Massive swarm of tunicates tilts ocean's chemical balance

January 31 2012

A surge of nutrients to the warm waters off the southeastern coast of Australia during the highly productive austral spring can spark an explosion in the phytoplankton population. Where phytoplankton bloom, so do the predators that feed on them. Some of these predators, like the globally prevalent, barrel-shaped tunicate salp Thalia democratica, excel at capitalizing on the transient nature of phytoplankton blooms.

Salps are tiny gelatinous creatures that feed on plankton and other microorganisms by straining them from the ocean water with a fine mesh sieve. A rarity among multicellular animals, salps retain the ability to reproduce by asexual budding, with one salp spawning a clone of itself. This budding, combined with sexual reproduction, enables salp populations to grow by up to 250 percent per day.

During early October 2008 the southbound waters of the East Australian Current entrained a column of nutrient-rich coastal water, spawning a self-contained clockwise-rotating cold water eddy. Within the eddy, nutrient-rich deep water mixed with warm surface waters, sparking a surge in phytoplankton and, consequently, salp populations. Using temperature, salinity, fluorescence, and nutrient concentration measurements, along with particulate matter concentration detections, Everett et al. describe the highest-density salp population ever recorded.

Concentrated in a 15-kilometer by 20-meter (9-mile by 66-foot) disk, the authors estimate that roughly 40 trillion salps gorged on phytoplankton, with a peak density of more than 6,000 salps per cubic

meter. Samples from the swarm showed individuals ranging from 0.5 to 5 millimeters (0.02 to 0.2 inches) in length. Stretched end to end, the swarm would stretch halfway to the Sun. Salp swarms can have a powerful temporary effect on localized biology, impinging other species' survivability by limiting carbon and nitrogen supplies.

The authors estimate that this swarm would have tied up 264 metric tons (582,000 pounds) of carbon and 72 metric tons (159,000 pounds) of nitrogen.

More information: Three-dimensional structure of a swarm of the salp Thalia democratica within a cold-core eddy off southeast Australia, J. D. Everett and I. M. Suthers, *Journal of Geophysical Research-Oceans,* doi:10.1029/2011JC007310 , 2011

Provided by American Geophysical Union