

The discoveries awaiting us in the ocean's twilight zone

Below the sunlit surface waters, there's an otherworldly realm known as the twilight zone. At 200 to 1,000 meters below the surface, sunlight is barely a glimmer. Tiny particles swirl down through the darkness while flashes of bioluminescence give us a clue that these waters teem with life: microbes, plankton, fish. Everything that lives here has amazing adaptations for the challenges of such an extreme environment. These animals help support top predators such as whales, tuna, swordfish and sharks. There could be 10 times more fish biomass here than previously thought. In fact, maybe more than all the rest of the ocean combined. There are countless undiscovered species in deep waters, and life in the twilight zone is intertwined with earth's climate.

Yet the twilight zone is virtually unexplored. There are so many things we still don't know about it. We know so little about the twilight zone because it's difficult to study. It's exceedingly large, spanning from the Arctic to the Southern Ocean and around the globe. It's different from place to place. It changes quickly as the water and animals move. And it's deep and dark and cold, and the pressures there are enormous.

What we do know is fascinating. You may be imagining huge monsters lurking in the deep sea, but most of the animals are very small, like the lantern fish. And this fierce-looking fish is called a bristlemouth. Believe it or not, these are the most abundant vertebrates on earth and many are so small that a dozen could fit in this one tube.

It gets even more interesting, because small size does not stop them from being powerful through sheer number. Deep, penetrating sonar shows us that the animals form dense layers. This is actually the largest animal migration on earth. It happens around the globe every day, sweeping through the world's oceans in a massive living wave as twilight zone inhabitants travel hundreds of meters to surface waters to feed at night and return to the relative safety of deeper, darker waters during the day. These animals and their movements help connect the surface and deep ocean in important ways. The animals feed near the surface, they bring carbon in their food into the deep waters, where some of that carbon can stay behind and remain isolated from the atmosphere for hundreds or even thousands of years. In this way, the migration may help keep carbon dioxide out of our atmosphere and limit the effects of global warming on our climate.