

Breath of the ocean links fish feeding, reefs, climate

An ocean odor that affects global climate also gathers reef fish to feed as they "eavesdrop" on events that might lead them to food.

Dimethylsulfoniopropionate (DMSP) is given off by algae and phytoplankton, microscopic one-celled plants that float in the ocean. Release of DMSP usually indicates either that tiny animals in the plankton are feeding on the algae, or that massive growth of algae -- an algal bloom -- has occurred, said Jennifer DeBose, a UC Davis graduate student and now a researcher with the National Oceanic and Atmospheric Administration's Flower Garden Banks National Marine Sanctuary in the northwestern Gulf of Mexico.

Once released from the ocean into the atmosphere, derivatives of DMSP promote cloud formation, so clouds reflect more sunlight back into space and cool the Earth.

These sulfur compounds are also known to serve as odor signals to marine organisms and are likely to play an equally important role in marine ecology, said Gabrielle Nevitt, professor of neurobiology, physiology and behavior at UC Davis and senior author on the study. The researchers wanted to know if reef fish also respond to these chemicals.

DeBose released plumes of DMSP at low concentrations on reefs off the Caribbean island of Curacao, Netherlands Antilles.

"It was pretty impressive," she said. "We would be surrounded by hundreds of fish for up to 60 minutes." The plumes mostly attracted fish known to feed on plankton, such as brown chromis and Creole wrasse, and the researchers noted that these fish were mostly arriving from down-current as if they were following a plume of scent.

The fish are using scent to "listen" to the interaction between plant plankton and their predators, DeBose said.

"They're not smelling food, but other cues that might lead them to food," she said.

DMSP is also given off by zooxanthellae, one-celled organisms that live inside coral polyps and allow them to photosynthesize. Stressed or damaged coral can lose its zooxanthellae and become "bleached," Nevitt said.

"DMSP is the smell of a productive, healthy reef," she said.

DMSP has mostly been studied in the context of atmospheric chemistry and global climate regulation, and not as a signaling molecule, Nevitt said. A better understanding of its effects could help in the recovery of damaged reefs, and understanding the links between climate change and the biological realm.

Source: University of California - Davis

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