SPURS_Webinar 3: Q&A Transcription

SPURS_Webinar 3 (3/12/13) – Question and Answer Section

Website for this webinar: http://cosee.umaine.edu/programs/webinars/spurswebinars/spurswebinars3/

Video:

Note: Bold text in the transcript indicates questions from the audience. Non-bold text is a response from by Dr. Fred Bingham or the host as specified.

Question: Do all of the ARGO floats measure salinity? How long have all of those floats been in the ocean?

Dr. Bingham: Right. All ARGO floats measure salinity. The thing that is innovative about the floats that are being deployed in SPURS is the ability to measure salinity at the very surface between 10 m. depth and the surface. That's something that ARGO floats haven't had until now; the standard ARGO floats don't have. The standard ARGO float protocol which is what you saw in that one figure that I showed you right here could last up to 5 years. In our deployment for SPURS we've changed the protocol a little bit, so these floats will probably not last nearly that long, but that was the idea. The ARGO floats last a long time out there. I hope that's an answer to your question.

Question: How long did it take you guys to uncoil the 3 miles of rope and chain when deploying that mooring?

Dr. Bingham: Yeah, it was quite amazing. It took an entire day. Putting all of that out was a full day's worth of work. I think they started at the crack of dawn, and they threw the final anchor over about 5pm. The thing is these guys have all this down to a real science. They actually spent more time doing bottom surveys, so they had to know exactly what the shape of the bottom was where they were trying to drop the anchor. They wanted to drop the anchor at a very specific place.

So we spent a couple of days just surveying the bottom using this thing called a side scan. I've never been on a big mooring deployment like this; it was just simply amazing to watch this going on. The PRAWLER mooring was very similar to this. It was really a very exciting to watch that final weight being dropped over the side, and there was a big huge splash. It was quite an amazing event. People were celebrating when the final weight went over. It was a lot of fun.

Question: During field work, does equipment have to be adjusted and modified due to unexpected factors and/or wear and tear? How do you do that?

Dr. Bingham: Oh yes, all the time. Field work is fraught with instruments that don't work. There's just constant dealing with instruments that doesn't work, not for any [?], or good maintenance, or competence on anybody's part. It's just the ocean is such a difficult environment. For example, we had to pull out the sea gliders. We put them initially, and then we had to pull them out 2 or 3 times because they weren't really working right. So we pulled them out and put them back in.

It was the same thing for wave gliders. For example, I don't know if you remember there were the front fins, the vertical fins, and the horizontal fins for the sea gliders. Well somebody put one of the sea gliders in with vertical fins rotated at 45° off from where they were supposed to be. So they put the sea glider in and it started doing all these crazy things. They would tell it to go somewhere and it started doing all of these crazy paths it was going on. We brought it back onboard and they figured out pretty quickly that the fins were rotated. Was that the question? That's the kind of thing that we ended up dealing with. That's just par for the course.

Carla: It sounds like a lot of adaptation to make all that instrumentation work.

Question: How many people crew members were on the last cruise and what about the upcoming one? How many people will go with you when you do something like that?

Dr. Bingham: There was about 22 scientists onboard the Knoor, and a similar number of crew members. There was close to 50 people on board that ship. You have to realize too that on a ship like that life is 24 hours a day. People are up and about at all hours of the night and day doing operations. Operations never stop on board a ship. We had lots of people, but everybody was busy, and we were all working very hard.

Question: Why is that buoy mooring located where it is, and how is it decided that's where it should be placed?

Dr. Bingham: We wanted to place this [?] mooring as close as possible to the center of that high salinity region that you saw on that very first slide. That's basically the reason why we put it there. We had an [nominal?] location that we wanted to put the mooring in, and when we got there we started doing all these bottom surveys to try and locate an exact position that we wanted to put it in. Nominally the main siting was to try to be right at the center of that high salinity region in the middle of the North Atlantic.

Question: Is GIS technology used at all in this field of research? Do you use those maps and are they shared with anybody else?

Dr. Bingham: There are not a lot of specifically GIS that we do. Some of people are using GIS with some of the bottom surveys. Oceanographers don't tend to use GIS that much. I think that's partly an historic issue, because we never have done it and a lot of people aren't trained in doing it. GIS tends to work for things that don't change very much. As you can probably imagine the ocean is in a constant state of change. Of course we're doing lots of mapping. Pretty much every day someone would line up all the surface salinities that we would measure, and we would make hand-drawn or computer-drawn maps of these values just to try and understand what the salinity field was doing. But there weren't a lot of people doing things with GIS.

Question: What was your favorite moment of the cruise? Are you going on the one that is leaving next week?

Dr. Bingham: No, I'm not going on the one next week. I was busy the entire time. It was just constant non-stop activity. My role was to basically try and keep track of this array. We threw out all of this

instrumentation, and my job was to understand what type of instrument was where; where we needed to take the ship to meet up with a particular instrument to survey a particular feature. There's this one sort of eureka moment about ⅔ of the way through the cruise when everything really started to click. We were in constant contact with these people on shore who were sending us model results, so we had some modelers involved who were putting out model pictures of the surface salinity. At a certain point about ⅔ of the way through the cruise, we felt we had just enough of a handle on what the observations were telling us. And suddenly there was this one model map that came in by email, and I took a look at the map, and I looked at the observations we had made, and suddenly the two made sense with each other. I mean before that happened the models and the map had seen sort of disjointed. But there was a particular point where we saw the models made total sense. We also pointed out the model gave us some guidance as to where to go to find this really interesting feature. I was able to pull out of the models and the observations where this interesting feature was and we could then go chase down and watch. We spent 3 or 4 days sampling this one particular very high salinity feature. It was really fun to see the models and the data comparing so well, and to be able to use them both together, and go look at this really interesting area that we saw.

Carla: Where are those models coming from? Who is producing those models for you guys?

Dr. Bingham: The models are produced by colleagues at the Jet Propulsion Lab. They are run on a computer there at JPL. It's a regional ocean model. We have some 2 or 3 modelers who are involved in the program which I didn't talk about any of what they do. They were working very hard. They were just as much a part of the team as everybody else out there. They were all on shore working with the computers and doing the model stuff. The thing that was innovative about the modeling in SPURS is that we were using the observations in what's called data assimilation. So we were taking the observations, sending them back to shore, and putting them in the model, and then using the model to create a forecast as to what the salinity field and temperature field would look like the next day. That is something that typically hasn't happened in the past with oceanographic research like this. Normally what you do is go out and make all of your observations, and then you come back and you try to make sense of it in the aftermath of it all with the model. But here we were using models in real time to try and direct our progress and figure out what it is we wanted to do.

Question: In some ways is SPURS kind of ground truthing those models from JPL?

Dr. Bingham: Yeah, very much. That was a big part of it. The data assimilation is the buzz word. What you're doing is you're pulling observational data into the model and using it to move the model forward. This is what the meteorologists and the weather models do on a routine basis. But this is a very new way of operating for oceanographers.

Carla: Great. We're a teeny bit over time, so I'm going to give you just one more question, but I just got to say your answers have been awesome so far. I really always love to hear things about how things are working well or what real science is like. So I got one more question kind of going back to the technology again.

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Question: Once all of those gliders and floats and drifters are deployed, are they all collected after they reach the end of their usable life or are they left out at sea [?] they stop functioning? How does that work?

Dr. Bingham: Excellent question. Typically the drifters and the floats are just left to go wherever they go. The gliders will be picked up. Those 3500 floats that I showed you—and our floats—will just disappear. It was interesting though. It was kind of fun. There was one point where we were able to go and pick a float up since we were in the vicinity and it was malfunctioning. We had a couple of floats that malfunctioned. If you can imagine this float in the water, all you'd be able to see is the very top right above here, and this antenna sticking up. It was out in the very middle of nowhere in the ocean. Amazingly enough we came right on top of it, and we were able to pick it up. But if we hadn't known exactly where it was, there was no way that anyone would be able to find it or see it. Even if you were looking hard for it you wouldn't be able to see it. You'd have to know exactly where it was. Anyway, the floats and drifters we'll leave out there, but the gliders we'll collect.

Carla: Great. Well I want to renew my thanks for such an excellent overview for all of this new technology. Also, to everyone who has come with us through this webinar series, I think it was a very nice arc of a story between the history of oceanography, and what's important about that high salinity area, and then really how do you get at the data that's going on in that area by using new tools and new technologies in combination. Thank-you very much to Fred and also to all of our other webinar presenters.