Ocean Gazing: Episode 18
The Prince's Predictions, Part II
Sound Predictions: Alaska Ocean Observing System

Ari: I'm Ari Daniel Shapiro, and this is Ocean Gazing where we take a running leap into the sea, and then, learn about where we've ended up. I'm just getting over a cold, so you'll have to excuse my voice. This episode is the second half of the story that we started last time. About the team trying to make really accurate forecasts of the weather and ocean circulation in Prince William Sound, Alaska. It's a project called Sound Predictions.

<fade down music>

Abramson: Hello, everybody, this is Leslie Abramson in Cordova, Alaska. Tomorrow I'll be heading out by floatplane to Knowles Head joining the research vessel Auklet.

<fade up music>

Ari: Leslie Abramson was with the Prince William Sound Science Center. And she went to the Sound to help collect the data for the Sound Predictions project. While she was up there, she took a bunch of audio recordings for us. Stay tuned, and hear the science in action.

<fade up music and sustain until end>

Ari: You probably use the weather forecast or the weather channel all the time. To figure out if you should wear a jacket, bring an umbrella or reschedule your softball practice. And maybe you even take for granted that you can have that information available whenever you need it, *wherever* you need it.

It's no different at sea. Oil spill responders, search and rescue crews, and fishermen need a similar forecast on the ocean. And that's pretty much the main point of this Sound Predictions project. To make sure the forecasts of Prince William Sound are reliable, and available for anyone to use. These forecasts are actually predicting 3 things in the Sound: the weather, the waves, and the ocean circulation. We'll be focusing on the ocean circulation piece here. The basic idea's pretty simple.

Chao: My goal is to create this kind of virtual ocean for me and for others to look, to look how the ocean evolves from hour to hour, from day to day and then hopefully on climate timescale, from decade to decade.

Ari: That's Yi Chao, who I talked with on the phone. Chao works at NASA's Jet Propulsion Lab in Pasadena, California, and he's one of a handful of people building the model to do the ocean forecast of Prince William Sound. This model relies on all kinds of information. Wind. Rainfall. River water. The temperature of the water in the Sound. How salty that water is. And how it all changes in space and time. Yi Chao mixes it all together to make a forecast for the Sound.

Chao: So in other words, we are predicting the 3-dimensional state of the ocean two days into the future.

Ari: That's the idea. But to get to that point, Chao first had to pair up with a field team in Prince William Sound to get his model up to speed. Refine it. Perfect it. For 3 intense weeks in late July and early August, Chao compared his model predictions with what the field team was actually measuring in the Sound.

<fade up ambi and sustain until the end of the piece>

Abramson: Can you pass the fruit to the bowl?

Ari: That's Leslie Abramson again. She's now on board the vessel called the Auklet anchored in the Sound. On one early morning, she and the field team had just woken up.

Janka: Wanna plate? A bowl? Or you wanna piece of pastry?

Abramson: I'll have a bowl. Pastry shall be my second course.

Janka: Or oatmeal. Oatmeal's ready here. Variety of tops. Not missing anything. There's raisins, craisins, walnuts, brown sugar, maple syrup, butter?

Ari: Starting the day with a solid breakfast was a good idea. It got the team energized for the 12 hours they'd be spending out on the water. It gave them a chance to bond and to figure out the plan for the day.

<cross-fade ambi to CTD cast>

Ari: The Auklet was tasked with getting what're called CTDs.

Abramson: Alright, switch is on…

Ari: It stands for conductivity, which is how salty the water is, temperature and depth.

Abramson: 163 meters!

Ari: The CTD instrument was lowered over the side of the Auklet and then down into the water. And at every depth, the CTD tasted how salty the water was and felt how cold it was.

Abramson: 50!

Ari: Some of this information is what Chao then fed his model. The CTDs provided him with a kind of vertical snapshot of salinity and temperature in particular places throughout the Sound. And those features are crucial for understanding the circulation patterns of the water.

<fade down ambi>

Ari: Now, the Auklet was only one of three vessels out there. A second vessel, the Alena K, used two underwater robots to measure the salinity and temperature in a different part of the sound. One of the robots was a glider – the kind we learned about a few episodes ago – that moves up and down in the water simply by changing how heavy it is. By taking on a little bit of extra water to sink. And by pushing it out again to rise. The other robot is something called an autonomous underwater vehicle, or AUV. It moves around using a propeller. Chao fed the salinity and temperature information from these robots into his model too.

But Chao also had to test how well his model was working. After the model took in all this information from the field, how well could it predict the ocean circulation in the Sound? And that's where the third vessel called the Vixen came in. The crew on the Vixen cast out drifters, which look like giant rigid beach balls. Here's Yi Chao.

Chao: Yeah, the drifter is a little device you can follow the ocean flow at different depths. So basically, you track the position of the drifter every hour, every 30 minutes or so by satellites and then by watching the location changes and then you can infer the velocity it produced.

Ari: Chao compared the movement of these drifters floating at different depths with the movement predicted by the model of virtual drifters.

<fade up Vixen ambi>

Ari: Now we're onboard the Vixen. You see, the crew wasn't just heaving these drifters overboard and letting them, well, drift. Sometimes the drifters moved beyond the edges of the study area. And if they weren't recovered, they could wind up leaving the Sound altogether and cruising along the coast of southwest Alaska. So the Vixen had to haul these roaming drifters back in for redeployment.

Pettigrew: I see it!

Abramson: Oh, yeah, keep your eye on it. Great.

Pettigrew: Yeah, there it is. Coming up on starboard.

Ari: We're listening to one of those drifter recoveries now. It required hauling in up to 40 meters of cable…

Pettigrew: Okay, haul away.

Abramson: Hauling!

Ari: …followed by a massive sea anchor.

Pettigrew: Comin' up.

Abramson: There she is. Oh, it's a big… Oh…

Pettigrew: Drogue coming aboard.

Ari: Not an easy task.

Pettigrew: Drogue on deck.

Abramson: Okay, next one.

<fade down ambi>

Ari: Yi Chao says all this intensive effort in the field and in the lab paid off.

Chao: Yeah, the project went really well. It's a dream come true for us. But we still have long way to go to perfect our system in the local areas and then to extend it other place around the globe.

<fade up banjo ambi>

Ari: But it wasn't all work out there. Crucial to any successful project, there was a balance between research and leisure. A little heavier on the research, of course. But some relaxation nevertheless.

Halverson: Pretty sweet banjo. It's a better banjo than I am a player.

Ari: This was last episode's sonic stumper. The field team played a lot of music including the banjo and told each other all kinds of stories and jokes. You see, there's this other part of the Sound, and of fieldwork. Of life, really. The part the model can't quantify. The laughter. This banjo. And the friendships. It's just as important as the science. It keeps everyone invested in the project. And it keeps 'em coming back to do it all over again the next time.

Ari: Okay, onto our new sonic stumper.

<fade up sonic stumper>

Ari: Now *that* should sound familiar. Send us your guess by visiting www.coseenow.net and clicking the podcast link. On our website, you'll have a chance to look at some results from the Sound Predictions experiment and hear about developments in preventing future oil spills. Also, we're trying to get the word out about Ocean Gazing. <fade up outro music> So can you forward a link of this episode to your friends, your family? Or, even better: Facebook. If you search for Ocean Gazing on Facebook, you'll find our page. So become a fan and then share it with your network.

Ocean Gazing is supported by the National Science Foundation. And it's a product of the Centers for Ocean Sciences Education Excellence.

Lots of people to thank for this episode. Leslie Abramson of course for all those recordings. Marilyn Sigman for dreaming up this idea for the podcast in the first place. And thanks to Darcy Dugan, Scott Pegau, Janice McDonnell, Jim Yoder and Sage Lichtenwalner. Evan Sanders composed our music.