RESILIENCE AND RECOVERY IN AQUATIC SYSTEMS

ASLO AQUATIC SCIENCES MEETING 2023

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The UN Ocean Decade program 'OARS - Ocean Acidification Research for Sustainability' proposes two sessions at the upcoming ALSO Aquatic Sciences Meeting in Palma de Mallorca, 4-9 June 2023. Please consider submitting your abstract to Session SS066 on "Ocean Acidification 2.0 – From Chemistry to Society" or session SS117 "Societally Relevant Ocean Forecasts and Projections of Climate Change and Ocean Acidification" by **February 23, 2023**.

SS066 Ocean Acidification 2.0 – From Chemistry to Society

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Ocean acidification has gained increasing recognition across national and international policy frameworks, such as national ocean action plans, the 2030 Agenda and the UNFCCC. To fully address and minimize its effects, scientists, governments, and end-users will benefit from co-designing science, monitoring, research, and syntheses that support informed choices about national mitigation, adaptation, and preparedness strategies. An overwhelming body of evidence documents ocean acidification, with potential significant impacts on marine species and ecosystems. The increase of atmospheric CO 2 due to fossil fuel burning is the main driver of ocean acidification in the open ocean. In the coastal zone, the variability in p CO 2 and pH is also driven by biological, near-shore and land-based processes, such as river run-off, stratification, and tides. The complexity of bridging chemical and biological changes associated with ocean acidification is often under-estimated. Today, projections rely mainly on proxy variables like pH, carbonate saturation states, dissolved oxygen, temperature, and salinity, and simplistic thresholds to speculate about the status and trends of biodiversity and ecosystem services. Ecosystem response to ocean acidification can be only assessed when considering factors such as adaptation to local chemical variability, evolutionary processes, ecological interactions, and the modulating role

of other environmental drivers or stressors. Therefore, global, regional, and local impacts on biology and ecology, whether gradual or stepwise, are not fully resolved. Experimental work often over-simplifies these processes, for instance by focusing on single species and stressors, short-term responses, and static conditions that do not incorporate natural variability. Ocean observing and data are often focused on one or a handful of physical and biogeochemical parameters, but generally do not include biology and ecosystem. On the other hand, results from experimental work and from in situ observing efforts are not always well integrated into synthesis and modeling efforts. As a consequence, although data are being generated about ocean acidification changes and separately about some ecological changes, we are not able to evaluate whether a local resource or ecosystem service is changing due to ocean acidification. The UN Decade program “Ocean Acidification Research for Sustainability” (OARS) aims to provide a road map to fill these gaps. In line with the vision of OARS, this session aims at providing a platform for the ocean acidification community together with those who have a shared interest of protecting and conserving biodiversity in the face of global changes. It will promote actions to address the need for broader, more diverse, inclusive, and interdisciplinary collaboration and co-design of science and action. There is a need for purposeful efforts to facilitate inclusion of all interested researchers in monitoring and ocean acidification research networks. We will encourage submission of poster and presentation focusing on, for instance, co-design approach, new experimental designs encompassing the chemical and biological complexity (e.g. natural variability, ecology, evolution, multiple stressors), syntheses and meta-analyses, and unification of chemical and biological observations.

Key words: Ocean acidification, Observation, Biological impacts, Synthesis, Co-design

SS117 Societally Relevant Ocean Forecasts and Projections of Climate Change and Ocean Acidification

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The anthropogenically forced increase in atmospheric carbon dioxide is accompanied by a commensurate trend in the carbonate system of the global ocean, a phenomenon called ocean acidification, recognized by the IPCC to be “highly certain”. In coastal environments, local processes can modulate or exacerbate this trend, and these processes occur on spatial scales that are not well represented in global climate models (GCMs). As a result, prognostic information to support decisions facing coastal communities subject to OA impacts is largely lacking. Ocean predictions and projections on the local scale to support decisions will require us to employ new technologies such as digital twins, machine learning, high resolution local predictions, and regional earth system models. Access to these ocean forecasts and projections seamlessly into everyday life will result in a more climate savvy public changing people’s behaviours, increasing public awareness, expanding knowledge and perceptions, and contributing to the UN SDGs. The data will allow for mitigation of climate change impacts on coastal communities as well as the natural environment like coastal acidification driven by eutrophication by examining scenarios within these tools to develop more realistic

plans for management within a multi stressor framework. The production of these projections and associated data products will enable better marine resource management decisions. These tools will allow for implementation of OA adaptation and mitigation strategies, and integration of this information into other adaptation and mitigation strategies like marine carbon sequestration and removal, thus enhancing our international capabilities. The UN Decade program “Ocean Acidification Research for Sustainability” (OARS) alongside GOOS: CoastPredict aims to provide a roadmap to achieve this vision. In support of this shared vision, this session aims at highlighting best practices for forecasting and providing localized projections of climate needed, new approaches to address the computationally intense requirements of providing climate information at hyper-local scales, innovative technologies that integrate autonomous real time observations and visualization of the output. We invite all approaches that deliver forecasts, projections of state, variability, phenology as well as novel ways of delivering data/knowledge to stakeholders.

Key words: ocean acidification, regional carbon sequestration, modeling, forecasts, climate downscaling