Oyster-Size Me!

Q Why are oysters from some sections of Washington's Willapa Bay less meaty than those from other areas?

A A new study has found that the water flowing through Willapa Bay can take up to four tidal cycles—or two days—to be replaced by new water from deeper portions of the bay or the open ocean. The lingering older water contains less food for sea creatures, and the study found a 25% decrease in dry tissue weight per shell height in oysters from parts of the bay with more old water compared to oysters that grow where the new water is more abundant.

Lead author Elizabeth Wheat of the University of Washington (UW) explains that before the new study, "there had been this belief that when water drains off of tide flats or out of a bay, currents and wind mix that water up. It turns out that this is not necessarily true. It takes multiple tidal cycles for this mixing to occur." According to coauthor Jennifer Ruesink, also of UW, the new research "is the first time that both a model and field data show 'old' water close to shore across tidal flats." The research was published in *Estuarine, Coastal and Shelf Science*. [Source: University of Washington]

Hot Take on Polar Vortex Effects

CAUSE: Weakening and warming of the springtime Antarctic polar vortex. ▶ **CONNECTION: Equatorward shift of the midlatitude westerly jet stream, with subsidence and warming in the subtropics.** ▶ **EFFECT: Extreme hot and dry conditions in Australia from late spring to early summer.**

A new study published in *Nature Geoscience* is the first to "identify and quantify a direct link between variations in the Antarctic polar vortex in spring and Australian hot and dry extremes from late spring to early summer," says Ghyslaine Boschat of Monash University (MU). By studying observations from the years 1979–2016, Boschat and colleagues discovered that extreme hot and dry weather in Australia—including heat waves and heightened wildfire conditions—was 4–8 times more likely with a significant weakening and warming of the stratospheric polar vortex. Coauthor Julie Arblaster, also of MU, says that the findings "can help us predict and prepare for these extreme events with sufficient lead time in Australia, and possibly in other regions of the Southern Hemisphere." [Source: Monash University]

Another First for Humanity

230 **parts per million—** Earth's average atmospheric CO_2 concentration during the Pleistocene Epoch, which started about 2.6 million years ago and lasted until about 11,700 years ago.

320 **parts per million—** Earth's CO_2 concentration in 1965. A recent study found that these are the highest CO_2 levels since the emergence of the very first Homo erectus. Scientists studied soil carbonates taken from central China to determine CO_2 levels for the last 2.5 million years.

410+ **parts per million—** Earth's current CO_2 concentration.

"We evolved in a low-carbon dioxide environment," says coauthor Yige Zhang of Texas A&M University. "[T]his current high-carbon dioxide environment is not only an experiment for the climate and the environment—it's also an experiment for us, for ourselves." The research was published in *Nature Communications*. [Source: Texas A&M University]

ECHOES

A Green Solution to Air Pollution

"The fact is that traditionally, especially as engineers, we don't think about nature; we just focus on putting technology into everything."

— Bhavik Bakshi of The Ohio State University, on a recent study that suggests introducing more plants may be cheaper than adding more technological interventions to curtail air pollution. Bakshi and colleagues studied emissions and land cover data for counties across the United States and calculated the cost of adding new plants. They modeled an increase of plant cover so that each county would at least match the current regional cover averages (which are, for example, lower in desert areas than in forested areas). This level of vegetation reintroduction to the landscape led to a 27% reduction in air pollution. In 75% of the counties, the plants would mitigate air pollution more economically than alternative technological approaches such as adding more smokestack scrubbers. "[W]e need to start looking at nature and learning from it and respecting it," Bakshi says. "There are win-win opportunities if we do—opportunities that are potentially cheaper and better environmentally." The study was published in *Environmental Science & Technology*. [Source: The Ohio State University]