Serial Numbers:

* 9561
* 10200
* 10230
* 10242
* 10244
* 10258
* 10260
* 10268

Project Name: Pop-Up/Under Ice Buoys

We are using RockBLOCK Iridium Shields to develop new technology for ITAE (Innovative Technology for Arctic Exploration) to study oceanographic conditions in the Arctic. “ITAE is a collaborative research effort by University of Washington (JISAO), University of Alaska Fairbanks (UAF), and NOAA engineers and scientists at the Pacific Marine Environmental Lab (PMEL).” (<http://www.pmel.noaa.gov/itae/technologies>).

Because of the unique challenges of deploying and recovering equipment in the incredibly harsh, unpredictable environment during annual sea-ice breakup, conditions just under Arctic sea ice during Winter and Spring months are largely a mystery. However, we do know those conditions play a critical role in shaping one of the world’s most highly productive ecosystems during the ice-free Summer months. The Pop-Up Buoy is a new type of mooring, designed to collect a vertical profile of the water column and data at the water-ice boundary during these vital periods. The first version will collect information on Depth, Temperature, and Photosynthetic Active Radiation.

These devices are designed to be deployed from a research vessel during the ice-free season, where they remain anchored on the bottom for many months until the surface is completely covered in sea ice. At a designated time for each device, a timed release is triggered which allows the buoys to float upward in the water column and float just under the ice. The buoys remain under the ice until they are forced out by break-up and melting, transmitting their data to shore via satellite when they do arrive at the surface.

One of the most critical elements of this project has been driving down the cost of each buoy at every level. Low-cost pressure housings, sensors, electronics, and materials all needed to be integrated without sacrificing performance in order to make this a viable technology. RockBLOCK Iridium Shields were a crucial piece of this puzzle, allowing us to not only reduce the size and cost of the electronics, but also to dramatically reduce product development time.

Attached are some photos of the first buoys we have produced. Our original goal was to deploy them in the Chukchi and Bering Sea over the 2016-2017 Winter, but the complexity of the project caused us to miss our window of opportunity. There have been numerous mechanical and electrical engineering challenges, which have taken time and diligence to dissect. We are now looking for another chance to deploy them in late 2016 or early 2017, as permitted by ship schedules and research cruises.

Our last remaining problem is that we are having some difficulty with buffering data from our Arduino microcontroller to the iridium module, and are working through that now.

Other notes:

* The ITAE website has *some* information on this project, but it is limited and a little out of date. This particular write-up is the most comprehensive done so far.
* More contact information can be provided for scientists involved in the research if so desired. Please note it is a joint initiative, involving various scientists and engineers with different affiliations.
* The only items that would be particularly useful in the admin area are some more tools for data manipulation. We are essentially dumping a short text file back to shore through SBD, so it would be nice to have the option to export messages as a continuous string. It would also be nice to devise a method of compressing and decompressing data (i.e. send as hex data and export as text).