



Understanding the Ocean – Sustaining Our Future

The Mission of the Future Ocean is to use the results of multidisciplinary scientific research on the past and present ocean to predict the future of the Earth's marine environment. This includes understanding changes to the past, ongoing and future ocean as well as the interaction between society and the ocean in regard to marine resources, services and risks. This Mission carries with it an obligation to develop and assess scientifically-based global and regional ocean governance options, taking their legal, economic and ethical aspects into account.

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The Future Ocean Kiel Marine Sciences

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Research for tomorrow

The Cluster of Excellence "The Future Ocean" pursues a research approach that is unique in Germany: marine researchers, geologists and economists join forces with mathematicians, computing, medical, legal, and social scientists to investigate ocean and climate change from a multidisciplinary perspective. A total of over 200 scientists from the Christian Albrechts University of Kiel (CAU), the GEOMAR | Helmholtz Centre for Ocean Research Kiel, the Institute for the World Economy (IfW) and the Muthesius Academy of Fine Arts are using innovative means to share their findings with the international scientific community, stakeholders, decision makers, civil society and the public at large because they believe that by understanding the ocean we can sustain our future.

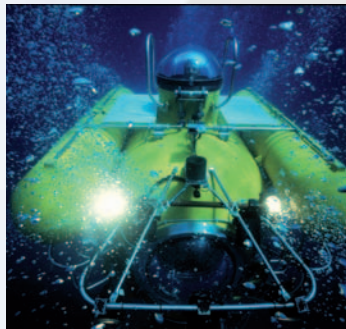
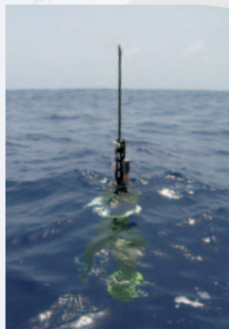
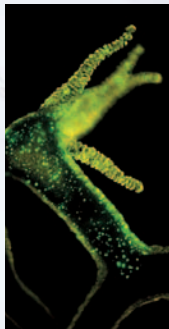
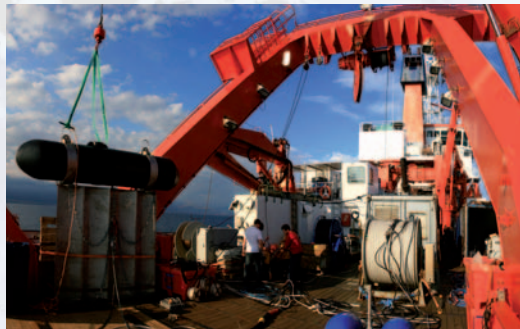
In order to transfer this interdisciplinary approach to the education of young scientists, the Integrated School of Ocean Sciences (ISOS) was created as a central element within the Cluster. A new focus of the Cluster is the support of young scientists within the network of Integrated Marine Postdocs (IMAP). Further, scientists of the "Future Ocean" have access to a wide ranging and excellent research infrastructure. These platforms include tools for ocean observation, numerical simulation, isotope and tracer analysis and molecular biosciences. The Cluster of Excellence "The Future Ocean" is funded by the German Research Foundation (DFG).

The Future Ocean Research 2012 – 2017

11 new research topics bring together experts from different backgrounds, strategically augmented by a group of PhD students and postdocs to perform cutting-edge integrated marine science.

Our Common Future Ocean

Disciplines: ethics, economics, art, political science, law
Objectives: concept of ocean sustainability; application to specific issues; artistic perception/interpretation of the cultural impact of ocean change
Central question: How can ocean sustainability be conceptualized in a way that can be widely agreed upon to guide responsible decision-making?
► **Contact:** our-common-future-ocean@futureocean.org



Ocean Governance

Disciplines: law, economics, political science, philosophy, geography
Objectives: new approaches to governing the ocean towards sustainability
Central Question: How can environmental liability law be implemented in the international setting and how must sovereign rights in exclusive economic zones (EEZs) be revised?
► **Contact:** ocean-governance@futureocean.org

Ocean Sinks

Disciplines: economics, law, mathematics, biogeochemistry, geosciences, marine biology
Objectives: assess the potential and limitations of marine carbon sequestration techniques
Central Question: What is the future role of marine carbon sequestration techniques in mitigating climate change?
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Evolving Ocean

Disciplines: biogeochemistry, marine ecology, genomics, biomedical research
Objectives: evaluate the rapid evolutionary change of populations, species and communities in the context of their biogeochemical environments
Central Question: How will rapid evolutionary change of populations, species and communities affect ecosystem and biogeochemical processes?
► **Contact:** evolving-ocean@futureocean.org

Predicted Ocean

Disciplines: ocean circulation, climate and carbon cycle modelling, numerical mathematics, optimization theory
Objectives: elucidate the prospective changes in regional ocean dynamics and biogeochemistry over the next 50 to 100 years
Central Question: How will climate change affect ocean properties relevant for ecosystems / societies (acidification, warming, sea level) at a regional scale in the next 50 to 100 years?
► **Contact:** predicted-ocean@futureocean.org

Ocean Resources

Disciplines: biology, geology, economics, law
Objectives: determine the potential of ocean resources (living and seafloor); better management and governance of these resources
Central Question: How can ocean resources be exploited in a sustainable or low impact manner by striking an appropriate balance between ocean use and ocean protection?
► **Contact:** ocean-resources@futureocean.org

Ocean Innovation

Disciplines: biology, medicine, and materials science
Objectives: identify chemical, structural, and physical principles for implementation in biomimetic materials (surface microstructures, medical products, dietary additives)
Central Question: How can ocean biological substances and materials be used to support technological innovations for a range of applications benefitting human society?
► **Contact:** ocean-innovation@futureocean.org

Ocean Interfaces

Disciplines: biology, chemistry, geochemistry, geology, physical oceanography, mathematics
Objectives: investigate the accumulation, transformation and transport of climate-relevant substances at ocean interfaces
Central Question: How do micro-scale processes at ocean interfaces affect fluxes of climate-relevant substances?
► **Contact:** ocean-interfaces@futureocean.org

Dangerous Ocean

Disciplines: geosciences, coastal engineering, economics, law
Objectives: investigate oceanic and coastal geohazards and their socio-economic consequences
Central Question: How can we cope with ocean hazards and prepare for coastal change?
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Ocean Controls

Disciplines: geophysics, biogeochemistry, paleoceanography, climate modelling
Objectives: investigate the role of the ocean in past climate and environmental change and identify key processes and potential tipping points that could control future global warming
Central Question: How does the ocean control climate and environment at transitions of warming?
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Ocean Observations

Disciplines: chemical and physical oceanography, informatics, geochemistry, geology, law, economics
Objectives: enhance and improve global and regional sustained ocean observations
Central Question: How can ocean observations be improved?
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