Over 70 scientists, resource managers, students, and other [international] stakeholders attended the Town Hall event at the 2026 Ocean Sciences Meeting (OSM) in Glasgow, Scotland.

What Questions Can We Answer Through Cross-Networking? An Ocean Observatories Initiative Facility Board (OOIFB) Town Hall to Strengthen Connections and Foster Innovation Across the Observing Community

An engaging panel took place that was moderated by Dax Soule (Queens College, OOIFB Chair), and included the following panelists:

- Jim Edson, Woods Hole Oceanographic Institution (WHOI), Ocean Observatories Initiative (OOI)
- Meghan Paulson, Ocean Networks Canada (ONC)
- Lucie Cocqempot, French Research Institute for Exploitation of the Sea (IFREMER)
- Sebastiaan Swart, University of Gothenburg
- Yavor Kostov, British Antarctic Survey (BAS)

The panel addressed a suite of questions that aligned well with high-priority topics identified in the RSVP responses received online. Audience-generated questions included those on research-ready data products (especially from an early-career scientist perspective), working with local communities, and translating the science/data back to those communities, and then how to better leverage groups that are working on standardizing observations, QA/QC, data formats, etc.

OSM 2026 Town Hall, Panel Discussion/Summary

Question for Lucie Cocqempot: What key technological advances — including autonomous platforms, low-cost sensors, and new biogeochemical/biological instruments — can help meet current and emerging ocean observing needs?

- She would like to highlight three main parts: sensor innovation, autonomous platforms, and intelligent system design. The biggest challenge may not be a lack of innovation, but a lack of fostering sustainability and how we plan...Technological shift is not about more sensors, it is about a smarter, more robust system.
- **Sensor Innovation.** This is exciting when considering miniaturization [of sensors], those that can measure biogeochemical, biological, and nutrient systems...optical proxies. Increasingly interesting genomic tools like eDNA. These are all important to addressing the ecosystem, not just the physicality of the oceans. Sensors…want density coverage, especially in coastal environments. This would involve a broader array of actors. No matter how fancy a sensor is, a sensor is only as valuable as its calibrations, ability, and its maintenance models. Calibration models, shipping instruments back to specialized

labs, is a cost driver. Scalable systems are needed. Calibration needs to be easier, [through a] shared system, modular components that can be swapped without rebuilding the instrument. Also need to reuse and reduce…

- **Autonomous platforms** (e.g. gliders, floats). These are expanding reach in coastal zones, marginal zones, and ice areas. Adaptability is key. Can [we] adjust sampling based on environmental signals or stakeholders needs? Efficiency- .less time, longer system life time. Durability, technology advancements…
- **Intelligent system design**. Must stop observing where we can,and instead, observe what we need.This requires better integration between satellite and modeling capabilities. Standardized metadata. And high quality time series data. Key advances are not in sensors and platforms, but in durable, interoperable systems, [that can meet] long term needs…

Additional comment from Seb Swart- Lucie's perspectives on the technological age we are in, with cheaper and miniaturized systems…one of the elements can be revolutionary. May be entrained in keeping spread out observations in the oceans, but then neglect elements of data and/or sensor quality. Can't ignore that, especially when constraints jeopardize data quality, even with long term data sensors. How do we assure the data is good enough for long term records?

<u>Question for Yavor Kostov:</u> How do we close critical temporal and spatial gaps in ocean observations — particularly in high latitudes, marginal ice zones, under sea ice, the deep ocean, and coastal/shelf environments?

- As a modeler, [he is] aware of gaps in observations (temporal and spatial) in the abyssal ocean and high latitudes, especially in winter- marginalized zones, under sea ice, and shelf cavities. Have a wide set of options with observational tools. Each has limitations. Under ice Argo, mammals as sensor carriers…issues with bird flu and how to adapt that that. BAS has a system, automated meteorological ice observing system (AMIGOS). Can use this to monitor ocean properties under sea ice- attached to sea ice. BAS continues to develop this technology and the ADIOS ice observing system. Moving to a system that no longer relies on iridium satellites, helps to improve features of the system.
- I am a modeler, his perspective is that models can be a valuable tool for closing the gaps between sparse observations. Models can help go beyond first order statistical observations…they can go further. Models with built in physical laws and established principals can help close the gaps. Use the ecostate estimate...combines estimates when available with a physical model- tool can close gaps when not possible to deploy additional instrumentation. Know some of the basic physical principles…can help to fill gaps.
- To add a different perspective…in the northern high latitudes, there are local communities that live in these zones of interest…my perception is that colleagues are becoming more and more aware of the importance of engaging these communities that have lived in these zones for centuries, and know their way around the ecosystem, because they can give knowledge that is unexpected…colleagues at BAS that study

narwhals, went to Greenland, the locals could point them to the fjords the narwhals spent their time in…this is knowledge that is additional to what “outsiders” cannot quickly obtain…topic of engaging local communities will come up again in this discussion. Important topic in (British) climate and ocean studies.

Follow on from Jim Edson: work in the tropics. Have gotten better at deploying fixed moorings. Combination of fixed moorings that can withstand extreme situations, and mobile platforms...this will help to close some gaps.

Follow on from Meghan Paulson: building on engaging the local community. ONC takes this pretty seriously. They partner with local and indigenous communities. Not just for knowledge, but for monitoring programs. Taking out instruments, planning the monitoring program (what the community members are most interested in for their region) and partnering with them on data management. It’s a valuable partnership, and building on this is really helpful for northern latitudes.

Follow on from Lucie Cocqempot: if we want to close gaps, we need to rethink where and when to observe, and how to design the system. Broader engagement is the first step. Co-design with other stakeholders, users, industry- this makes the system more relevant. When responding to regional and societal needs it will be more systemic. Data collected should have a multi-use purpose…

- **Yavor Kostov:** models can help with the optimal design of new observing systems. With some of the more advanced products…use this to pick the exact locations of where to put the instruments so can extract that maximum amount of data in the most cost effective way. This could be another avenue for collaboration with modelers and observational communities.

Follow on from Seb Swart: Polar theme. In a time for many communities, less ships [are available]. Robotics is on the way up…as a solution. This is reflected in the European landscape. Coordination among the ships that do exist and work in polar regions. Untouched resource to create more value for the observations we do make in the polar regions. Standardization across ships…data management and interoperability will create value in those data sets. Need better coordination between nations and institutions with vessels going to the polar regions- need to take better advantage of these opportunities. OASIS, fluxes, air-sea fluxes are an enormous gap in the polar regions. When you look at the map, polar regions are covered…hard to measure these areas. No information about air-sea interface and lower marine boundary layer. With the OOI mooring being suspended in the southern ocean, this has had a huge impact…how do we rally together to allow for time series and flux measurements brought back into the polar regions, especially in the southern ocean?

<u>Question for Meghan Paulson</u> - How do we ensure data quality, interoperability, and "AI-readiness" across observing networks, including standardized formats, metadata standards, and robust QA/QC processes?

- The work in all of these topics needs to happen before instruments are deployed, purchased, etc. Need robust data management plans for any deployments. At ONC, the operations team is broken into physical and digital operations. When people are speaking about oceanography, it's the flashy things, going offshore and putting things in the water. A lot of money is spent here. At ONC, for the whole operations team ⅓ of the team is physical operations, but the other ⅔ is data operations. Have many many data specialists. By focusing and investing in the data side, and planning things out before things hit the water, this is the only way to ensure data quality and interoperability, and even AI data readiness. Focus on standardized data work flows, instrument testing and validation and commissioning, once instruments are deployed. This is an important process. Have everything benchmarked for data quality before using the instruments- then you don't get a surprise if things look off.
- Interoperability- looking at international standards and best practices that are evolving and continuing to evolve...with the best practices as they are changing. And keeping up to date.
- AI data readiness- big topic. "Garbage in/garbage out" side of things. Rolls into interoperoperability and data quality issues. One tool at ONC, an AI readiness checklist produced by Earth Science Partners. Forcing them to structure how to put data out there and that it will be high quality data. Make sure data is machine readable, so that it can be used for these AI applications. Using this for focused AI and Machine Learning applications. Don't want to just push the easy button and have the computers do everything. Have a machine learning framework.

Follow on from Lucie Cocqempot: AI data architecture is as important as sensors. In France and in Europe have spent funds on sensors. Now through Copernicus and other projects, focusing on how data is shared. Need data to be FAIR- if can't be shared, just creating more complexity that is unnecessary….AI doesn't improve insitu observing- need to have high resolution data to reference things.

Follow on from Yavor Kostov: An analogy between modeling…and the observational world…In situ observations, for example. Remote sensing has not replaced in situ observations. Similarly, in the modeling world, AI models etc. can't replace the other, physical models. They complement each other. This is the way forward. Need to keep a solid physical understanding of how the oceans and climate work, but maintain this capability for large data processing and interoperability of data output, data sets, and models. This is the way forward. Keep using all the tools you can take advantage of, including AI, with better quality data.

Question for Seb - How [do the panelists] envision sustaining core observations while expanding into emerging needs such as biogeochemical, biological, and deep-ocean measurements? With funding and political constraints.

- This is a difficult one to answer. Touch on a couple of elements. Observing system design…in a time of constraint. Collect less data and make less observations. Need better informed observations. Need to therefore channel those observations in areas where they matter the most- do the homework to understand regions and times of the year, where one observation in that time and place could be that much more valuable in reducing uncertainty and improving understanding than in another place. A lot of work here is still to be done.
- in thinking of remote locations and where trying to do work and collect hard to reach observations. May not be for the marine community at large… There are partners out there that can have a big impact on how to collect observations- switch to what is available. Global south experience..cabaility, and infrastructure, not known to everyone as much as global north. If can work at identifying and understanding how those partnerships can grow…partenrships that can exist through a place like South America to then gain access to get observations, and use their expertise to grow observing systems in a time of constraint.
- AI is fantastic and useful, but it's not a silver bullet to filling gaps in the observing system. AI is not going to do that. Sarah Gilley talking about how AI can assist us if not training AI with extreme events that aren't in those data sets..

Follow on from Meghan Paulson: Funding side, what she finds is that funding for observations that are multi-use is really helpful for unlocking additional funds. Multi-use and what it means, societal benefits, early warning systems, it makes a difference in the available sources of funds, leveraging the observations for as many purposes as possible…funds are coming from different sources.

Follow on from Lucie Cocqempot: Three other elements to add. Collective resilience, invest in collaborative partnerships. Strong system ability- innovation elevates things, doesn't break down. Cultural transformation- shared project and shared responsibility.

Follow on from Dax Soule: in a time of financial austerity, OOI systems are built for the community. Data is available.

Question for Jim Edson: What incremental steps can we take to bring our ocean observing communities together, and what successful examples of cross-network collaboration (e.g., OSNAP, OceanSites, LandSeaLot) can serve as models?

- Think about low- hanging fruit…a lot has been picked.
- Where collaboration is working well. People talk about recent observatories (OOI), and then operational observatories (like NOAA). This type of distinction is unnecessary. Should think more about sharing data, multi-use. Work with NDBC- their data goes to

their buoys, or the buoy data comes through OOI. Once it gets to NDBC, data goes to global telecommunications systems. Way to bring data sets into an operational model system. Taking sophisticated measurements, and not forgetting what forecast needs wind, humidity, etc. so give them that through OOI.
    - [Jim] Got an email from a crab fisherman. The OOI has lost a number of moorings off Washington coast as part of the Edurance Array. Fisherman noticed this. Where are those moorings we used to rely on for forecasts? They were taken out/offline this summer. They would get their data from the NDBC sites…don't know what you've got until it's gone. Need to keep engaging with those communities, not just the researchers, to keep data relevant.
- Research arrays- work with research arrays. OSNAP is a group of US and European scientists looking at AMOC. Findings are pretty extraordinary. Brought together two research observatories.
- OOI is also working with OceanSites…
- Southern Ocean. Love 1.5 years of data able to collect on air-sea exchange. Huge waves grow as winds blow around circumpolar current. Need to work with colleagues in the south…South America. Want to work witt us. Ship costs are expensive..why had to get rid of the arrays. Can we use the Argentine Navy to get ships out..show them how to deploy and work with the assets? Would make the ship costs less..and then could get arrays out. Use Argo, use uncrewed vehicles. Need to get more assets [in the Southern Ocean].
- Satellites still remain one of the tools. If don't have the in situ measurements to do the validation, then…

Audience Questions/Discussion

- To Lucie and Jim: For early career-ish people, the OOI data users of yesterday are becoming the data producers of today. How can we come to an agreement to expedite the results of post-products for data users? Things that aren't the main part of the data set. How can we approach standardizing metadata? So people can use it for their own resources?
    - **Jim Edson:** OOI doesn't do the science, it provides the data for the scientists to do the research. Work is being done, "research-ready data sets". Zenodo, and NSF has their own system. Would love to see more of these.
    - Here to help develop research-ready data sets and make it more digestible

- Subcommittees or groups of observations at different maturity levels. Argo, very mature, have emerging networks on fishing vessels and gliders. How can we better leverage these groups that working on standardizing observations, QA/QC, data formats? How should we use those infrastructures?
    - **Meghan Paulson**: great question and not an easy question to answer. Keep going back to any program that gets launched. Baking in data interpretability into

the program. For every program that gets launched, data interoperatorily has to be part of it. Bringing people into your sampling plan with this expertise is key to make it all work. That is the link to other members of the community working on these standardized best practices.

- **Lucie Cocqempot**: Europeans. Ocean Pact, for the entire marine chain… for information. Europe is thinking about legislation for the ocean. Ocean Obseiving…to bring in observations, establish collaboration across all sea basins for support
- **Jim Edson**: this is what I'm looking for. This might be the starting point for the observing community to get together. GOOS is great. They don't have a lot of support. Wouldn't it be nice if GOOS could keep their list of research projects going on. This was seen as more. Need both, need GOOS, but also legislation. Need to bring groups together, and may be one under that umbrella.

- When engaging with indigenous group populations around areas of interest…is there a mechanism or effort in place to close the feedback loop to translate the science back to the community from where you got the science.
    - **Yavor Kostov:** In the UK, yes, there is a mechanism. BAS is host to a separate institution- the Natural Environment Research Council (NERC) Arctic Office. In addition to collaborating with scientists, they have an experienced diplomat who represented the UK on the Arctic Council and has experience working with indigenous leaders and different groups. One way to feed back [science] to the community is to involve them in the science process and allow them to directly benefit from doing the science. BAS has done such projects in Canada. Has involved local communities in study of the beaver population.
    - Can also directly address issues of content to them locally. E.g. Narwhal study- narwhals are a source of sustenance and are important to local culture. So they want to learn more about narwhals and their population.