Print

Cape Abilities Partnership: Past Projects

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Cape Abilities crew member Lisa Magnuson adds the mounting flange to the top of the sediment trap wells. (Photo by Tom Kleindinst)

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From left to right: Cape Abilities Job Coach Buzz Friend, worker Lisa Magnuson holding the sediment trap well (with insert), and Project Manager Trevor Harrison holding the trap. (Photo by Tom Kleindinst)

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A deployed Cape Abilities-built sediment trap sits deployed on a dune on Santa Rosa Island, FL, waiting to collect wind trasport sand. WHOI Research Assitant, Richard Sullivan, records the heading of another trap in the background. (Photo by Trevor Harrison)

Aeolian Sediment Traps

Cape Abilities has undertaken another project with Rob Evans, along with colleages Jeff Donnelly and Andrew Ashton in the Coastal Systems Group.

Under a SERDP grant, the scientists are researching the formation and evolution of coastal sedimentary environments, looking especially at the coastal response to climate change, sea-level rise, and anthropogenic activities. The group contracted Cape Abilities to build fifty new aeolian sediment traps for deployment on Santa Rosa Island, a barrier beach in the Florida Panhandle. The traps offer temporally and spatially specific high resolution data concering wind driven sediment transport. The three scientists will combine this data with LIDAR data offering large scale, lower resolution information concerning key points in the island's lifespan (following Hurricanes Katrina and Dennis), as well as sediment cores and Ground Penetrating Radar offering insight into past shape and evolution of the island, with the eventual task of modeling the future of the island dependent on variables such as sea-level rise and storm frequency.

The sediment traps are a two part system, with a collector above ground capturing the sand and a below ground well with insert container to receive the sand. We built two versions of the trap. The first version is a rotating collector and a realtime data logger measuring water level in the receiving tube (sand falls into a tube with water, displacing the water, raising the water level). With data logger also recording time, we can determine the angle of the rotating trap by simultaneously logging the wind direction and speed at a control station. The second version of the trap is stationary, angled towards the prodominant wind direction of the area. These traps will offer only mass flux over the deployment time.

The sediment trap collector has sides of Galvanized Steel Metal, with a top and bottom made of PVC. The back of the trap has a fine (63 micron) stainless steel mesh to capture all but dust particles entering the trap. The trap well is composed of 3" PVC pipe, a pipe cap, and a flange to interface with the above-ground trap. The insert, which collects the sand, is made of 3" Polycarbonate Tubing, and capped at the bottom with an expandable gasket.

Cape Abilties workers participated in the following steps:

- Built the screens from raw materials
- Cut aluminum stock into frame pieces and assemble
- Cut screen
- Cut tubes to proper lengths
- Assembled the insert cap and insert tube
- Assembled trap collectors
- Pre drilling
- Screwing parts together

Awarded this contract in late January 2012, Cape Abilities completed all fifty traps by March 5, in time for their scheduled mid-March deployment on Santa Rosa Island.

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Cape Abilities Worker Carol Dimock crimps silver foil around a silver flag, a step in the creation of the silver core of the electrodes. Project Manager Trevor Harrison looks on. (Photo by Tom Kleindinst)

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A New Silver Chloride Electrode (Photo by Tom Kleindinst)

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WHOI researchers recover a magnetotelluric instrument built with Cape Abilities electrodes during a cruise on the RV Connecticut. The instrument had been on the seafloor a hundred miles off of Cape Cod. (Photo by Nick Waldo)

Silver Chloride Electrodes

From May 2011 through October 2011, we built 180 Silver-Silver Chloride Electrodes for use in a fleet of 20 new Seafloor Magnetelluric Instruments.

Originally designed between 1960 and 1970 by Jean Filloux of the Scripps Institute, the electrodes were long considered the best for their magnetotelluric application. For the new fleet, we took time to update the design, taking advantage of developments in materials science. The new model is more robust, less expensive, and more easily manufactured, with equal or better performance than the old version.

In May 2011, we began training a crew of four Cape Abilities workers to build the electrodes. They began their training with Environmental Health and Safety's General and Machine Safety courses. Project Manager Trevor Harrison and Cape Abilities Job Coach Buzz Friend trained the workers in the various tasks included in production, most of which are listed below. The crew worked in the lab one day a week for the six months, performing about 75% of the production process, with hazordous and delicate steps being completed by Trevor Harrison and WHOI Engineering Assitant Chris Judge. The entire batch of new Silver-Silver Chloride Electrodes is now complete.

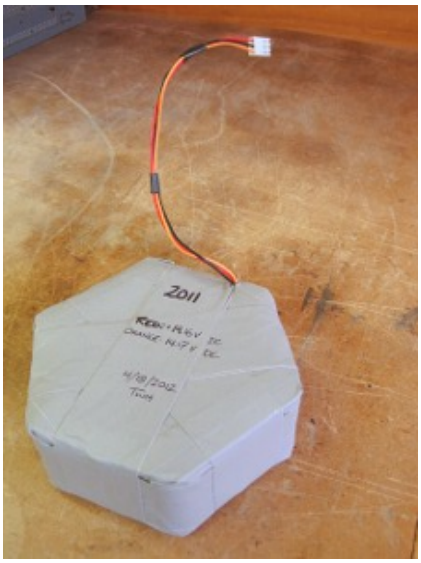
The production process includes the following steps:

- Assembling components
- Cutting, stripping cables
- Cutting wire to length
- Basic soldering
- Basic machining: use of drill press
- Clean handling of sensitive materials
- Hand sanding and deburring
- Rolling silver foil
- Crimping silver foil
- Pulverizing silver chloride

Battery Packs

A common site around Woods Hole Oceanographic Institution, alkaline battery packs supply power to many oceanographic instruments, buoys, and underwater vehicles.

Acoustics researcher Art Newhall of the Ocean Acoustics and Signals Lab (in the Applied Ocean Physics and Engineering Dept.) contacted Cape Abilities to assemble a number of power packs for use in the REMUS AUV Gateway Bouy. These packs will be used during field work to study acoustic scattering from fish schools.



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One of the six alkaline battery packs assembled by Cape Abilities worker Carol Dimock. (Photo by Art Newhall)

Cape Abilities Worker Carol Dimock, who learned soldering on the Silver Silver Chloride Electrode project, assembled six packs. She performed all of the steps necessary in the build-up:

- Cutting and stripping wire
- Tinning wires and batteries
- Mechanical assembly of the batteries into a pack
- Wiring two sets of 9 batteries in series to create the requisite 14.4V pack
- Final wrapping of the pack
- Adding Molex pins and shell for external connection

The packs were load tested and cleared for use by the project manager.

Related Links
&#0187 Cape Abilities Partnership Video

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