

Dear Colleagues,

On May 6th and 7th, 88 U.S. scientists with a strong interest in scientific ocean drilling (SOD) convened a workshop in Denver, CO, entitled “NEXT: Scientific Ocean Drilling Beyond 2023,” to discuss United States priorities for SOD after the current IODP science plan ends. Joining the workshop were several representatives from the *JOIDES Resolution* Science Operator (JRSO), experts in drilling/coring, geoscientists from other organizations, and about 30 international partners. In total, approximately 140 people participated. Fifty-three institutions in 28 U.S. states were represented, and 39% of attendees were early- and mid-career scientists. NEXT followed similar planning workshops by three of our international partners/consortia (Japan, ECORD and ANZIC) to discuss future directions in SOD.

Goals of the NEXT workshop included: What new scientific challenges should be addressed in the new SOD program? What should the framework or structure of the new science plan look like? And what is needed in a new U.S. riserless drilling vessel (from coring to shipboard analysis) to respond to the new challenges identified in this next science plan?

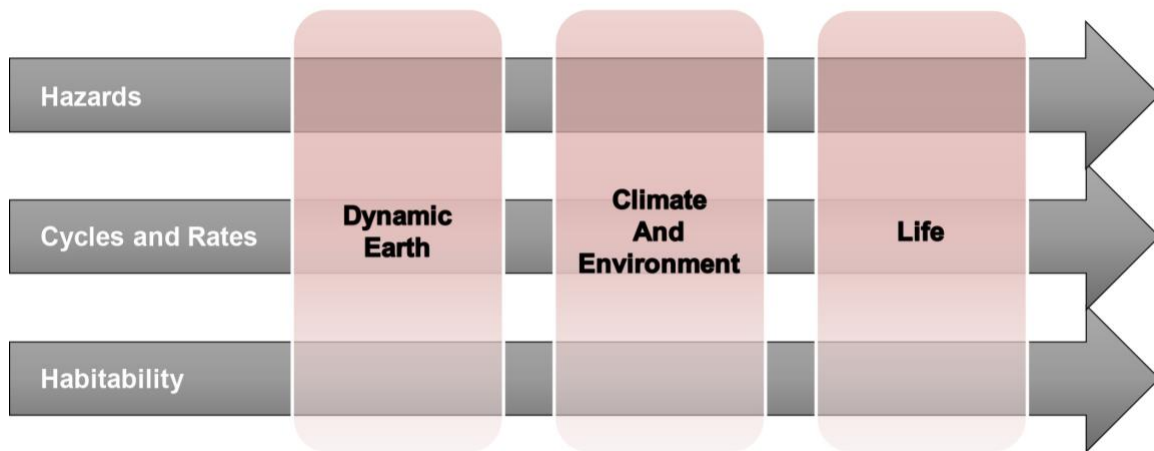
These goals were ambitious but achievable because our community provided valuable thoughts and ideas well in advance of the workshop. The pre-meeting information was sorted and distilled by the NEXT Steering Committee (https://usoceandiscovery.org/next_workshop/) and distributed to attendees prior to the workshop in an effort to prime participants’ thoughts and inform the meeting’s dialog.

During the workshop, plenary sessions introduced various topics and concepts to be considered in the next science plan and focused the discussions that followed in breakout sessions. Breakout groups took on different forms during the workshop, with participants sometimes organized by discipline (e.g., themes in the current science plan) and other times randomized to combine IODP community members with different expertise. On Day 2, a breakout group comprised of early career scientists (assistant professors/research scientists, post-docs, and graduate students) was formed in order to provide these future SOD leaders with an opportunity to work together, develop, and eventually share their priorities with the larger group in plenary session.

The first plenary presentation by Brad Clement, Director of JRSO, shared plans for a potential new riserless drilling vessel to succeed the *JOIDES Resolution* and generated considerable excitement among the participants. Such a vessel with modern technology would increase the number of expedition “science days,” largely through reduced transit times and faster pipe tripping, and improve core quality through reduction in weight-on-bit variations. A larger space for labs would afford the opportunity to expand the shipboard laboratory capabilities in the future. However, obtaining such a vessel for SOD is predicated on developing a science plan that is new, cutting-edge, and forward-thinking. The plan shared by Brad represents the first option for replacing the aging JR; other options may follow as this process gains momentum.

The focus of NEXT then shifted to developing the elements and structure of this new science plan. A common sentiment was that the current plan designed around themes and challenges often leads to “siloes” science. A new science plan, therefore, should focus on and prioritize interconnected research questions. Interestingly, multiple breakout groups independently moved in this direction. This

ultimately led to a consensus that the new science plan should focus on understanding Earth's "Hazards," "Cycles and Rates," and "Habitability," each of which cuts across the general research topics of "Earth Dynamics," "Climate and Environment," and "Life":



As Day 2 progressed, the NEXT breakout groups pivoted to addressing what science questions have emerged or remain to be addressed by future SOD. This too was an ambitious undertaking, and yielded a total of more than 140 questions across the five breakout groups.

The final session of the workshop was designed to explore connections with other geoscience organizations that share common scientific interests, and to consider integrating the large amount of data generated by past, present and future SOD. NEXT participants strongly endorsed reaching out to our sister organizations and establishing common science objectives as SOD moves into the future.

After the workshop was over, the NEXT Steering Committee members met on the following day to carefully consider and distill the original 140 science questions, finding commonalities that could be combined and consolidated to form 22 overarching questions. In turn, these 22 questions can be encompassed by 8 strategic objectives:

- Define the conditions for life and planetary habitability
- Constrain the feedbacks among Earth, oceans, life, and climate
- Examine the cryosphere and sea level under different climate states
- Use the past to inform our understanding of a future Earth
- Identify the causes, scales, and consequences of climatic and environmental perturbations
- Investigate the life cycle of a lithospheric plate and its impact on the earth system
- Characterize the transfer of water, energy and matter in the earth system
- Assess the conditions and processes that control the occurrence of natural hazards that affect society

These objectives are based on current knowledge and priorities but are crafted to be open-ended so as to accommodate and encourage new discoveries and innovations that will certainly occur in the years to come.

By early July, a draft version of this report will be posted online and we welcome comments by the US community before a final workshop report is presented. Also, representatives of the U.S. and its international SOD partners will meet in New York on 23-24 July 2019 to consolidate the various strawman science plan structures that emerged from each of the four international workshops. The U.S. representatives will present the NEXT structure outlined above, focusing on interconnected pathways that cut across various research interests. Our NEXT community also advocates a science plan built around strategic objectives and will propose the eight objectives listed above as starting points in the conversation. The outcomes of the summer meeting will be posted on <https://iodp.org> before being presented at the IODP Forum in September 2019.

Meanwhile, all members of the SOD community must continue to write drilling proposals. With so much exciting science still waiting to be performed, it is critical to signal to funding agencies via proposal pressure that a stockpile of compelling, cutting-edge, and “drillship-ready” proposals are in the pipeline.

Sincerely yours,
Anthony Koppers and Jim Wright
NEXT Steering Committee Co-Chairs