Combined effects of temperature and microplastics on *Phaeodactylum tricornutum* and *Nitokra Spinipes*

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Human activity has led to two major environmental stressors: climate change and plastic pollution. Due to their increasing production rate, wide distribution, and durability, plastic debris is accumulating and becoming omnipresent in marine environments. Microplastics (MPs) are small plastic debris ranging in size from 1 µm to 5 mm. They can be produced through the fragmentation of larger plastic debris or can be manufactured as microbeads and released directly into the environment. There is a growing concern about the potential effects of MPs on marine biota, for example, MP ingestion may lead to metabolic and energetic costs. These particles can act as complex stressors in marine environments due to their wide range of shapes, sizes, specific densities, polymer types, and degradation stages. Since laboratory work in the past has focused on individual effects of pristine, spherical MPs on organisms, the potential effects of realistic mixtures of MPs at environmentally relevant concentrations are not yet fully understood. Next to plastic pollution, climate change induces additional stress in marine organisms. The goal of this study is to assess the combined effects of rising temperatures (according to IPCC climate change scenarios) and microplastics on marine organisms. To do so, phytoplankton (*Phaeodactylum tricornutum*) and zooplankton (*Nitokra Spinipes*) will be exposed to microplastics under realistic environmental scenarios in laboratory experiments following standardized protocols (e.g. [ISO/TS 18220:2016]). To this end, we expect to see a decrease in the zooplankton filtration rate with increasing MP concentration. Possible differences in responses are expected for different temperature conditions, indicating if climate change will enhance or mitigate plastic pollution effects. The assessed combined effects of temperature and microplastics in organism growth and survival are key to understanding potential repercussions at a population level.

Keywords
Climate Change; Global Warming; Microplastics; Plastic Pollution; Ecotoxicology