plan the conference, the early-career scientists also organized their own 3-day symposium. This symposium actively promoted critical thinking about challenges facing climate science, and it offered opportunities for networking with an internationally diverse group.

The final day of the conference was devoted to climate information for sustainable development and the future of climate and ocean science. Presenters and panelists concluded that CLIVAR of the future must help build a society resilient to environmental changes by expanding understanding of uncertainty (<https://eos.org/opinions/future-directions-for-the-world-climate-research-programme>) in climate risk assessments and providing regional climate information and seamless predictions across

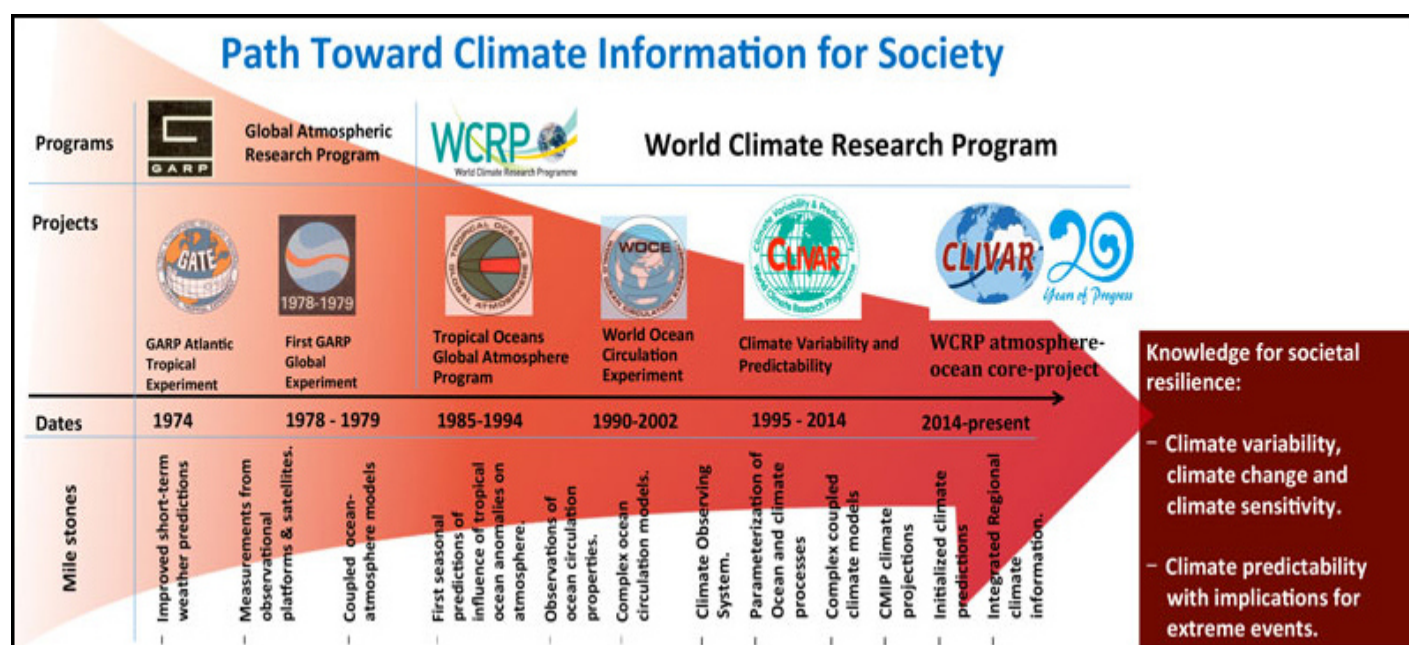
timescales.

Improvements in understanding climate processes must cover scales ranging from centimeters to global and from hours to decades and longer.

All participants argued for continued international CLIVAR coordination to improve observational records (including paleorecords (<https://eos.org/research-spotlights/ancient-ocean-floor-seashells-improve-model-of-past-glaciers>)), models and process understanding, and communication of scientific discoveries. Furthermore, the conference highlighted that further improvements in understanding climate processes are required. These improvements must cover scales ranging from centimeters to global and from hours to decades and longer.

The conference instilled in attendees amazing enthusiasm about CLIVAR's research and fortified the notion that CLIVAR is and will be a critical source of climate information for society. CLIVAR fosters international cooperation of the type that will continue to be indispensable for developing the human capacity and infrastructure that underpin major scientific breakthroughs. The conference certainly helped pass the enthusiasm to the next generation, whose excitement suggests a bright future for CLIVAR and WCRP.

The conference and symposium were hosted by the new Qingdao National Laboratory for Marine Science and Technology (<http://www.qnlm.ac/en/index>) and the First Institute of Oceanography (<http://www.fio.org.cn/en/>). Eight international organizations, as well as U.S. and Chinese entities, cosponsored the events.



For more than 40 years, scientists studying Earth's atmosphere and oceans have built our understanding of the factors that drive our climate.

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