Dear Editor-in-Chief of Ecology and Evolution,

I am writing about the submission of our manuscript entitled “Recurrent heatwaves slow down the recovery of a phytoplankton community” for consideration for publication in Ecology and Evolution. Our study addresses a critical gap in understanding how repeated heatwaves affect the ecological resilience of aquatic communities.

Our research uses an outdoor freshwater mesocosm experiment to simulate three subsequent heatwavess on a semi-natural phytoplankton community. We aimed to test two hypotheses: critical slowing down and community rescue. Critical slowing down predicts a reduction in resilience leading to potential community collapse, whereas community rescue suggests increased resilience and stable ecosystem functioning despite recurrent perturbations.

Our findings indicate strong evidence for critical slowing down but no support for community rescue. Specifically, we observed a gradual decline in the recovery capacity of primary productivity and dissolved oxygen following the first two heatwaves, with a sharp decline after the third heatwave. This functional decline correlated with significant compositional turnover within the phytoplankton community. Although our data did not suggest a shift to an alternative stable state, they underscore the potential for reduced overall resilience in phytoplankton communities subjected to repeated heatwave events.

We believe our study provides valuable insights into the mechanisms underlying community resilience and highlights the necessity of monitoring recovery dynamics in aquatic ecosystems facing frequent severe perturbations. Our work aligns well with the journal's focus on ecological processes and contributes to the broader understanding of climate change impacts on ecosystem stability.

We hope our findings will stimulate further research and discussion within the scientific community.

Thank you for considering our manuscript for publication, and we look forward to your response.

Sincerely,

Francesco Polazzo,

Markus Hermann,

Melina Crettaz-Minaglia,

Andreu Rico