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The settling mechanism of *Noctiluca scintillans* and its implications for actual coastal ecosystem

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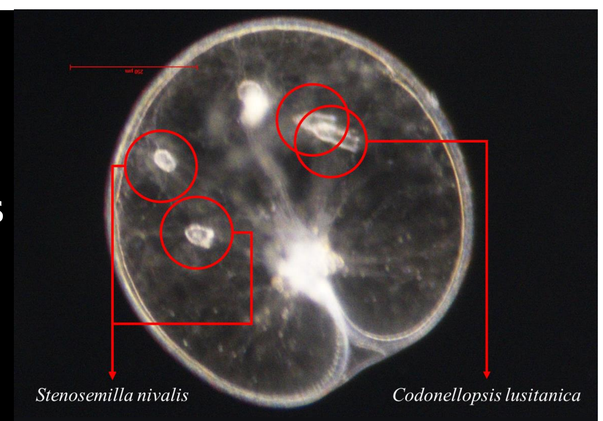
Introduction

Noctiluca scintillans is a heterotrophic dinoflagellate, capable of regulating its cell's ammonium concentration through feeding to control density flotation and sinking. Observations in Nangan island, Matsu from 2020 to 2021 showed a negative correlation between *Noctiluca* and tintinnid (One of the oligotrich ciliate). Additionally, field sampling revealed records of *Noctiluca* feeding on tintinnid ciliates and their subsequent sinking. It is hypothesized that during *Noctiluca* blooms, feeding on tintinnids cause their depletion in surface waters. This study aims to observe the size of *Noctiluca* food vacuoles and assess their efficiency in promoting sinking by feeding on different prey.

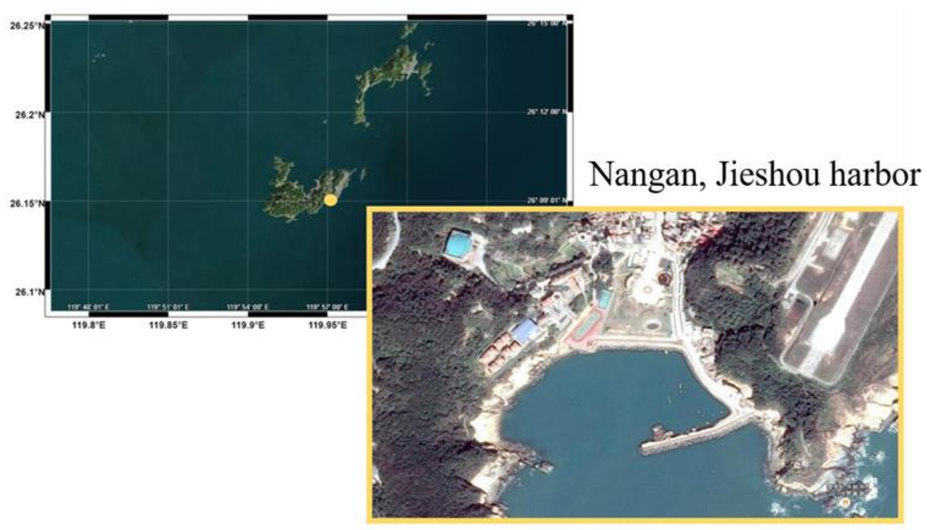


Tintinnid ciliate inside *Noctiluca*'s food vacuoles

Material and Methods

During 2020 and 2021, we collected samples of *N.scintillans* and Oligotrich (Tintinnid and Naked ciliate). *N.scintillans* samples were specifically obtained during the bloom season (March to July). After fixation, all samples were counted under a microscope. Feeding experiments involved seven species of tintinnids, *Tetraselmis chui*, and Pseudo-nitzschia feeding on *N.scintillans*. We monitored the settling rates of *N.scintillans* and measured food vacuole sizes.

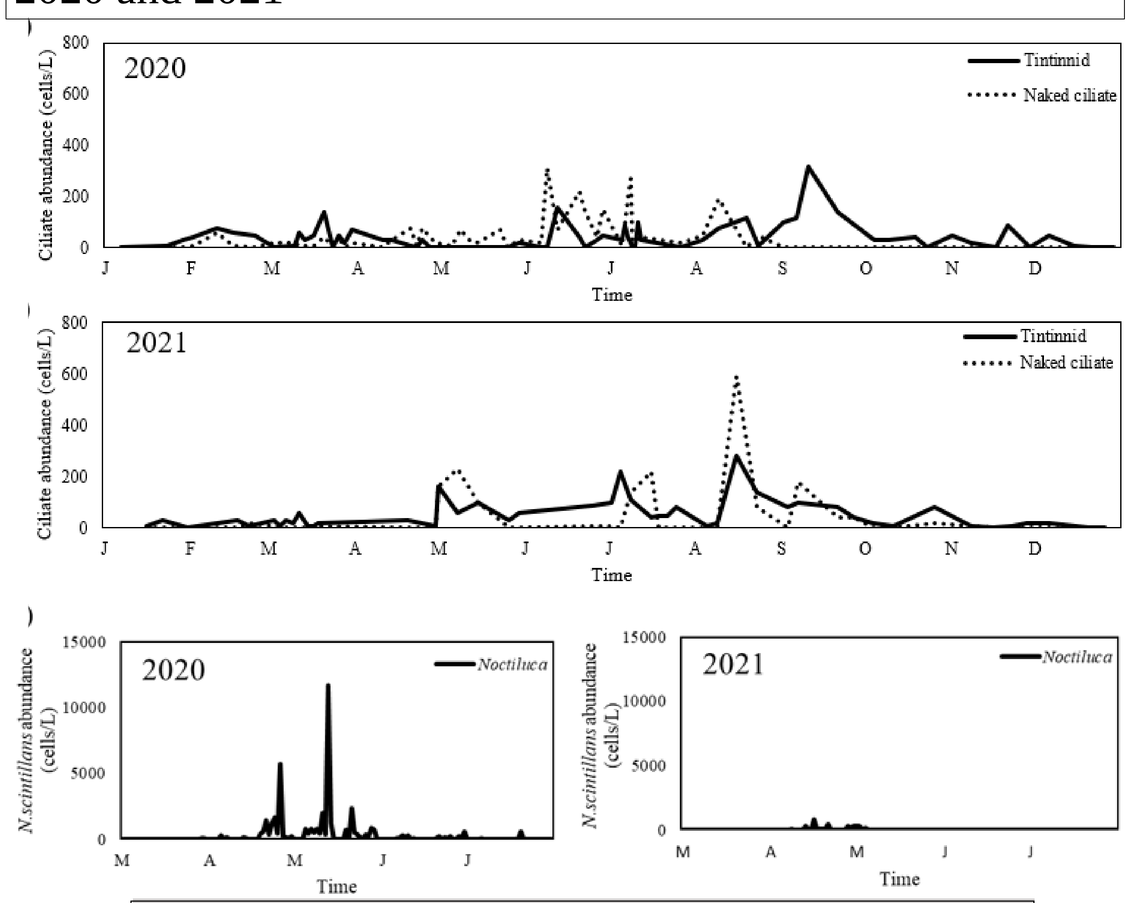
Sampling Spot



Nangan, Jieshou harbor

Result

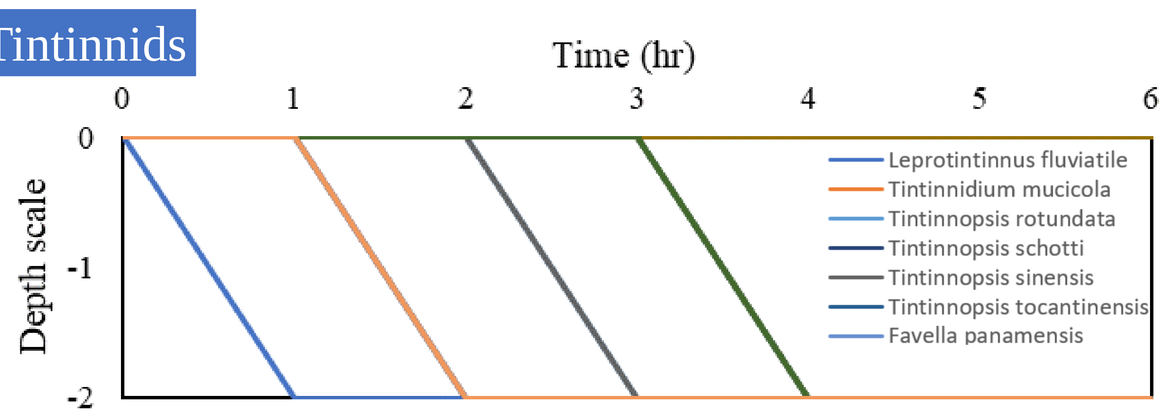
Temporal distribution of Oligotrich and *N.scintillans* during 2020 and 2021



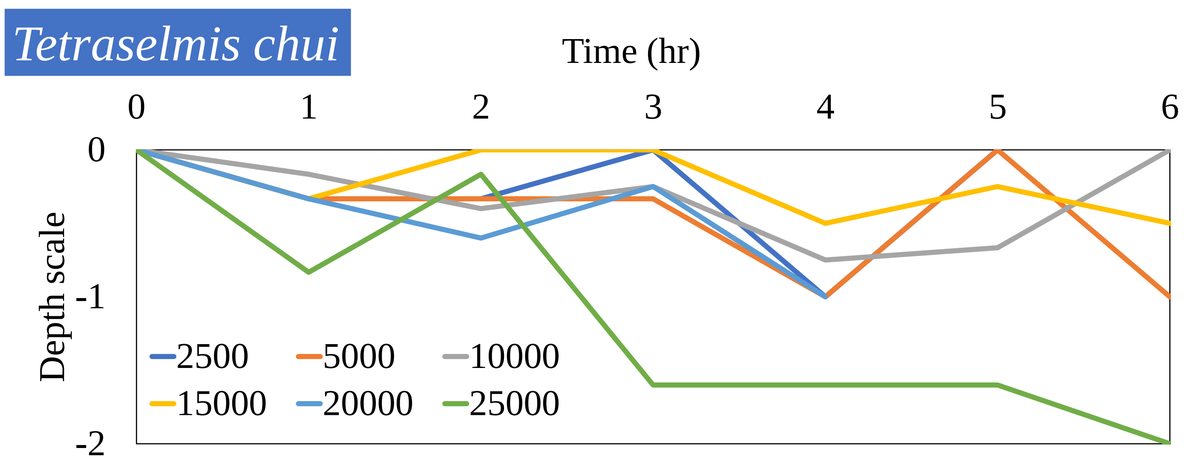
	Tintinnids	Naked ciliates	*N.scintillans*
Tintinnids	1	-.103	-.719*
Naked ciliates	-.103	1	.303
N.scintillans	-.719*	.303	1

Settling rate : Comparison between three types of prey reveals that tintinnids seem to be the most efficient prey in inducing settlement of *N. scintillans*. *T. chui* can only induce settlement of *N. scintillans* under high concentration conditions. None of the *N. scintillans* settle after predating *Pseudo-nitzschia*.

Tintinnids

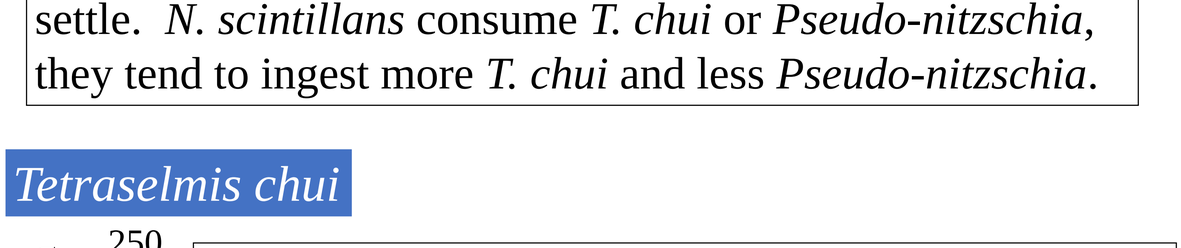


Tetraselmis chui



Food vacuoles area : When *N. scintillans* predate on tintinnids, it only need 1 tintinnid to make *N. scintillans* settle. *N. scintillans* consume *T. chui* or *Pseudo-nitzschia*, they tend to ingest more *T. chui* and less *Pseudo-nitzschia*.

Tetraselmis chui



Pseudi-nitzschia

Conclusion

- *N. scintillans* predate on tintinnid ciliates, they consistently exhibit sinking behavior, regardless of the number of individuals being consumed
- *N. Scintillans'* predation on the highest concentration of *T. choi* induces sinking behavior, but the highest concentration *T. choi* in the feeding experiment cannot be found in nature environment
- This finding highlights rather the significant role of tintinnid ciliates than the overestimate of the effect of food vacuole size in the sinking mechanism of *N. scintillans*.