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Ed Parsons: Museum of the White Mountains

Origami as a form of math-art at the Museum of the White Mountains in Plymouth. (ED PARSONS PHOTO)

PLYMOUTH — The Museum of the White Mountains in Plymouth has a new exhibit called "Forecasting: Climate Change and Water Impact." The other day, instead of going hiking, I went over with a friend to see it. It is impressive. I recommend it to Mount Washington Valley residents and teachers.

Climate change, like the air, is invisible, though real. Educating the public has been a challenge for scientists. This exhibit weds science with art, creating a vehicle for understanding through art.

This is consistent with an educational approach for students called STEAM. This stands for science, technology, engineering, art and mathematics. This used to be STEM. But adding art gives students a design approach to real world problems, using design principles to encourage creative solutions.

As I walked around and spoke with Interim Director Marcia Blaine, I realized that this was different from my experience with past exhibits at the museum. This exhibit was an educational tool and, in effect, the tip of an iceberg, inviting one to look more deeply beneath the surface.

Though it was about the whole planet and its water, mountains were an integral part of it, and Mount Washington in particular.

Eric Kelsey is the director of research at the Mount Washington Observatory and assistant research professor in atmospheric science at Plymouth State University. Part of the exhibit stems from his research.

In Kelsey's words: "We are seeking to understand why the summit of Mount Washington is warming more slowly than the lower elevations of the Northeast. This decreasing warming trend with elevation opposes what is occurring at several other mountain ranges and what climate models predict in the future."

Research on this topic at the Obs includes the "boundary layer exposure project," with collaborators from the Appalachian Mountain Club and Dartmouth.

"The boundary layer of the atmosphere rises from the surface of the Earth to about 1-3 kilometers, and is highest in summer," Kelsey said. "Above that is the more stable 'free troposphere.' The boundary layer has different moisture, cloud and thermal properties from the free tropospheric air above. As the climate warms, observations indicate these two air masses are warming at different rates.

"Because the summit of Mount Washington can experience either air masses throughout the year, what is the impact of changing air mass exposure on climate and the health of ecosystems in the mountains?" he asked.

The answers are important. In Kelsey's words: "Mountain ecosystems provide sustaining water, natural resources and numerous economic benefits for more than half of the world's population. Climate change threatens the stability of these mountain ecosystems."

A method was devised to find the boundary layer on Mount Washington. "Compared to the free troposphere, water vapor molecules in the boundary layer more often contain heavy oxygen ^{180}, an isotope that has two neutrons more than the lighter oxygen ^{160} that constitutes 99 percent of all oxygen atoms."

To find where the boundary layer was on Mount Washington, Kelsey drove up and down the Auto Road, collecting water vapor isotope samples at different altitudes, looking for the transition from heavier (180) to lighter (160) oxygen isotopes.

In the midst of this ongoing research, he collaborated with two of the museum exhibit's contributing artists, Shandra McLane and Kimberly Anderson Ritchie. Using a large profile drawing of the mountain with towers on top, and lines and arrows showing prevailing westerly winds in the boundary layer, they created an acrylic panel illustrating the boundary layer on the mountain. For extra effect, a video projector depicts clouds going by. The making of this panel is shown in a film, which can be played by museum visitors.

One result of the Mount Washington research so far, said Kelsey: "Our team has learned that strong winds can push shallow boundary layer air over the summit on days when the boundary layer otherwise stays 1,000 feet below the summit elevation in the valleys. This process results in cooler summit temperatures and may in part be responsible for the slower warming trend."

Both McLane and Ritchie have many works of their own displayed, other than the one mentioned above. They were also co-curators of the exhibit along with Cynthia Robinson, curator of the nearby Karl Drerup Gallery.

McLane is a glass artist and owns Squam River Galley in Ashland. She is an active advocate for the STEAM initiative, having received grants and taught interdisciplinary practices in various places around the world. She visited the five oceans of our planet over a two-year period, observing ocean rise, fish migration and species disappearance. Her show within the show is called "Oceans in Relief," and is made of kiln-formed glass reliefs, and other objects including a large clear object representing an industrial fishing sinker weight.

Ritchie is an assistant professor of art at Plymouth State. Her work in the show employs cyanotypes, or photographic blueprints, showing shrinking water bodies around the world. These are striking as you walk in the entrance door and look on the wall to your right. Her other work, called "Ice Shelves," is about climate change affecting large ice shelves. In Antarctica, the Larsen C ice shelf is about to calve a piece the size of Delaware.

Fawn Atencio of Denver, Colo., contributed paintings and prints to the exhibit in a series called "Atmospheres" that show water bodies affected by climate change, and shrinking. Nine years ago, she and her husband traveled through Asia and Africa, observing the shrinking supplies of potable water. One of the sad things she remembers in India was locals filling bottles from their limited supply and selling them to tourists as pure water.

Then there was the father-and-son team of Martin and Eric Demaine, who create math-art. Martin is an artist in residence at the Massachusetts Institute of Technology, and his son is a professor of computer science. For fun they create math-art and work on new problems in mathematics together. For the exhibit, they have examples of curved/crease folding origami. These are striking.

According to Eric Demaine, this kind of design innovation promotes a different way of looking at the world. "Folding base engineering could have an impact on the future and even on climate change," he said.

To emphasize this connection, one of the origami pieces has some tiny plastic green frogs scattered about it. "This represents the 'Rabbs fringe-limbed tree frog,' which went extinct in Panama in 2009," he said. Frogs and other amphibians are keenly sensitive to temperature and water availability, making them extremely vulnerable to climate change.

Curious to go deeper for your own information or for your students'? The museum has two interesting upcoming programs:

-- Wednesday, Feb. 22. 5:30-7 p.m. — "Art Meets Science: Climate Change and Atmosphere," with Fawn Atencio and Eric Kelsey. Free.

-- March 10 from 9:30 a.m.-2:20 p.m. — "Interweaving Art, Science and Technology in our Classrooms." $30 for lunch and materials.

Go to the Museum of the White Mountains website to learn more (www.plymouth.edu/museum-of-the-white-mountains).