

TINY CELLS WITH A BIG IMPACT: AN UNEXPECTED BLOOM IN THE MID-ATLANTIC

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1. Unusual Observations

NOAA's Mid-Atlantic Bight ecosystem monitoring survey of November 2-12, 2018 encountered an unprecedented, massive bloom of gelatinous phytoplankton, which completely clogged 335 μm zooplankton nets. This widespread bloom was encountered throughout a large part of the cruise track (see far-right panel).



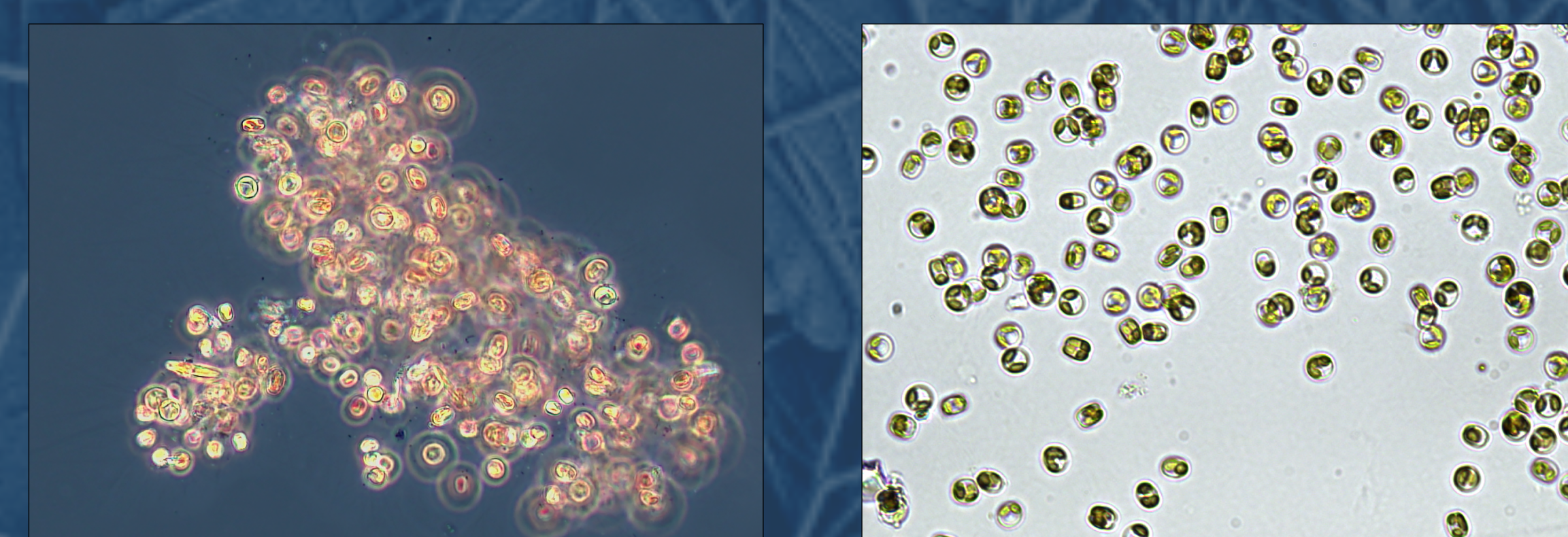
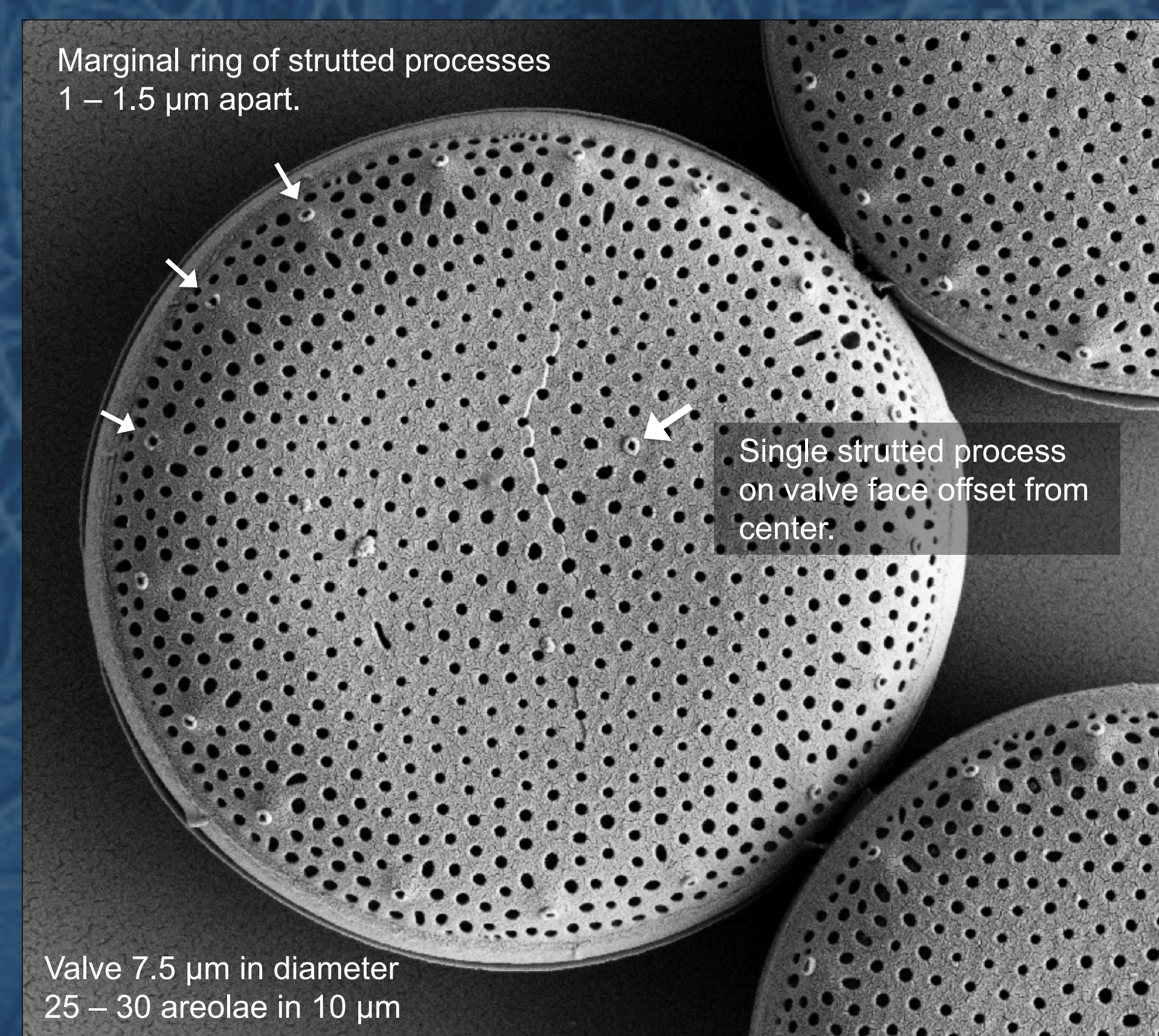
Left, a 335 μm plankton net fouled with brown, slimy phytoplankton.

Below, the net's contents scraped into a sample tray. Note the dark color and gelatinous consistency.



2. Microscopy & Taxonomy

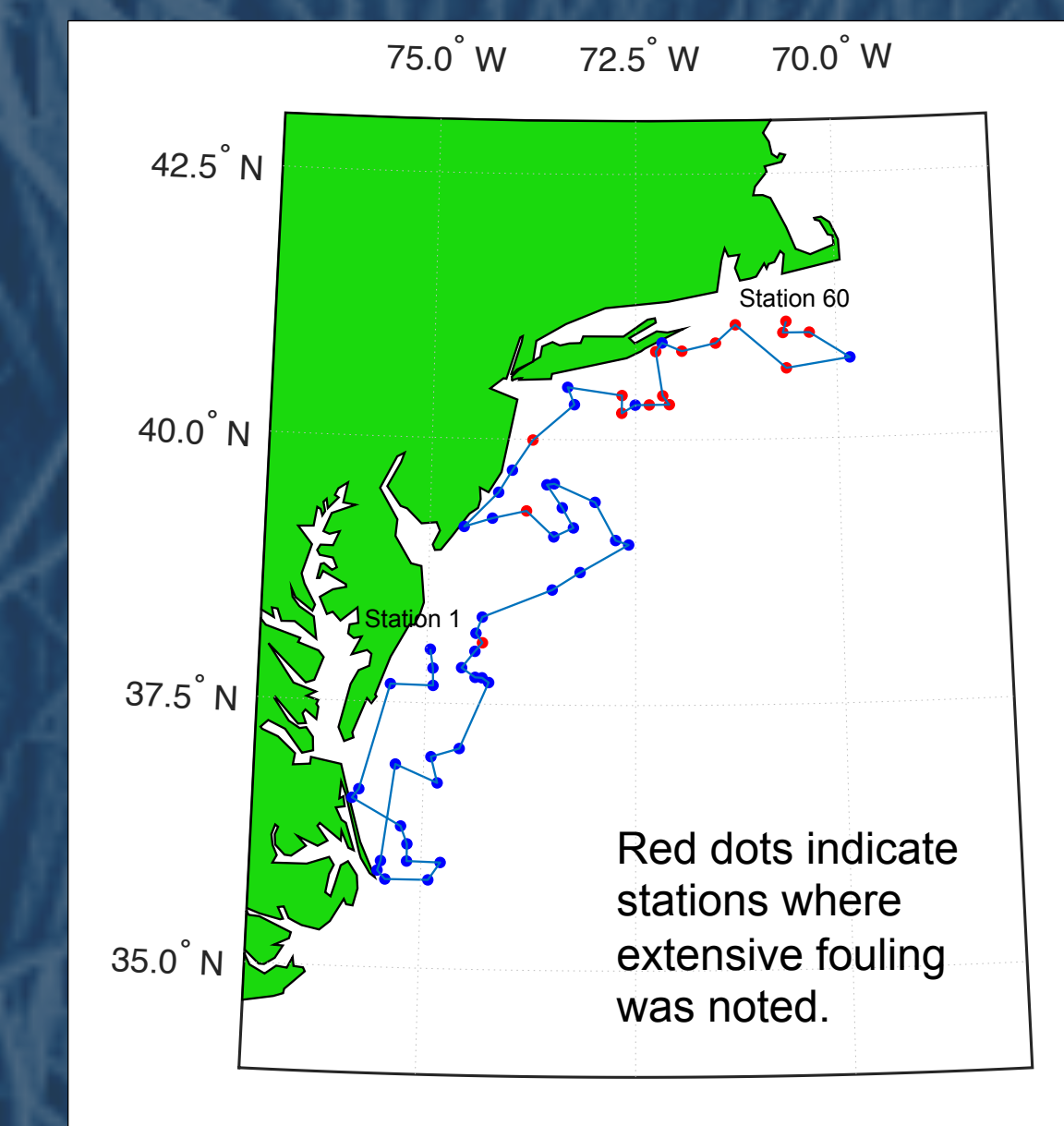
Light microscopy of preserved samples brought back from the cruise revealed a nearly monospecific bloom of $\sim 7.5 \mu\text{m}$ cells embedded in a gelatinous matrix. This morphology is characteristic of several species of *Thalassiosira* (Bacillariophyceae) and *Phaeocystis* (Prymnesiophyceae), both of which are known for causing noxious blooms but are only distantly related, and have very different biogeochemical impacts on Earth's ecosystems. Using Scanning Electron Microscopy (SEM, below), we identified this organism as the diatom *Thalassiosira mala* Takano.



This diatom has been previously observed in Narragansett Bay, but at much lower concentrations. Above left, a live, dense mucilaginous colony (phase contrast). Right, loosely associated cells (brightfield).

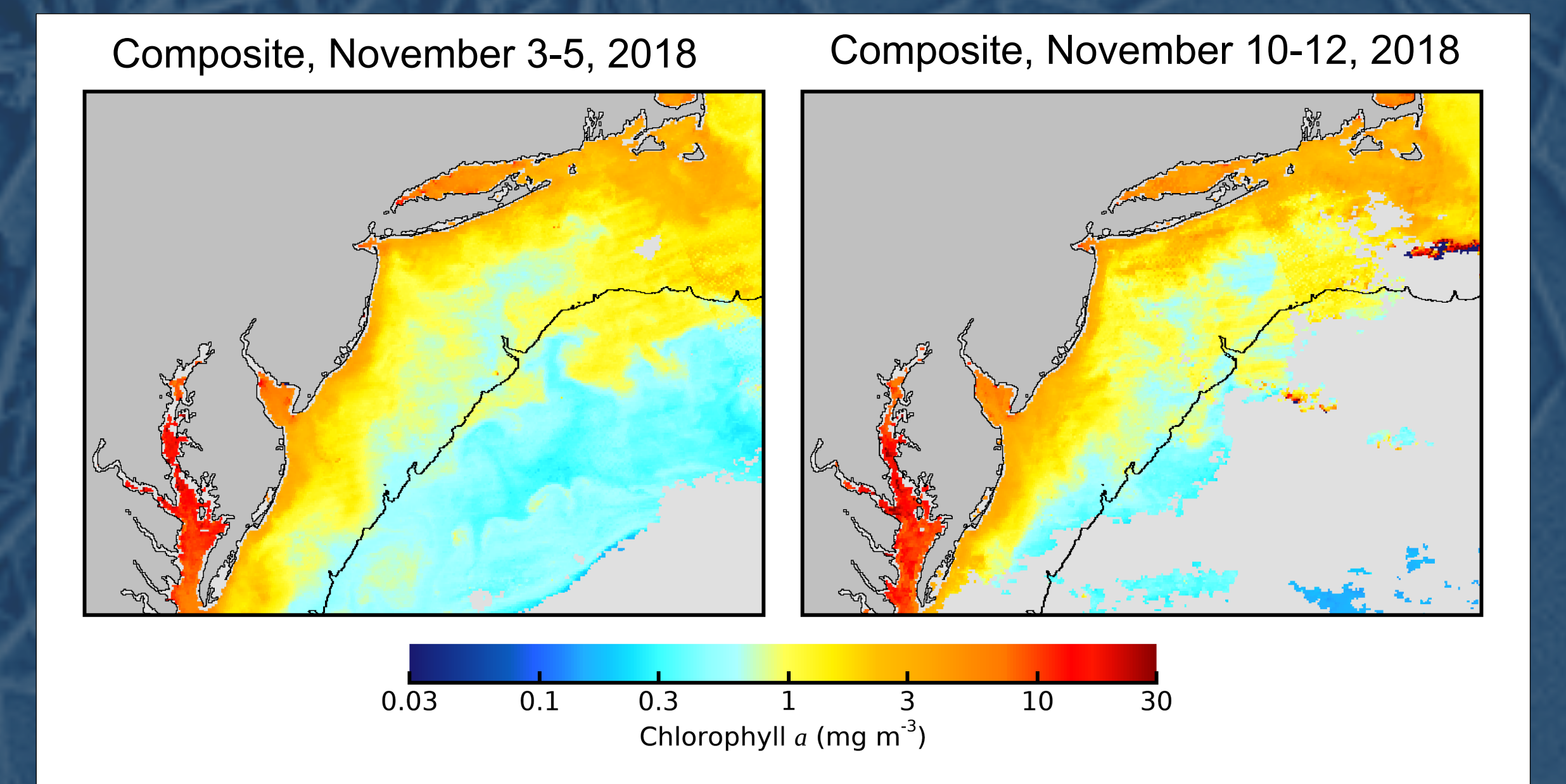
The copious fibers in our background SEM image are chitan threads, which emanate from the diatom's marginal ring of strutted processes. They are responsible for creating the gooey, gelatinous consistency of the colonies, known to impair filter-feeding mollusks.

3. The Big Picture



At left, Cruise track of the Northeast Fisheries Science Center's Mid-Atlantic Bight Ecomon survey on R/V Sharp, November 2-12, 2018.

We compared ship-based observations to remote sensing data for this time period: Satellite imagery shows an extensive phytoplankton bloom throughout the Mid-Atlantic Bight, however the heaviest fouling of nets and instruments occurred mostly in southern New England waters.



Thalassiosira mala has a wide geographic distribution but is rarely reported, presumably because it is often overlooked or misidentified because of its small size. It has, however, been observed in Narragansett Bay on multiple occasions. Given the magnitude of this unusual bloom and the taxon's potential for causing noxious events, closer study of the ecology and distribution of this diatom in our region is warranted.

References: Takano, H. (1965). New and rare diatoms from Japanese waters - I. Bulletin of the Tokai Regional Fisheries Laboratory 42: 1-10. ; Hargraves, P.E. & L. Maranda (2002). Potentially toxic or harmful microalgae from the Northeast coast. Northeastern Naturalist 9: 81-120.
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