NEW HORIZONS: WHAT'S NEXT FOR OCEANS?

Announcer 00:00

Please welcome the panel on "New Horizons: What's Next for Oceans?," moderated by Senior Correspondent at TIME, Justin Worland.

Justin Worland 00:26

Okay, everyone, good afternoon. Let's give maybe people a second to sit down and—or not. Okay, good afternoon, everyone. It's great to be here. It's great to follow that session—I think they did a great job laying out the challenges and a little bit of hope—the opportunities for climate. We're here to talk about oceans, and oceans are extremely challenged right now. But from a climate perspective, oceans are actually a great opportunity as well to address mitigation, and also there are a lot of issues with adaptation, as well, with oceans. So we're going to dig into that, and we're going to especially focus on how do we finance it? Obviously, this being the Milken Conference. We've got a great group here to discuss that, starting with Governor Green—Josh Green—right next to me, and Wendy Schmidt, president and co-founder of the Schmidt Family Foundation and the Schmidt Ocean Institute. I should have said Governor Green of Hawai'i, just to be clear—it's also up there. Then followed by Rodrigo Prudencio, managing partner at Propeller—he'll tell us more about it, but—a VC firm focused on oceans, and David Gruber, the president and founder of Project CETI. That's CETI with a "C," and we'll hear more about that shortly. I think, just to lay the groundwork, I might turn to a couple of you just to ask, what's at stake? Why do we need to have this conversation about oceans now? And I might start with you, David, from a science perspective, and you know, as a scientist, to give us that overview. And then maybe go to you, Wendy, as well, bringing in the philanthropic urgency here. So we'll maybe start with you, David.

David Gruber 02:07

Yeah, why now? The decisions that we make today in the ocean could affect us in 18,000 years. We've not even had the ability, really, to explore some of the deeper parts of the ocean until the last 50, 60 years, and now that these technologies are here amongst us, we have a lot of decisions to make about how we do things. So it's really a

critical moment at this time, because how we do things today could affect how generations living literally 18,000 years in the future, will be looking back at this moment.

Justin Worland 02:41

So it's a critical moment. Wendy, from your research—from the research that the Schmidt Ocean Institute supports, what do you see? Why is this a critical moment?

Wendy Schmidt 02:49

It's been a critical moment for a long time. I want to say, first of all, I'm very happy to see Milken doing an ocean panel. You know, the ocean isn't just something you go to visit once in a while. It's the center of the world economy—whether you're looking at food or labor or transportation or tourism and recreation, it touches everybody. And yet, when I open the newspaper, I read about rockets and Mars and space satellites and all the things we're going to do sending people into space. And that's okay, because people are curious, you know, they're interested. We like to communicate with each other. That's all true. But the reality is, if you look back at our own planet, we know we've mapped in high resolution, only 25 percent of the deep ocean—of the ocean's floor. Which would tell you—if you do the math, that's half of our planet we don't have a map for, really. We have better maps of Mars. So that's really strange, when I think about that. And I think about the technology that you're talking about, and all of the ways that we've seen already—we can learn about the ocean now. We can see it in ways nobody could see it before. They saw it at 30,000 feet or from a ferry boat. But we have technology now to take us closer to the ocean, and as a sailor and a diver and an ocean advocate and philanthropist, I'm optimistic about how these technologies can reconnect us to our own biosphere that has supported us with life forms that are millions of years old. And we're not that old. We've been living in our villages for 20,000 years. So the perspective you bring is really, really important. And I'm an optimist, and I think it takes us in a circle back to Indigenous thinking about the natural world and what's important for human life. You know, if you go to stay in the space station and you come back, you might have osteoporosis when you've been up there for a while, because we're not evolved to live in space. We're evolved to live here, and discovering the ocean is the best way for us to understand our connection to the Earth.

Justin Worland 04:49

Excellent. Okay, well, Governor Green, I want to ask you that same question, coming from Hawai'i. What's at stake? Why have this conversation now?

Josh Green 04:58

Well, thank you for having me. It's our way of life in Hawai'i. We're the most isolated land mass on the planet, surrounded by this beautiful Pacific Ocean, connected to the all the Polynesian nations, and then, of course, connected back this way to the mainland United States. So when we think about the ocean, for us, it's essential in

every way to everything that we do. And Hawai'i is important to the United States strategically. It's important as people. It's important in so many ways historically. So, for us, as there's a challenge with sea level rise, it affects us very immediately. It affects our shores. It affects the people that are all across Polynesia. There are individuals that have to migrate away from their island nations that are just vanishing. And then, of course, it is our commitment to the planet to preserve this huge area—this huge space that's all around us. And so, I'm sure we'll be talking about some of the technologies and the moves that we're making to preserve and protect it. We have a monument: "Papa," we call it—Papahānaumokuākea, so we'll call it "Papa" for the gang here—and it's 586,000 square miles, put together originally by President Bush—"W"—then reinforced by the UN and ultimately President Obama. And it is central to how we deal with climate change and what we are and our life in the Pacific, so it's very immediate. And I was just so grateful to hear David talk about the future, too. So it's both present and future for us as we consider the oceans.

Justin Worland 06:31

Absolutely. Okay, and so Rodrigo, I want to turn this opening question to you with just a little additional twist, which is you have a VC firm that focuses on oceans. So, you know, what's at stake? Why now? And why now to work on, you know, VC and ocean intersection?

Rodrigo Prudencio 06:37

Yeah. So thanks, Justin, it's really nice to meet with everyone here. We think, much like Wendy was saying, there's a massive amount of the world's population that lives near the ocean, is going to be affected by the ocean, operates on and around and in businesses that influence the ocean and are influenced by the ocean. It goes into weather systems. It goes, actually, into farming—if you look upstream, into the downstream effects that farms produce that [inaudible]. There's so much of our economy that is connected to the oceans in direct and orthogonal ways. For us, that's the real exciting opportunity to find entrepreneurs who are looking for new solutions. [Inaudible] ... using the ocean's superpower to store carbon—ten times more than terrestrial sources... [inaudible]... technology that we think can be derived from the oceans, and for those other industrial things that are happening—shipping, fisheries, [inaudible]... and all of the supporting infrastructure both mitigation and adaptation.

Justin Worland 06:47

So, before we get into the financing questions, [inaudible]... 24 trillion dollars in economic value a year—that's a WWF figure—it's hard find ways to finance conservation, it's sort of a hodgepodge of the oceans given the breadth of the ocean. It might be hard to find [inaudible]-oriented investments. I think the figure is [inaudible]... environmental philanthropy, on the philanthropy side goes towards oceans. So how do we fix that? And I'm going to start with [inaudible] pulling on that thread? What opportunities are you seeing for the return-oriented investment and entrepreneurs working to deal with conservation in the ocean?

Rodrigo Prudencio 08:46

We think we see lots of entrepreneurs who are trying to solve real problems that exist today for large industries—everything from direct air capture from ocean ships, which is now enabled by the IMO's decision to go forward with a price tier format to penalize emissions in in the ocean industry, to companies that are building—we have one of investment that's building stainless steel coated rebar to make sure that all of the resilient infrastructure that is needed in coastal areas is going to last hundred years and not twenty years when sea levels ultimately approach and get closer to human infrastructure. I think the real key is finding those entrepreneurs who want to apply all this new innovation that's got massive tailwinds, everything from material sciences to AI to computer vision and all sorts of other connected technology, connected internet technology that's had huge tailwinds from other industries and apply it to the many places that are needed across all these industries around the world.

Justin Worland 09:54

So Wendy, I want to come to you on the philanthropy side. I mean, you think it's 15 years since the Schmidt Ocean Institute started, is that right?

Wendy Schmidt 10:01

Started in 2009 and launched our first ship in 2012.

Justin Worland 10:05

Okay, great—so, yeah, it's been a while. You're familiar with this ecosystem intimately. What have you learned? What are the opportunities, you know, not just for your philanthropy, but broadly speaking?

Wendy Schmidt 10:17

I think what Rodrigo is saying is you have to rebuild the whole world basically with sea level rise— That's a big opportunity for the business world. I come at it from a philanthropic point of view. Our direct investment has paid off. That's what I will tell you. It starts out very small. It starts out with sensors and low cost things, and they find markets and applications. We have one in Hawai'i. The Purple Mai'a group is a group of 50 community-based organizations that are in charge of restoration and then maintenance of the community fish ponds. And they're using sensors that were developed at the University of Hawai'i—Hohonu sensors—and we gave them a $5,000 investment maybe ten years ago, and now they're all over the world, and even working in Hawai'i. There are many examples of where this technology that's low cost to develop can find its way into markets where we need monitoring. We need, you know, information about the changes that are happening in the ocean so we can respond to them. Even insurance companies are going to need this kind of information. So you need to attack problems like overfishing with better nets, right, to reduce bycatch that people aren't catching the fish they don't want. That's conservation minded, but it's also good business for people, because they can't use the bycatch. So there are all sorts of solutions embedded. The one that I—I will talk about Falkor (too) and our research later on—but I want to mention Saildrone. You all know about this autonomous sailing fleet that started with a project in

2009 that didn't work. We gave Richard Jenkins $5,000 again—that's the magic number people, $5,000 to get them started, proof of concept—well, in 2021 Saildrone had grown into a company that attracted $100 million in venture money, and just last week, they announced their subsidiary in Copenhagen. Saildrone, Copenhagen, or Saildrone, Denmark, is opening to monitor the Baltic and all of the infrastructure of great value that is there strategically for all of those countries and to get ahead of the problem. So again, the technology side is the key to improving the infrastructure, improving the services and the delivery, and improving life for human beings.

Rodrigo Prudencio 11:42

Reinvent it—

Justin Worland 12:39

So I want to broaden the discussion. In just a minute, but I want to just follow up with both or either of you about this really critical question to my mind. Because, you know, oceans are all encompassing, as you pointed out, Rodrigo—they touch on all sorts of different parts of the economy, of society. Now, if I'm thinking, I want to get involved as an investor or philanthropist, might say that's a lot to try to understand. So how do you do that? What is your advice to people who might be looking to enter that space, and, you know, don't know where to start or how to get themselves familiarized and get started?

Rodrigo Prudencio 13:10

I think again—Wendy said it really well—it's something that when I get excited about talking about venture investing in the climate space. It is the reinvention of almost every part of the economy and sometimes I meet with founders or even post-MBA students or post-college students who are like, "Where should I get involved here?" It's like, find something that you like, find a customer solution. Work backwards from a real customer pain point, and then build from there and be passionate about it. Follow it and build the best solution possible. I'll give you one example of—and it's also an ageless challenge in terms of, there's not just—it's not just 20-year-olds that are starting this company. We just backed a company out of the UK that was started by very experienced signal physicists who discovered a way to compress with an algorithm all of the signals that come off of undersea cables. Undersea cables are like nerve centers in that are laid down in the bottom of the ocean that are bringing energy back from offshore wind systems. But there's also communication cables. Those are trip wires for understanding everything that's going on in the ocean. You can not only improve the operational efficiency of wind farms—which lowers your cost of operations, lowers your cost of financing, lowers the overall cost of delivery energy—but it also serves a security and defense awareness question. And so these are older folks who are—these are entrepreneurs who are in their forties and fifties who discovered this capability. And so it's also never too late to go and start a solution that you work backwards from a customer need and build the best thing. And that's the thing, is every—again, I'm very, very positive that every industry around the world is changing, and there's many industries that work on and around the ocean.

Justin Worland 15:01

Great, so I'm going to come to Governor Green now. This is, you know—we were talking about financing, philanthropy, you know, investment, venture investment. You just passed—Hawai'i just passed last week, a climate impact fee, which will enable financing of some of these conservation things. You know, public finance via tax—well, via, I guess you could explain the fee, but via people traveling to Hawai'i. So maybe tell us a little bit about this, and then how you might envision the revenue being used to help with ocean conservation and climate.

Josh Green 15:39

Sure, totally. First, let me just say I absolutely love this panel, with the single exception of Rodrigo calling me and Wendy older folks.

Justin Worland 15:45

[Laughter] I called our founders.

Wendy Schmidt 15:50

He didn't do that!

Josh Green 15:53

So we did something this week, which was—

Rodrigo Prudencio 15:56

Innovation is ageless, and you're about to talk about your innovation here, Governor.

Josh Green 16:00

Exactly—started and conceived not so long ago, right? But led by people like you three. We in Hawaiii have been worried for a long time that we just don't invest in these necessary and critically meaningful technologies and resiliency efforts and ways to just deal with our environment and the chaos that has come with climate change. So—took me three years—but we passed the first climate impact fee in the country. It passed on Friday. I will sign it into law sometime in June. And no other state has done this. So what it is—let me be real specific. It is a tax when people go and stay at hotels. It's a 0.75 percent tax. So if you spend $400 at a hotel or an Airbnb, short-term

rental—you'll pay three bucks. The world is going to work with us now. We have a huge impact of ten million visitors to Hawai'i—which I think, unanimously, we all love—those of us who live there, even more. And now we have those resources to go—every year will be about $100 million of hard money—and when bonded as much as, say, $2 billion a year—to deal with the most critical needs that we have. Whether it's fire mitigation—because, as you all know, in August of 2023 we went through a tragedy, the fire in Maui. Storms, powered by climate change, hurricane force winds, took the fires down the mountain and took away the town of Lahaina. We needed better sensors, like those are being developed. We needed better capacity to have infrastructure. We needed better ways to be in the sea safely with ships. So now we're going to have this money. And we had been fighting for this for a long time, because we knew that we had to find our way to do our part to match what comes from philanthropy, which is extraordinary, and come from investment capital. And I strongly believe that this is the model to deal with environmental change and climate change going forward. As we also know—here we sit in California, where the Los Angeles wildfire devastated so many people that we know and love—again, driven in large part by climate change and drying land, which can be mitigated if we if we love our oceans, but can't, can't be stopped if we don't really commit ourselves to this. And so the climate impact fee, the Green Fee, hopefully will show people in many other nations, in other states, that they can do these things so there's a constant source of committed revenue to help deal with what is really a problem. So whether states come and go from something as important as Paris—you know, whether people come and go from office or change with executive orders, we can now be committed deep into our children's future. And that's what it is, that's what we're trying to do. And I think there will be different versions of this, but I think we need to match the good work that these three people are doing to save our oceans and our environment.

Justin Worland 19:08

That's great. I just, really quickly, I'm curious your thoughts on—obviously, Hawaii has a tourism sector that will be a significant driver of revenue for this fee. What do you see with this being imposed in other jurisdictions, like what sectors?

Josh Green 19:23

Well, it is very helpful, when it's directly connected, a direct nexus to the impact of people. That's—you know, I think in government, when you make these policy changes, people at least, need to have some reality moment. It's only going to work if people feel committed to it. Everyone can do it differently. Obviously, what would happen in the Midwest would be very different than what happens in Hawai'i or California. I do think there is a, you know, there's an obvious nexus with fuel, with fossil fuels. That's where we've been for a long time, and we've been able to use some of those resources in order to deal with climate change. So each state has that component. Each will find its way. We have worked very closely with those who rent houses, those who rent apartments, because once again, you have people driving in, they're occupying they're using the spaces. You also have some states that have a lot of shoreline, of course, and there are docking fees. The cruise ships are also part of this. And I'm not going to say it was easy, and I'm not going to say it's without pain. But the real pain comes when we miss the mark, like we were talking about in the previous panel, when we miss the 1.5 degree mark, or we miss the 2.5 degree mark, God help us. If we see our our seas change in acidity, if we see a mass loss of marine life—the extraordinary research that David's doing on whales. If we lose those things, all of us suffer. And so that—for that reason, everyone should contribute a little bit. And that's really what the model is. I would lean into every state and its governor and

legislature and let them find a way. But this is a way for us to commit to the environment, and it kind of takes down the pressure, believe it or not, because then you don't—year after year after year—have to find your way to a new appropriation or a new massive economic fundraising drive, which can be tough when times are tough.

Justin Worland 21:19

So I want to come—thank you for that—I want to come to David, you mentioned his work with whales. I also just want to ask this—well, first, you should explain what Project CETI is for everybody—but ask this question about how we can better activate the public, get them to understand, and build support for ocean protection, you know, the work that Project CETI does in that regard, but just more broadly.

David Gruber 21:39

Sure. Well, first, thank you, Governor, for those creative ideas. And also, thank you Wendy—I've been on your boat several times. And it gave me a chance to be innovative. Like, I think we're at a real critical moment where there's just so much possibilities, so much room for creative thinking about solving this. And it's really a moment of optimism, because we have all these new tools at our fingers. So how do we use these tools? We're really looking at the question of, can technology bring us closer to nature? And that's been a kind of, what are the core themes of my work. There's another about—I have two themes. One is about being gentle, and some of the soft robotic fingers that we're using on Wendy's boat are envisioning, like, how could we gently interact with marine life? We're going down, you know, several kilometers. We're meeting deep sea fauna that have never been seen before by humans. How is it that we make that first contact? And how do we—can we possibly study them without harming them, and without killing them, and with the degree of gentleness. So we showed that's possible. Now we're creating digital holotypes—basically able to identify new species just by having them go inside a rotary-actuated dodecahedron. Then they get scanned in the middle, and then with, like, DNA swabbing technology, you could get the entire genome, and then you could let the animal go, and have a 3D model with the whole genome and and learn just an incredible amount. So that's just an idea of, like, the possibilities of being gentle. Trying to get people inspired—like, all I've done my whole life is study the ocean. I started out as a surfer, and just realized I like being in the ocean, like I love the physical activity of it. But then, of course, money comes in here—I had to make a living—so I became a marine biologist, and here I am on this stage now. And I've kind of gone through, like, starting from microbes. I did climate change research. We, I, did work on corals, I did work on sharks. But what I really found is, like. whales have this amazing ability to tap into the human imagination. Like, they are mammals, just like us. They went back—we all came from the ocean. Thinking about this panel being an ocean panel—I mean, we all are little packets of ocean trapped in skin. We all came from the ocean, but there's this one group that went back in. So about 50 million years ago, there's these first whales, Pakicetus, kind of started going back into the water. Then you get the modern whales—like the baleen whales and the tooth whales—for 35 million years, have been living this amazingly complicated, intricate life and communicating and being the first whale to actually cross an entire ocean in terms of navigating and using the stars. So it was the kind of idea of, can we work together? Can we bring linguists and AI enthusiasts and technologists and roboticists, and all come together and focus on "Moby Dick"—focus on the sperm whale—and understand what it's saying. So project CETI is now—we're the largest interspecies communication project, and we're decoding the language of sperm whales. And even saying "language" was a bit edgy until just a few weeks ago, that we could almost—we could start using the word "language" now for whales. And then what does that mean for future generations of people—kids growing up now,

you know, seeing that some of the most talented scientists in the world are putting their brain power to wanting to know what a whale has to say. And we're just seeing a real thirst, like there's just a thirst for knowing, like some of the really cool siphonophores that you've been finding recently. We're so amazed by these things we love, kind of, passing it to each other on Instagram really quickly. But how do we then translate that into action and to people? And that's where I think this all comes together, because we all need each other, and we all need to work together and think, you know, holistically, including Indigenous knowledge, if we want to have a kind of healthy future, which is very possible.

Justin Worland 25:56

Did you want to come in on that? Oh, no—I thought Wendy, I thought—okay, that's okay. I want to—

Wendy Schmidt 26:01

Beautifully said.

Justin Worland 26:03

That was great. And I, you know, I would say it's, it's incredibly important to have those things that are accessible for people—that they want to share on Instagram, that inspire them. And so it's really impressive and interesting work. I want to shift gears a little bit to talk about deep sea mining. These deep sea mining has been a big topic in the international fora this year, and of course, President Trump signed an executive order fast-tracking permitting for deep sea mining, both in US and international waters. A lot of countries have protested and said that's not within his jurisdiction to do. But I want to take a step back and just ask, what are the risks? And I know, Governor Green, you signed a ban on deep sea mining in Hawai'i—in the waters around Hawaii—and Wendy, I know that you've written about this issue. So maybe I'll start with you, just to ask, what are the risks here, and how can we better understand the potential consequences of this?

Wendy Schmidt 27:04

The risks are known and unknown. I think that's the way to answer the question. And it really comes down to how much destruction are we willing to tolerate before the system we depend on for our life on land begins to break apart. You mentioned acidification—there are many things. Plastics is a tremendous challenge. The threat of deep sea mining is particularly awful because it represents a way of thinking that goes back hundreds of years, particularly in the 20th century, of extraction and exploitation of resources. And we can see what that's done on land. Even if you try to regulate it and control it, there's still a lot of destruction to things we didn't even know then. And now we're dealing with the ocean where we know so little. I pointed out the mapping—that's one part of it—but when we dive down those thousands of feet with our ROV Sebastian 4500 feet—and that's not even that deep, okay, in all of the ocean—but we see something we didn't expect to see every single time. And this machine that was built up off-the-shelf parts in 2016—talk about tech innovation—has done more than 600 dives, and it's

still going. But the point is, you see what you don't know is there. When you lift up the crust of the earth under a glacier that's moved in Antarctica, you find life forms you didn't know existed. We're finding life off of the coast of Chile, over toward the Clarion-Clipperton Zone, where a lot of these, I guess, permissions, have been given for people to explore mining. People thought it was a desert. It's not a desert. It's not a desert at all. It's got all kinds of interesting new species. And I think the cautionary principle probably applies here. There have also been a number of very good studies that point out, if we thought about minerals differently and we recovered them and recycled the ones we already have, and know how to mine responsibly on land, we would not have any need to even explore what's in the ocean. And since it provides so many services and so many potential compounds for human health and well being. It's at our own peril that we go in and try to mess around with it. I just don't see the long term point of it.

Justin Worland 29:31

Do you want to come in? This was a big deal when you did this.

Josh Green 29:34

Yeah, it just seems very short sighted to me, is all I can say. You know, everything Wendy said is completely accurate. We could destroy things that we don't even yet know how valuable they're going to be to us. We have over 7000 species in our preservation area. We know that that's critical—if we start mucking around with our sea level floor in pursuit of short-term wealth and growth, God knows what the long-term damage will be. And so I think we would be better served to go the way of very thoughtful research—people that are slightly geeky like David can do at every level. Okay, because that is where the win is going to be, having some really serious knowledge about these ecosystems. And since they are in some ways, our last frontier, maybe we should respect it a little bit more than we have suggested with this quick fix that we might have to go and extract, like Wendy said, what's precious.

Wendy Schmidt 30:39

And using that industrial framework, you know, the knowledge is coming in as fast as anything. We found just last year that these nodules, these polymetallic nodules on the bottom of the ocean, actually produce oxygen. And we don't know what role that oxygen plays, either in the ocean or in the atmosphere, in climate. We don't even know. We just discovered this last year.

Josh Green 31:02

Yeah, I mean, look, David only needs another sixty days to take a look at the genetics and images of it, and God knows what we'll find, you know, and then six months and six years. We should play the long game on these things. And obviously the long game is more important than anyone is acknowledging right now. So this is one of the challenges we have when we walk away from research and we walk away from the mentality that I think many

people embrace in life—it's not quite so simple, like quickly balancing a budget and shutting people's research down. You cost yourselves decades and generations when you do that. And so I think we have to take a pause and really acknowledge what's at stake here. And I don't mean even just in, you know, in the ocean, the floor of the oceans. I'm talking about cancer research and oxygenation and what happened to our atmosphere. All these things are pretty well connected. So we in this building and this conference have a great capacity to influence decisions and influence policy. So I hope that those of you who are experts and have interest and can compel with messaging really spread the wisdom that these three guys have, at least, because that will, hopefully, in time, influence what the larger policies are.

Justin Worland 32:24

Super important. Rodrigo, I want to turn to you and frame this question around, you know, finance, right? So, you know, say that you're—this deep sea mining requires capital. They would have to raise capital to do this. What are the risks? What are the risks from an investment standpoint of engaging in deep sea mining?

Rodrigo Prudencio 32:45

So with the caveat that we don't invest in—

Justin Worland 32:48

Yeah, not suggesting that you're evaluating—

Rodrigo Prudencio 32:53

—Just to frame this as, you know, these are still exploration type of activity in the ocean, and there's no, you know—it's an incredibly risky set of even industrial activity in the ocean. At the same time, that mineral—if it is for mineral extraction—it's competing with an industry that is moving at light speed on land and replacing the mineralogy that supposedly, if it's easier to go get cobalt in the ocean—well, the whole battery industry is moving away from cobalt, right? And so now you're putting a bunch of assets at risk to go mine the ocean only to come up to the surface, go do your mineral extraction and refinement, and find that you can't sell it into a market that has moved towards sodium lithium batteries. So that alone is got its own set of risks in there. What I'm excited about, however—things that we've talked about here—is that putting assets in the water to understand life, biology, chemistry, at every level of the ocean is also accelerating in a downward cost curve that's going to make it more—that's going to make the reality of putting more exploratory assets in the water. But that doesn't mean it's only going to go towards, or purposely go towards, exploitive industries. Or some of the exploitation might happen around biotechnology that might solve some important human diseases or earth bound diseases that we didn't know about. And so I am a proponent of riding this cost curve, of putting assets into the water, just like you funded the first five with the first $5,000, the first Saildrone, and now there are hundreds out in the water doing lots of different missions that they first didn't imagine—because it's a lot cheaper to build them, to put the sensors on

them, and to understand more about what's going on there. And there's lots of companies that are doing the same thing. That's the technology trend that I'm excited about, that I think improves our understanding of the ocean. It feeds the models that David is using to understand whale language and soon, those whales gonna be talking with their own TikTok accounts and like say, which then opens up a whole other kind of interesting conversation about TikTok personalities that live in, you know, at, you know, 400 to 4000 feet of depth. Wow. Okay, so, David, I don't know if you want to pick up on this thread here, thinking about what sort of discoveries we might have as we have better, you know, ability to explore it at greater depths, and what might we learn?

David Gruber 35:31

Well, it'—I mean, I agree with—it sounds like you want to make a smart decision first, that there's really—it's not even that economically feasible to go down there when you're—you have plenty of stuff on land—

Rodrigo Prudencio 35:41

—certainly isn't a guarantee—

David Gruber 35:42

—a guarantee, and you could start even recycling what you already have. So why go there, and then, like, the things that we don't know? I mean, it's like going—it's so recent that we're visiting these systems, like so recent. And again, 71 percent of our planet is ocean. Every time Wendy's Sebastian goes down there, it's likely going to see a new area. I found it interesting—when you go down—I've been in regular submarines as well as at watching ROVs from the surface—you'll see what just looks like, "Oh, these are a bunch of like, weeds and, you know, little sponges and things like this." They're literally 18,000 years old, some of them, so it looks like little things and it looks like it'll just grow back. But you'll have to wait, like, you know, nine times the calendar for that to grow back to where it is now. So, you know, just recognizing time frames that could be very different. Yeah, it's like, I would really hate for us to make some capricious decisions now and then, literally, we're at the year, you know, 20,025 before this thing starts growing back. So these are really important things that we should just do with care and make sure we're doing it smart.

Justin Worland 36:51

So, I want to shift gears a little bit again. And in the last panel, there was a discussion about adaptation. And so Rodrigo, I want to turn to you. I mean, the thought is often that adaptation is a philanthropic effort, that it's hard to earn a return on adaptation, and you're working on various portfolio companies that deal with adaptation,—and you alluded to some of it earlier—but I just want to pull that thread a little bit. What are the opportunities for return-oriented investment and adaptation with regard to oceans?

Rodrigo Prudencio 37:23

Yeah, I think oceans and their encroachment on human civilization, because of the reality of sea level rise, offer a bunch of challenges to the built infrastructure. And that built infrastructure wasn't built for contact with salt water. That's an important first thing—that wasn't built with the energy that's in the storms and the energy that's in the expansion of oceans. Our ability to anticipate floods and ocean events was not censored—or even the sensors we deployed along coastlines—wasn't built with the idea that these storm surges were going to happen as frequently as they happened. So there's a bunch of new technology opportunities, both in the built environment and the censored environment, that's going to be needed to prepare us for that and to continue to coexist with the ocean—which, again, human civilization has had to do for hundreds of years, thousands of years—but we're just in a new phase of acceleration now. And the good thing is, again, we're in a new phase of accelerated availability and cost reduction of technologies that entrepreneurs are applying to these challenges—everything from taking space-based information and interpreting what's happening in coastal areas to using cameras and other image sensing to, as I mentioned earlier, rust resistant or rust avoiding steel that's going to go into the backbone the infrastructure that's going to have to be built in these coastal areas.

Justin Worland 38:55

Yeah, yeah, really interesting. So I want to go back to research, because research has come up. I mean, it's obviously crucial to everything we've been talking about. And turn to you, Governor, you were talking about research universities and alluding to the threat to research, you know, that's happening right now. And I guess I would just ask broadly, what is the role of research universities in advancing ocean conservation? What's the threat right now? And then we'll turn to the panel and look at other opportunities to fund research.

Josh Green 39:29

Sure. Well it's very immediate for us in Hawai'i. We, you know, we have a terrific University—University of Hawai'i, at Manoa—and we have a satellite system. It's one of the best places to go and study marine biology and climate and oceanography. In the in the last 100 days, we've lost somewhere between $30 and $50 million of direct research dollars—and that's without any conflicts over anti-semitism, or any of those things. I mean, that—you kind of put that away, that went down, but we're still losing these research dollars. And it's very problematic for us, because those are, first of all, those are people that are very thoughtful people that have been doing research for, you know, many years. They've made their lives in Hawai'i. They do great work. It has incredible application, not just to our ocean and our sea, you know, our shoreline, but it has applications in a lot of different fields. Interestingly, there's a lot of defense applications that come and, you know, we can debate where we are on on that front, but it's relevant. This stuff is all actually an ecosystem of research. So we're planning a special session in October to backfill what can't be lost or paused. And I think that that's something we should all think about, as far as some of the use of our dollars. I worry that we disrupt people's careers and send them metaphorically to the wind or to the sea and to other places, because we need them doing this work with young postdocs and younger people to get the next generation interested. So again, you can't disrupt research and not expect a long-term effect. We are bracing—we do over $700 million of research at UH alone, and much of it is in this area. That's one of our core economic drivers for our state. So it will again have that consequence. So I'm very sensitive about this right now, as a governor, and I know that every governor and every university is worried. You're seeing basically

an entire section of society be somewhat threatened. So again, we're all hoping to kind of navigate this and damp it down a little bit, but we're going to need help, and we have to speak up thoughtfully. And if we do, we will survive this period.

Justin Worland 42:04

Speaking up is important. Wendy, I would be curious to just talk about the role for philanthropy and research. To what degree can philanthropy help fill the really, potentially immense gap? But then also, just to talk a little bit about the research. You know, you've talked about it already at length, but just to talk a little bit more about the research that you are you are funding and what might come next?

Wendy Schmidt 42:28

I think you said that very well, Governor—you don't want anything lost, and you don't want things disrupted and discontinuous. A lot of the most valuable research in marine biology is continuous. You get to see things over time. All the climate science, in fact, relies on models that rely on data that's been collected for a very long time. This has been going on for a while. We are at the low point of government investment in science right now—a 25 year low. So we're already in that soup. It's getting worse right now, but this has been the reality for a long time. As philanthropists, what we can do is offer research ships for free to people who are doing research projects. We may have to actually fund the project too, if they don't get government grants right now, because the ship has to sail and the science has to happen. So we've got our own little engine going on. Back in 2014, Eric and I assumed the cost of running the Keeling Curve, which many of you will know, is the hockey stick in Al Gore's film. That was at risk of shutting down—started in 1958 measuring CO2 in the atmosphere off the top of Mauna Loa. It had to go on. It doesn't make any sense. What do we make sense—how do we make sense of the world in the future if we don't have those things? So we are thinking very seriously about how to fund work that is continuous, to assure young career scientists—particularly in interdisciplinary work—that they will have support, and that the labs they need will be funded. It's an emergency. It's a science emergency. That's the way we're looking at it.

Josh Green 44:07

if I may. That was one of the cuts that that recently hit the chopping block. Some of the sensor work on the top of our mountains in in Hawai'i—which I know that sounds a little exotic for the moment—but that's how you measure climate change. That's how you measure carbon in the atmosphere. That's how, by the way, we do a lot of the significant security work globally. So some of these cuts, which have been done, as we've seen a little chainsaw action in the social media, are not cool. I mean, they have to be rethought. Because, I don't just like these people, these are people doing work that is important for so many different parts of our societies. And it's very short sighted. And not even that much money, in many cases, to do the work that will sustain our species over time.

Justin Worland 45:04

Well, David, you're on a campus, university campus. I mean, I don't know if you want to speak to this challenge—this research challenge.

David Gruber 45:11

Yeah, it's, I mean, it's pretty drastic, like Wendy said, the long term work is important. Once you stop it, it can't get continued. I think, you know, it's like, it's already a field like marine biology or especially oceanography, it was already pretty underfunded compared to biomedical science or neuroscience. So now it's very, very underfunded. I think the hardest thing for me is, like, being a marine biologist—like every kid is like, "I want to be a marine biologist," and then they were like—they have to give it up at some point. So to even be here at this stage is like, basically, like being a professional baseball player. Like, the odds of being a marine biologist are so slim and so hard. So I think it just makes it, you know, it just makes it that much tougher to kind of crack into the field. And even this project now, Project CETI, is generating so much enthusiasm, and getting so much interest, but it's kind of hard to be like—everybody wants to play a role. Everybody wants to, you know, be a part of this. And so the more there's opportunities, the more people that could do this work.

Justin Worland 46:17

I mean, so much of "basic research" research that we're talking about here is the basis of innovation and entrepreneurship later. I don't know. I mean, Rodrigo, do you see this and think, "Well, you know, what does the pipeline look like in in ten years if we're not doing the basic research now?" I mean, how do you think about these questions?

Rodrigo Prudencio 46:38

Yeah, the pipeline gets challenged. At the same time, again, if some of our companies, and more companies that get invested in are successful in building this infrastructure of new startups that are operating around the ocean, hopefully it has that sort of positive feedback to employment, to those researchers who—or sorry, to those scientists who thought they were only going to have an opportunity in academia, but might have an opportunity in the private sector. So if you were an astrophysicist, you know, ten years ago, you might not have been thinking that you were working to launch new site—new types of microsatellites into space. And I think the same thing could be existing into expanding the amount—if you were an oceanographer, you might not have been working for a company that was doing autonomous sailing vessels to do bathymetry studies, fishery studies, and also possibly some security and defense applications. So these are dynamic. And again, we think that if there's an entrepreneur out there building version 1 of something, that next year is going to build version 10 at half the cost, and next year version 100 at another half the cost, there's a path for something interesting and successful, and maybe even a path for more careers in these kinds of startups. But that is—it's an and statement, right? This is not at the exception of the ongoing research that philanthropy and universities—and frankly, our federal dollars play in backing up that important basic research that is absolutely uncompromisable.

Wendy Schmidt 48:12

And one of the things we're forgetting here is that this digital world we all live in with our phones and our entertainment and everything we know that's digital was funded by the government for decades and decades. Things didn't pop out from Steve Jobs' mind that they were built on in labs, in research facilities and universities and corporate labs. That whole infrastructure was essential for the leadership of the United States in this area. It's why we are where we are today, and it's really a threat to our future that we're not there now.

Justin Worland 48:46

Absolutely, absolutely. It's such an important point. I mean, I think it is interesting. It'll be interesting to see the developments that have happened—the research that's happened thus far, and the innovations we're seeing already. And hopefully that will be inspiration for further investment, necessary investment. We just have a couple of minutes left, but I do want to touch on—despite the challenged political environment, there is a lot happening in the intergovernmental space right now, with regard to oceans. There's the push to ratify the High Seas Treaty. Negotiations over a plastics treaty for oceans. There's a big UN oceans conference happening in next month in Nice. What is the significance of all of those developments? For NGOs, for philanthropists, for investors—what does all of that mean? That's an open question to anyone who's excited to take it.

Rodrigo Prudencio 49:40

Well I'll start. And very quickly again, there should be some inspiration by the fact that, even though the US did not send a representative and sent sort of a nasty letter to the International Maritime Organization, 150 other countries said, "thank you very much. First, the US doesn't have an actual commercial cargo fleet. The rest of us who do run these cargo operations want a set of rules that we can understand for the next 50 years, and we are going to vote for this and put in place a set of regulations that are going to actually put in place emissions restriction for us." Hopefully, that kind of example of the rest of the world being able to move without the US, if the US chooses not to be in those fora, will inspire ongoing work in these other fora that you just mentioned.

Justin Worland 50:22

And I'm sure that that enables a lot of companies that you work—yeah, that you invest in. Does anyone else have thoughts on the intergovernmental context?

Josh Green 50:32

Well, you know, it only comes partially in jest, but as the 50th state—in advance of Greenland and Canada, of course—we are happy to participate globally and internationally. And there are, of course, some rules. Rules are made to not be followed, I'm learning, at the federal level, and we are willing to participate. And so, of course, we will send our emissaries and experts, but we do have some capacity. The state of Hawai'i, for one, has welcomed

many nations into our sphere. And interestingly, Hawai'i and some parts of government are asked to continue—no matter what the dynamic is with other nations—to continue important work. Some people use the word soft power. I know that that's a debate, a strong debate about that term. But it's very important that we continue to have very long term relationships with many other nations, because we have to have a working relationship with Asia—all of Asia. We have to have a working relationship with every nation that that interfaces with the sea. So we're there and we've enjoyed to have that—we've enjoyed having that role in Hawai'i. And I think it's not just the young people that come out as thought leaders from our university, which—we are so grateful that people take them in and find careers for them—but we would like to be that state. And I think these political challenges really do ebb and flow. I have thought a lot about what these individuals are saying, and by having the extra network of philanthropy and industry and investment, it does create a slightly tighter web that is more difficult to disrupt. People, I think, will be more reluctant to disrupt large operations if it's going to cause bankruptcies—if it's going to cause displacement of capital. So I think we can find a little shelter from the storm, if you will, if we put all these pieces together.

Justin Worland 50:37

That's great. We have no time, but I know you wanted to say something on this, David.

David Gruber 52:47

No, I was just gonna just end with—there's also these international panels—of coming together. It's like there's a sense of kindness, of that, as humans, as a species, this is a new thing. No species has ever had to present this self-regulation—like the whales and the sharks haven't had to come together and have international panels on climate change. So this is new territory for us, and I think it's great that these things are happening, but also to be easy on ourselves as we kind of maneuver through this territory, because it's not been charted before.

Justin Worland 53:21

This has been a great discussion. You know, typically I would offer a summation, but I think the thing that I found most interesting is the ways in which people can engage. And so there's the need for the philanthropic capital. There's the opportunity for financial-oriented investors. There's your very critical point you keep you kept reiterating about the need to engage—just engaging with policymakers, using your voice, critically important. Thank you to this excellent panel. It's been great.

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