



# DEEP OCEAN OBSERVING STRATEGY

## **DEEP OCEAN OBSERVING STRATEGY (DOOS)**

**Third Steering Committee (SC-3) Report**

**November 2019**

[www.deepoceanobserving.org](http://www.deepoceanobserving.org)

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## DOOS GENERAL UPDATES AND DISCUSSIONS

The DOOS Steering Committee's third meeting (SC-3) was conducted at the Prince Waikiki in Honolulu, Hawaii, on 15 September 2019, preceding the Ocean Obs '19 meeting. The complete attendee list can be found in Appendix A. An overarching goal of this meeting of the SC was to discuss and advocate for the promotion of DOOS-related goals and objectives at the upcoming Ocean Obs '19 meeting and review the plans for an upcoming NSF AccelNet proposal submission. Appendix B provides links to an overview of DOOS related conference activities, a Summary of the Breakout Session and subsequent recommendations.

### [Introduction and Obs '19 Activities / SC Co-chair, Lisa Levin](#)

The presentation focused on DOOS related presentations and posters at the Obs '19 meeting, the release of the science and Implementation Guide (SIG), the publication of the Community White Paper (CWP), DOOS presentation given during the intersessional period. Looking forward she provided an overview of the goals of the NSF AccelNet program and how it fits with DOOS objectives. See Appendix C for the meeting agenda and Ocean Obs '19 DOOS related sessions and posters.

### [Project Management Overview / Project Manager, Andrea McCurdy](#)

The presentation provided an overview of the role and activity related to the 45 Tracked Actions recorded during the SC-1 session. It was shared that 25 had been closed or completed and the remaining 20 were up for revision post the SC-3 sessions. The presentation concluded with a call for engagement during the meeting for members and participants to recommend Actions for the project going forward. The DOOS SC-3 Tracked Actions can be found in Appendix D.

### [What it means to 'DOOSify' / Group Discussion](#)

During the SC-1 proceedings the SC considered what it would mean to create an environment that reflected the needs or requirements of the deep ocean observing community. Since this time several reports, Terms of Reference, and recommendations have been generated by DOOS. Among them are the Actions listed in the SIG, the Terms of Reference, and the DOOS principles. Participants used these outcomes to consider what may be the core characteristics for an environment in alignment with DOOS.

The ability to demonstrate closer alignment with DOOS by groups involved in deep-ocean observation was then discussed. It was agreed that aligning with DOOS would be of benefit to several groups conducting a range of observing activities. Among them are Deep Argo, the International Seabed Authority (ISA), and negotiations being conducted related to the Clarion-Clipperton Zone (CCZ). From this discussion evolved a consideration of what closer engagement with ISA could produce.

In the context of the CCZ, greater alignment of the International Seabed Authority (ISA) with DOOS would show that the ISA has consulted with DOOS, thus providing greater scientific credibility. This closer alignment between the two groups would also be of benefit to DOOS as ISA has broad reach and deep roots in the community. Additional benefits would include a greater understanding and knowledge of sea-going resources, enhanced dialog with stakeholders, and implementation strategies related to data curation.

One of ISA's projects under development is large data base program called Deep Data. DOOS could play a major role in helping to define roles in this endeavor. There is a benefit to beginning now and using the CCZ as a starting place given there are similar ISA activities in other mineral rich environments in the deep sea.

It was then discussed whether or not there are benefits to data certification and/or data quality standards (e.g. certification in IOOS, 'labels' in Europe). It was generally agreed that as part of a DOOSify description it may be helpful to plan and implement projects in alignment with best practices/quality standards/set of processes/consensus on why we need to observe specific EOVs.

**ACTION 3.1:** Explore whether or not to lead the community in developing best practices/data quality standards/set of processes/consensus on measurement requirements.

**ACTION 3.2:** Determine whether 'Phenomenon EOV' quantification survey should be conducted focused on the deep ocean; with a primary outcome of gap identification, rather than the development of a list of priorities.

## TASK TEAM REPORTS

The task team chairs were asked to provide an update on activities during the period, to discuss needs and expectations for the Obs '19 conference and discuss upcoming activities for the task team.

**ACTION 3.3:** Continue dialog with GOOS Panels to ensure that DOOS EOVs and deep-sea related issues are fully taken into science, societal, and policy consideration. As appropriate, continue to make modifications to the GOOS EOV spec sheets.

### Biology/Ecosystem Task Team / SC Co-chair and TT Chair, Henry Ruhl

Generally, the group has been working to add DOOS requirements to the GOOS EOVs. A current major thrust is related to hard and soft corals and the generation of a common set of definitions. An EOV concept has been drafted and sent to the GOOS Panel, the DOOS TT is waiting on further guidance – but no one within the GOOS Panel appears to be working on this topic. There is a need for a DOOS champion to step up and help drive the dialog forward.

**ACTION 3.4:** Explore how DOSI can work with GOOS to lead in the development of deep-ocean EOV specifications on benthic invertebrates on the seafloor.

Additional activities are focused on a range of topics, among them are ocean sound which is taking on traction, microparticles, and looking at data meta standards such as Darwin Core (acceptance taking shape, but little is being learned about operational use). Other tools being worked on include machine learning, and eDNA. It is hoped that greater consensus on paths forward related to these items will be an outcome of the Obs '19.

**ACTION 3.5:** Evaluate Obs '19 outcomes and agree on a prioritized list of activities in support of community accepted burgeoning tools, and topics.

Beyond this it is generally agreed that DOOS needs to encourage GOOS to better engage the GOOS Regional Alliances (GRAs) and encourage more robust problem solving from this sector. DOOS may also want to take a leadership role in the development of a human impact EOVS or set of EOVS.

**ACTION 3.6:** Work with the GOOS SC and the Bio/ECO Panel to raise the profile of GRA activities and subsequent solutions.

**ACTION 3.7:** Determine whether, or not the Bio/Eco Panel should take a leadership role in generating human impact EOVS in the deep versus following the GOOS Panel lead.

A desired primary outcome for Obs '19 is to generate tangible examples of community practices and outcomes that address reasons to get involved and support broader community engagement in ocean observing. It was suggested that greater involvement of requirements setting needs could come from beyond the science community, such as regulators, technology manufacturers, data users. There is a need to better understand how to get to wide-scale adoption, this is especially important for the bio/eco community as scaling up is particularly difficult for this group.

**ACTION 3.8:** Develop a roadmap or set of building block activities that lead to wide-scale engagement beyond the science community. (Maybe start with a case study focused on a data stream that everyone wants.)

### Physics Task Team, TT Chair Bruce Howe

Bruce reported that during the period through the OOPC, the task team was able to establish Ocean Bottom Pressure (OBP) as an emerging EOVS. At this time additional definition will be required with a target delivery date of March 2020 where the specifications will be reviewed at the annual OOPC meeting. To facilitate this process, it was suggested that greater guidance on the GOOS EOVS development and maturation process is called for.

**ACTION 3.9:** Seek guidance from the GOOS Program office on EOVS development and maturation processes.

Other activities during the period included the vetting of turbulence and bottom fluxes, providing input into the Deep Argo pilot (based on Obs '19 outcomes), a review of the ocean sound EOVS, and a review of the remaining minor changes to existing GOOS EOVS spec to reflect deep-ocean requirements. As a side note, it was reported that the Smart cables pilot study may have a solution reusing retired telecommunication cables and placing scientific nodes on them.

### Biogeochemistry Task Team, TT Chair Felix Janssen

Felix reported that rather than develop a separate set of EOVS, the task team focuses on contributing deep-sea related specifications to the GOOS EOVS spec sheets as part of a community revision of BGC EOVS. New spec sheets will only be developed for variables missing in the current set of GOOS EOVS but considered essential for the deep ocean. One or two 'guiding experts' have been found to lead the revision process for most of the EOVS.

Currently the focus of the BGC TT work is on the creation of a BGC-focused online questionnaire to guide input by deep ocean observation experts. To assist users, not familiar with every component of the survey (GOOS, FOO, BGC), Felix has created a tutorial to assist with completion of the online forms. A desired outcome of the survey is to receive a range of feedback based on the FOO principles regarding BGC phenomena and scales with

emphasis on conditions and processes in the deep ocean. Currently, revision of the questionnaire structure and content by guiding experts is being finalized. Discussion focused on an optimal way to approach deep ocean observing experts to contribute to the revision. It was suggested to use the GOOS community connection and the DOOS website to reach out to the community.

**ACTION 3.10:** Complete the review, development, promotion, and conducting of the online survey. Determine the most effective use of resources to socialize and publicize the outcomes.

Beyond work on the GOOS EOVS spec sheets and the survey, the task team contributed to the DOOS SIG, the Obs '19 CWP, and generated a poster for the conference in Honolulu.

### Data and Cyberinfrastructure Task Team / TT Chair, Karen Stocks

Karen reported that during the previous period the task team has agreed that deep ocean observing requirements may be different, but they are not necessarily unique. As such, an optimum strategy for DOOS is to leverage existing infrastructure to meet deep-sea data needs.

Karen reported that the task team will be working on a living statement or document that highlights to governance bodies the requirements for metadata ontologies in the context of the deep ocean needs. This will include ties back to data collection best practices and how some may be unique to the deep ocean observing community. This could be a major contribution of DOOS to the observing community. It was noted by the ISA representative that this would be most helpful as a contribution to their recently launched database project.

It has been well documented that DOOS has adopted the FAIR principles. Beyond this declaration there are several actions that are required to assist the deep-sea observing community with achieving its desired goals. It was proposed that supporting a common metadata and ontology, and endorsing a common registry, such as Re3data, would assist the community in taking on traction related to enhanced data accessibility.

**ACTION 3.11:** Promote a common meta-data protocol and repository designed to allow for greater accessibility of deep ocean data.

Karen reported that most in the data realm are well versed in best practices and operate accordingly, an important next step for DOOS will be to work with the scientific community to articulate a short-list of specific deep-sea considerations that can be readily expressed and socialized throughout the observing community. The task team was encouraged to work with the larger SC and the TTs to generate a list of deep-sea considerations or characteristics (1-10 suggested) that are important to the scientific community when collecting deep-sea data, (e.g. how to best capture depth, species and habitat considerations/characteristics). It was discussed that a determination may need to be made as to whether these needs are unique to some EOVS and not others.

**ACTION 3.12:** Work with the SC and TTs to generate a short-list (approximately ten) of subtle yet important deep-ocean observing nuances or considerations that can be expressed in a relatively simple manifesto. This list can be further socialized to the deep-sea and best practices community, and subsequently publicized on the website.

The desire to conduct a deep ocean data audit of aggregators, protocols, standards among other variables was strongly supported at the 2016 workshop and the SC-1. The task team has given this considerable consideration and recognize that it would be a valuable initiative, however, note that this could not be accomplished without additional funding and/or resources. It is agreed by the task team that to demonstrate, through a case study or

use case, how data discovery and availability exercises are conducted would be of benefit. It was suggested that this should be pursued as a process study (rather than a more traditional gap analysis) under the AccelNet proposal activities or part of one of the Demonstration Projects.

**ACTION 3.13:** Pursue a data discovery and accessibility process study as funding permits.

**ACTION 3.14:** Work with the International Seabed Authority (ISA) to determine effective and efficient data archival needs. Determine what format this should take, be it requirements setting, use cases, or data traceability matrix

## ACCELNET PLANS AND DISCUSSION

During the next period DOOS is planning to submit a proposal to the NSF funded AccelNet solicitation. The overarching goal of the NSF program is to accelerate research through international network-to-network collaboration, and to accelerate the process of scientific discovery and prepare the next generation of US researchers for multiteam international collaborations. Proposed project objectives are required to support one of the four NSF goals. To date the project is being developed to support the goal of harnessing data with a special emphasis on the needs of the modelling community.

DOOS SC Co-chair Patrick Heimbach is leading the AccelNet effort, he provided an overview of activities and plans leading up to the SC-3 meeting. These plans were reviewed and agreed to by the SC. It was agreed that an emphasis on harnessing data and engaging modelling groups across disciplines would be of particular benefit to both the US and international communities. Additional advice was provided on known needs, working group formation, and network-to-network organization. The SC provided guidance on optimal partners and international collaborations that would be desired. The next milestone will be the submittal of a Letter of Intent to propose, due on Oct. 30, 2019.

## DEMONSTRATION PROJECTS

DOOS has determined that a critical link to the formation of a sound strategy for global ocean observing is through the execution of demonstration projects. Through these projects DOOS seeks and support for projects that demonstrate the feasibility of sustained deep ocean observing, technologies to be employed in deep ocean observing, and/or the impact and utilization of deep ocean observations for industry, policy, and management. To date there has been a focus on activities in three areas, the Clarion-Clipperton Fracture Zone, the Azores Archipelago, and the Northeast Pacific. Participants were updated on the activities and infrastructure in these three areas. A discussion followed on how utilization of these resources can be used to address DOOS science questions and be enjoined to assist in meeting the needs of the AccelNet project. (For more background and information on the role of the Demonstration Projects please see DOOS SIG pages 48-53, the report is at the following URL: <http://deepoceanobserving.org/wp-content/uploads/2019/05/DOOS-2019-Science-and-Implementation-Guide-2019-05-31-V3.pdf> )

### Azores

An update on the changes being made at the Azores AIRS observatory were given by Maria Carriero- Silva. The observatory is undergoing expansion with new partners from Holland, the UK, Brazil, and South Africa. The area hosts a highly diverse bathymetric area, including the deep-sea, and a recently developed model mining site. The area has not had the benefit of a great deal of physical oceanography research and could benefit greatly from DOOS research in the area. AIRS is also part of EMSO and can contribute outcomes to this environment.

**ACTION 3.15:** Assess feasibility of finding resources for a requirements workshop.

### Clarion-Clipperton Fracture Zone (CCZ)

Two briefs were provided on potential deep ocean observing activity in the CCZ from Luciana Genio at the International Seabed Authority, and the TPOS 2020 SC member Meghan Cronin.

The [ISA brief](#) focused on the data integration project, Regional Environmental Management Plan (REMP) recently launched in the CCZ, to be used as a model in other areas. A primary activity is to identify data gaps, as it has been recognized that there is quality data being generated in the area, some of it by reputable science institutions but not all. To address this potential data quality gap, requirements for improvements have been developed, yet they are not necessarily followed. The group discussed that a good place for DOOS to engage will be to determine which EOVs are being measured in the CCZ, and what is the data quality and accessibility.

**ACTION 3.16:** Work with the ISA to determine measurements made in the CCZ and engage the DOOS EOVT to conduct an analysis of the data quality and accessibility.

TPOS 2020 has been conducting a series of conversations related to this area, as it has such a large footprint and human activity in this area will likely create an impact. As such there is a need to establish a monitoring scheme to baseline the conditions. While some exploration is being conducted in the licensed areas, primary interest is in placing assets in areas where there will not be mining. It was suggested that now is a good time for TPOS to consider its proposed activities in the area along with the needs of the deep ocean. To date the project has worked by setting requirements from a series of process studies and could envision a 'supersite' that incorporates the current proposed measurements along with those required to better understand the deep-sea

environment. It was discussed that there may be an opportunity to work with NOAA (in the Lockheed area) to create such an infrastructure. Other possible locations in APEIs or unclaimed areas were discussed based on the incorporation of known partner and stakeholder opportunities and resources.

**ACTION 3.17:** Work with TPOS 2020 (upcoming SC meeting) to determine common requirements for observations that would serve the goals and objectives of both projects. Follow-up with potential sponsors and known stakeholders to assess next steps.

## Northeast Pacific

An overview of Ocean Network Canada's (ONC's) NEPTUNE was given by Kim Juniper. The brief emphasized the desirability and importance of deep-sea observations over time. The observatory hosts sensors at 2,600m depths that are serviced annually, they also work with JAMSTEC to conduct vertical profiling measurements in the area. These assets provide a wide range of opportunities to measure habitats and DOOS EOVs. It was discussed that there is a great deal of observing confluence in the area and what could be the unique contribution provided by DOOS. A range of projects ideas were discussed including an assessment of what observations are needed at what scales that can easily be accommodated by the existing infrastructure provided by the ONC and the OOI. Topics included an assessment of temperature data, geographic data comparisons, complementary observation to enhance what is taken up by the west coast data model, use of observations of sablefish to better understand relevant physical and biogeochemical data needs, study of OMZ assets between OOI's Hydrate Ridge and the ONC's Berkley Canyon.

**ACTION 3.18:** Determine whether a concerted OOI and ONC collaboration is feasible, identify available resources and potential funding possibilities.

## Roundtable Discussion

Based on the content provided by the presentations, a roundtable discussion followed exploring ideas and resources. The possibilities included:

- Conducting a demonstration project in both the Azores and the CCZ but with unique funding sources
- There may be an opportunity to explore possibilities with ONR
- Explore through EMSO if there are similar TPOS type resources or plans
- Look to find a common scientific question that can be explored in 2 or 3 of the areas – and assess what is needed to get to a common understanding of the environment
- It may be worth asking what are the core science questions of interest to ISA such as carbon cycling, abyssal plain habitat – assessing the human impact (especially mining) and climate, or comparison of abyssal plain and ridges to get a notion of scale and intensity of variability (especially to ecosystems)
- Incorporation of input from OceanSITES and GO-SHIP are highly desirable in any case
- Potential to look at coupling between surface ocean and deep processes
- Assess what are longer-term issues and see how AccelNet project can facilitate this in the shorter term
- An AccelNet focus might also be to assess what JCOMM does for currently well observed depths and create a similar structure to support the needs of the deep sea
- Other brainstorm ideas included:
  - It was noted the ITCZ is poorly modelled
  - APEI network is of interest to foundations
  - Is there a scale issue that can be addressed?
  - Abyssal plain could be a good focus as they are everywhere

- Climate change is everywhere – compare two different ecosystems – (similar to the study recently funded in the Gulf of Mexico)

**ACTION 3.19:** Develop relevant science questions as to why do observing in these areas and if appropriate articulate a compelling reason to combine these efforts and determine stakeholder interest and commitments.

## DOOS GOING FORWARD

The SC-3 agenda listed a suite of potential topics that the SC may want to discuss while in session. Given time constraints the following three items were selected by the SC and given consideration by the group.

### Should DOOS seek ISA Observer Status?

It was discussed that there are several types of ISA observers and that a more appropriate fit for DOOS may be for GOOS to seek observer status which would allow DOOS to send a representative. It may be that some of the GOOS sponsors such as the International Science Council could also facilitate this type of representation. It was mentioned that the proceedings would benefit from the presence of physical oceanographers, Bruce Howe expressed interest.

**ACTION 3.20:** Explore GOOS and its sponsor's status and the possibility of using this as an avenue for representation at ISA sessions.

**ACTION 3.21:** Hold an information briefing about deep-ocean observing and ecosystems for ISA delegates that reside and work at the UN in New York. Emphasize needs relative to ISA decision-making and environmental mandates.

### UN Decade for Ocean Science Participation

There was an expressed keen interest in participating in the UN Decade activities. DOOS will work to have a presence at as many regional planning sessions as is possible. To facilitate this the Project Office will create a one-pager of deep ocean talking points. The Project Office was also asked to poll the SC members asking them what a desired deep ocean observing outcome of the decade would be. (As an outcome of the Obs '19 Conference, DOOS submitted a contribution to the Decade Planning committee, see Appendix B for a link to this document.)

**ACTION 3.22:** Create calendar of key sessions related to primary engagement needs and activities.

**ACTION 3.23:** Creation of UN Decade support documents including a one-pager of DOOS related talking points and desired Decade outcomes.

**ACTION 3.24:** Continue to engage GOOS and make the global community aware of DOOS activities and their legacy to GOOS, especially as they relate to the UN Decade of Ocean Science.

## Potential Changes to SC Membership

The current Co-chair Henry Ruhl is stepping down as Co-chair but will remain the BioEco TT Chair. Henry will be replaced by Felix Janssen who also serves as the BGC TT Chair. Both members are thanked for their contributions and dedication.

It was discussed that there is a need for additional representation on the SC in order to fully represent the goals and direction of DOOS beyond 2019; more specifically what will be needed in order to get from an Implementation Guide to an Implementation Plan. DOOS will seek to add a representative member from the ONC, NOAA's Office of Ocean Exploration, GO-SHIP, Argo- preferably Deep Argo.

**ACTION 3.25:** Reach out to remaining SC members for suggestions on additional changes to membership and representation.

**ACTION 3.26:** Strengthen relationship with NOAA's Office of Ocean Exploration by adding a representative to the SC. Additional actions may include sessions to explore recommendation or observing requirements for upcoming Okeanos field session, and a potential shared Demonstration Project.

**ACTION 3.27:** Through the AccelNet process engage large networks and implementation teams. These linkages should include a range of activities including focused workshops and DOOS representation at large network meetings and sessions.

**ACTION 3.28:** Modify Engagement Plan to support AccelNet, Demonstration Projects, UN Decade SDG/SDG 14, and G7 Future of the Seas and Ocean needs

**ACTION 3.29:** Based on AccelNet discussion and drafting consider the desire or need to modify the structure, SC, TT activities and/or Terms of Reference.

**This report and session presentations can be found online at:**  
<http://deepoceanobserving.org/activities/sc-3/>

## APPENDIX A: Attendees

### **Steering Committee Attendees:**

\*Lisa Levin

\*Henry Ruhl

\*Patrick Heimbach

Sun Song

Felix Janssen (*will replace Henry Ruhl as SC Co-Chair*)

Craig Smith

Bob Weller

Simone Bauman-Pickering

Karen Stocks

Bruce Howe

### **Guest Attendees and Presenters:**

Luciana Genio

Maria Carriero-Silva

Meghan Cronin

Kim Juniper

### **Project Office:**

Andrea McCurdy

Leslie Smith

*\*Denotes SC Co-chair*

## APPENDIX B: SC-3 & Ocean Obs '19 Online Related Materials

### **Ocean Obs '19 Community White Paper: Deep Observing Needs of the Global Ocean**

Prior to the convening of the Ocean Obs '19 Conference DOOS was highly engaged in the development of a Community White Paper.

<https://deepoceanobserving.org/reports/cwp-global-observing-needs-of-the-deep-ocean/>

### **DOOS related Ocean Obs '19 Breakout Session and Recommendations**

During the Ocean Obs '19 Conference a session was held to reflect the content of the Community White Paper. A summary of the convened panel, discussions, and recommendations is provided below:

<https://deepoceanobserving.org/activities/ocean-obs-19-session/>

### **DOOS UN Decade of Ocean Science Action Plan Declaration**

In response to encouragement given during the Ocean Obs '19 Conference, DOOS submitted its contribution to the Decade for Ocean Science for Sustainable Development Science Action Plan.

<https://deepoceanobserving.org/activities/un-decade-of-ocean-science/>

## APPENDIX C: SC-3 Agenda



**DOOS SC-3  
PROVISIONAL AGENDA**  
Prince Waikiki Hotel  
Waihi Room  
15 September 2019

Start	Topic	Lead	Outcomes
9am	Intro & Update <ul style="list-style-type: none"> <li>• Related Obs19 Activities</li> </ul>	Levin	
9:15	Review of Tracked Actions <ul style="list-style-type: none"> <li>• From SC-1</li> </ul>	McCurdy	Update will be in read-ahead docs
9:30	SIG Actions and Thoughts/DOOSify	Levin	
9:50	TT Reports and Discussion <ul style="list-style-type: none"> <li>• Phy</li> <li>• BGC</li> </ul>	Howe Janssen	<ul style="list-style-type: none"> <li>• 20 min each</li> <li>• TT Update</li> <li>• Obs19 Objectives</li> </ul>
10:30	BREAK		
10:50	TT Reports and Discussion (cont.) <ul style="list-style-type: none"> <li>• Bio/Eco</li> <li>• Data and Cyber</li> </ul>	Ruhl Stocks	
11:30	AccelNet Introduction and Intent	Co-chairs	Brief on status and partners thus far
12:00	AccelNet Discussion	All	Outcomes: Scope/ Partners/ Next Steps
12:45	LUNCH (In hotel dining room)		
1:45	Demos– time allotted each, TBD <ul style="list-style-type: none"> <li>• CCZ</li> <li>• Azores</li> <li>• NE Pacific</li> </ul>	Co-chairs	Overview and status of each endeavor
2:45	Demonstration Discussion	All	Outcome: Identify leads and next steps
3:00	BREAK		
	DOOS Going Forward <ul style="list-style-type: none"> <li>• Sub-topics below</li> <li>• Approx. 20 min. for each topic</li> </ul>	Levin/All	Format: Short intro with roundtable discussion
3:20	Key SC-3 Actions		Compiled during break
~3:40	Partners and Engagement <ul style="list-style-type: none"> <li>• Enhanced GOOS integration</li> <li>• ISA Observer Status</li> </ul>		Others TBD based on day's discussion
~4:00	UN Decade OcSci Plans <ul style="list-style-type: none"> <li>• DOOS representation in planning</li> </ul>		Based on schedule of planning session
~4:20	SC Membership and Leadership		Changes
~4:40	Emerging Ideas/Needs		Open
5:00	END SESSIONS: Self-hosted reception on hotel rooftop		

## Deep-ocean Related Sessions and Talks

Sept. 15	DOOS SC Meeting: Waihi Room / Prince Waikiki Hotel, 9am-5pm
Sept. 16	Deep Ocean Flash Talk (Plenary)
Sept. 17	The role of the ocean in climate change and variability
Sept. 18	Integrated Ocean Observations II: Diverse Stakeholder Needs
Sept. 19	Observing Needs in the Deep Ocean: 11:30-12:30, Rm 316B – <i>DOOS with NOAA</i>

## Deep-ocean Related Posters

### Steering Committee Members:

- Levin et al.: Deep-Ocean Observing Strategy Science Implementation Guide
- Ruhl et al.:
  - Evolving approaches for deep-ocean biology and ecosystems observations in the Global Ocean Observing System
  - Evolving approaches for streamlining access to biology and ecosystem observations to support the objectives of the UN Decade of Ocean Science for Sustainable Development
- Howe: Physics Essential Ocean Variables in the Deep Ocean Observing Strategy
- Janssen (reference author: McCurdy): Essential Ocean Variables for Biogeochemical Observations
- Baumann-Pickering: Seasonal response of large mobile predators to oceanographic and prey conditions at an offshore pelagic environment

### Non-Steering Committee Members:

- Perlman et al.: The Deep Ocean in Human Society (DOSI)

## APPENDIX D: SC-3 Tracked Actions

**ACTION 3.1:** Explore whether or not to lead the community in developing best practices/data quality standards/set of processes/consensus on measurement requirements.

**ACTION 3.2:** Determine whether 'Phenomenon EOY' quantification survey should be conducted focused on the deep ocean; with a primary outcome of gap identification, rather than the development of a list of priorities.

**ACTION 3.3:** Continue dialog with GOOS Panels to ensure that DOOS EOYs and deep-sea related issues are fully taken into science, societal, and policy consideration. As appropriate, continue to make modifications to the GOOS EOY spec sheets.

**ACTION 3.4:** Explore how DOSI can work with GOOS to lead in the development of deep-ocean EOY specifications on benthic invertebrates on the seafloor.

**ACTION 3.5:** Evaluate Obs '19 outcomes and agree on a prioritized list of activities in support of community accepted burgeoning tools, and topics.

**ACTION 3.6:** Work with the GOOS SC and the Bio/ECO Panel to raise the profile of GRA activities and subsequent solutions.

**ACTION 3.7:** Determine whether, or not the Bio/Eco Panel should take a leadership role in generating human impact EOYs in the deep versus following the GOOS Panel lead.

**ACTION 3.8:** Develop a roadmap or set of building block activities that lead to wide-scale engagement beyond the science community. (Maybe start with a case study focused on a data stream that everyone wants.)

**ACTION 3.9:** Seek guidance from the GOOS Program office on EOY development and maturation processes.

**ACTION 3.10:** Complete the review, development, promotion, and conducting of the online survey. Determine the most effective use of resources to socialize and publicize the outcomes.

**ACTION 3.11:** Promote a common meta-data protocol and repository designed to allow for greater accessibility of deep ocean data.

**ACTION 3.12:** Work with the SC and TTs to generate a short-list (approximately ten) of subtle yet important deep-ocean observing nuances or considerations that can be expressed in a relatively simple manifesto. This list can be further socialized to the deep-sea and best practices community, and subsequently publicized on the website.

**ACTION 3.13:** Pursue a data discovery and accessibility process study as funding permits.

**ACTION 3.14:** Work with the International Seabed Authority (ISA) to determine effective and efficient data archival needs. Determine what format this should take, be it requirements setting, use cases, or data traceability matrix

**ACTION 3.15:** Assess feasibility of finding resources for a requirements workshop.

**ACTION 3.16:** Work with the ISA to determine measurements made in the CCZ and engage the DOOS EOVT to conduct an analysis of the data quality and accessibility.

**ACTION 3.17:** Work with TPOS 2020 (upcoming SC meeting) to determine common requirements for observations that would serve the goals and objectives of both projects. Follow-up with potential sponsors and known stakeholders to assess next steps.

**ACTION 3.18:** Determine whether a concerted OOI and ONC collaboration is feasible, identify available resources and potential funding possibilities.

**ACTION 3.19:** Develop relevant science questions as to why do observing in these areas and if appropriate articulate a compelling reason to combine these efforts and determine stakeholder interest and commitments.

**ACTION 3.20:** Explore GOOS and its sponsor's status and the possibility of using this as an avenue for representation at ISA sessions.

**ACTION 3.21:** Hold an information briefing about deep-ocean observing and ecosystems for ISA delegates that reside and work at the UN in New York. Emphasize needs relative to ISA decision-making and environmental mandates.

**ACTION 3.22:** Create calendar of key sessions related to primary engagement needs and activities.

**ACTION 3.23:** Creation of UN Decade support documents including a one-pager of DOOS related talking points and desired Decade outcomes.

**ACTION 3.24:** Continue to engage GOOS and make the global community aware of DOOS activities and their legacy to GOOS, especially as they relate to the UN Decade of Ocean Science.

**ACTION 3.25:** Reach out to remaining SC members for suggestions on additional changes to membership and representation.

**ACTION 3.26:** Strengthen relationship with NOAA's Office of Ocean Exploration by adding a representative to the SC. Additional actions may include sessions to explore recommendation or observing requirements for upcoming Okeanos field session, and a potential shared Demonstration Project.

**ACTION 3.27:** Through the AccelNet process engage large networks and implementation teams. These linkages should include a range of activities including focused workshops and DOOS representation at large network meetings and sessions.

**ACTION 3.28:** Modify Engagement Plan to support AccelNet, Demonstration Projects, UN Decade SDG/SDG 14, and G7 Future of the Seas and Ocean needs

**ACTION 3.29:** Based on AccelNet discussion and drafting consider the desire or need to modify the structure, SC, TT activities and/or Terms of Reference.