MBARI scientists study underwater avalanches

Laurel Hamers, Santa Cruz Sentinel, 11-9-15

MOSS LANDING -- In a murky underwater abyss that's deeper than the Grand Canyon, strong currents and underwater avalanches pull everything from pesticides to plankton away from the California shore and into the deep ocean. But because conducting research in the otherworldly environment of Monterey Canyon is so challenging, scientists understand very little about how this material moves and the impact it has on our planet.

Now, researchers at the Monterey Bay Aquarium Research Institute are spearheading an 18-month international effort to put as many sensors and monitoring devices as possible into Monterey Canyon to learn how material moves through its depths. The canyon, which begins offshore near the institute's headquarters in Moss Landing, extends about 95 miles into the Pacific Ocean.

"These channels carry a huge amount of material, and we know surprisingly little about how this moves," said Charles Paull, a scientist at the institute who is leading the project.

Unlike rivers on land that flow constantly, the flows in submarine canyons are unpredictable — periods of relative calm are punctuated several times a year by large cascades of sediment.

The flows have wide-ranging effects. For instance, phytoplankton washed down the canyon can carry oxygen down to the depths of the ocean. The flows also can bring pesticides and other pollutants that wash off the land out to sea. Undersea geologic events such as these can even disrupt underwater fiber-optic cables carrying massive amounts of data between continents, though such cables are not found in Monterey Canyon.

In the past few weeks, Paull and his collaborators at the United States Geological Survey and schools in China and the United Kingdom have lowered arrays of instruments into different parts of the canyon — devices to measure current, water temperature, sediment levels and other data that could illuminate how material is moving through the canyon.

They're also using beach-ball-sized devices developed by institute engineers that track avalanches by moving with the sediment. The balls idle until they experience an acceleration, then snap into action to measure how far and how fast they've been carried by the avalanche.

Scientists have collected such measurements in the canyon before, but never so extensively. The coordinated effort provides data in context, "which promises to be much more powerful than just collecting little bits of this data piecemeal," Paull said.

"We've never had a data set like this. Nobody has ever tried this anywhere else in the world," said Peter Talling, a collaborator at the National Oceanography Centre in Southampton, England.

The researchers won't start getting data back from most of the devices until April, when they'll send automated underwater vehicles down to the bottom of the canyon to retrieve the equipment arrays and bring them up to the surface. There, they'll extract the data, change the batteries and send the equipment back down.

"Historically one reason we know so little is that people have been too scared to put instrumentation in the canyon," Paull said. "You can't study the process if you keep hiding from it."