Thermal legacies promote stability of rocky intertidal biofilm to warming extremes

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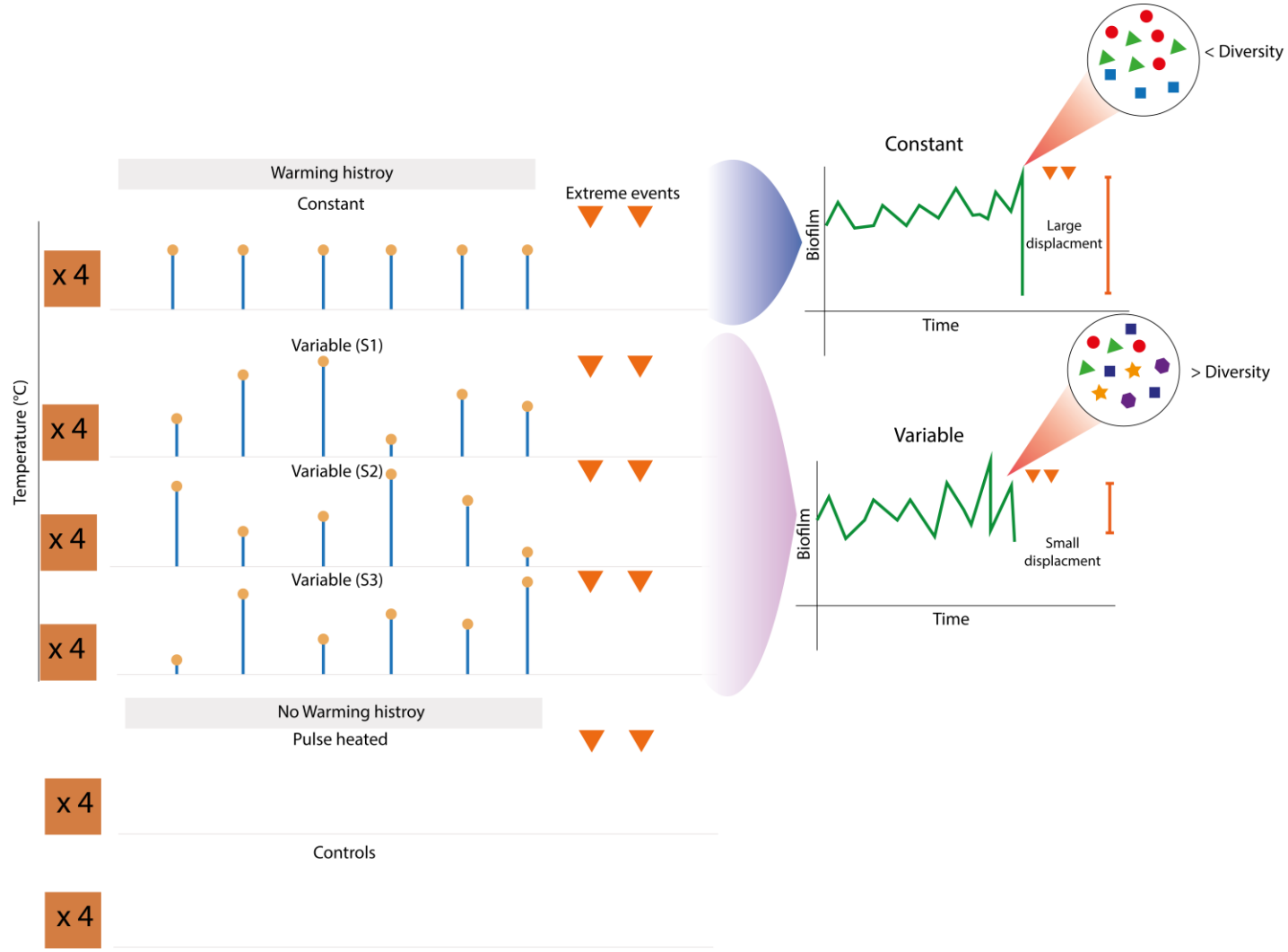
Climate change entails an increase in climate variability

History of disturbance influences the ability of ecological systems to respond to perturbations

- Variable conditions may sustain diversity providing resistance to perturbations
- High-variability may instead reduce diversity (exceedance of physiological-limits) and selecting for resistant taxa
- Constant conditions are likely to reduce diversity and therefore the ability of system to buffer perturbations

Natural laboratory: rocky shore epilithic microphytobenthos

An experimental design to assess the effect of warming history (constant vs. variable) on biofilm stability



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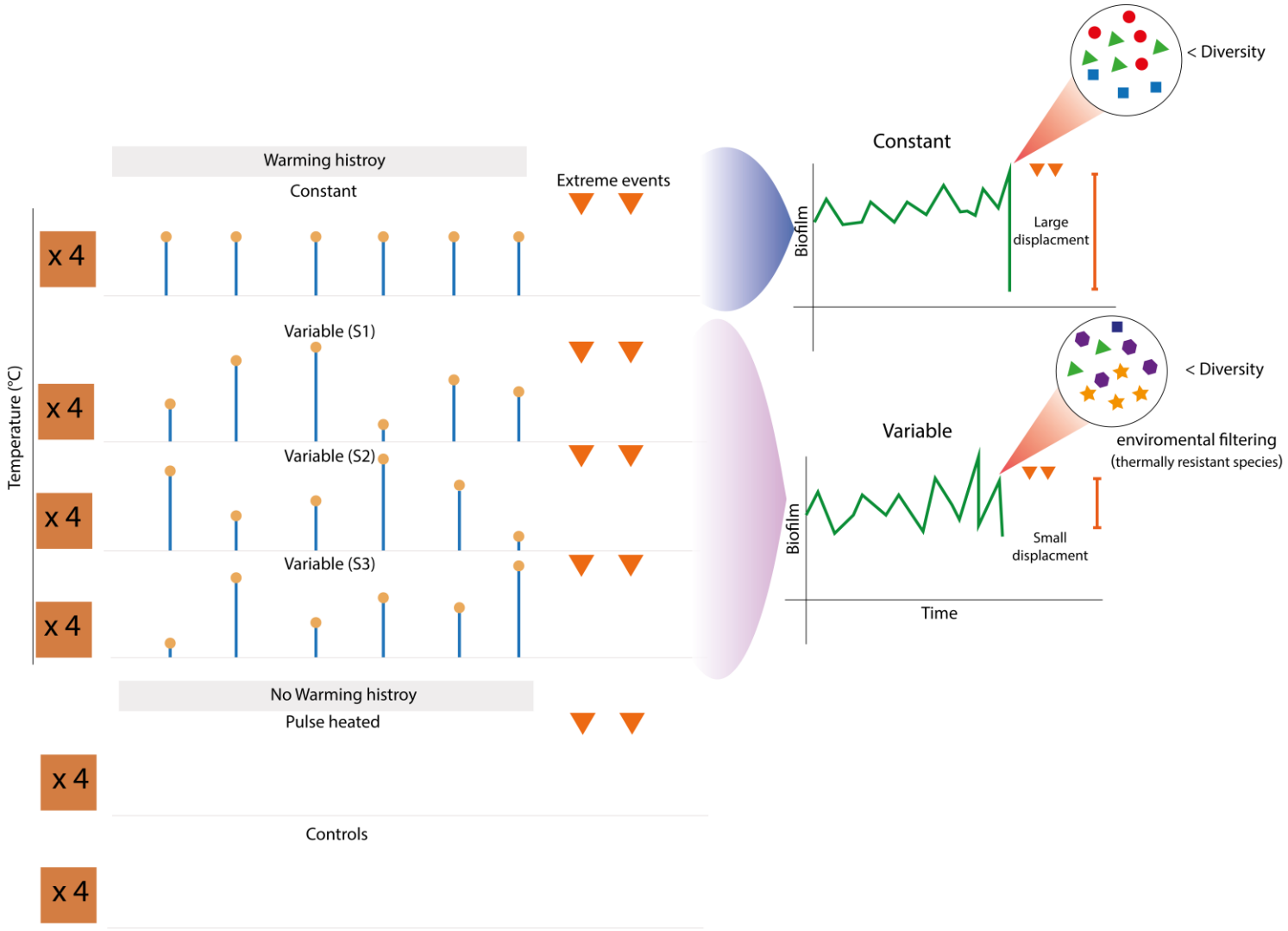
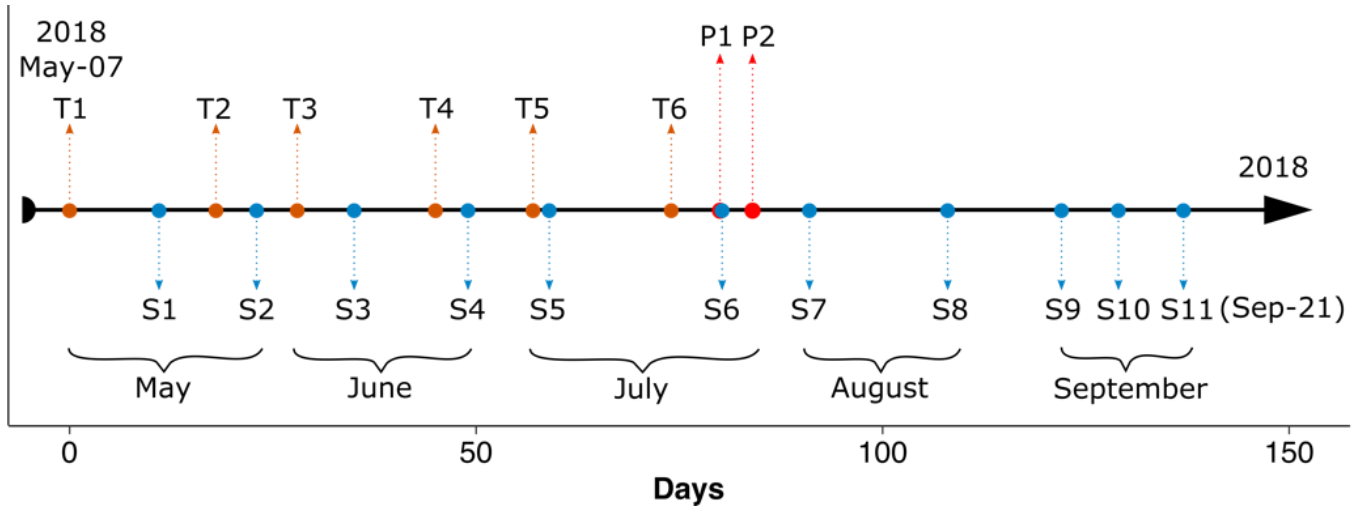


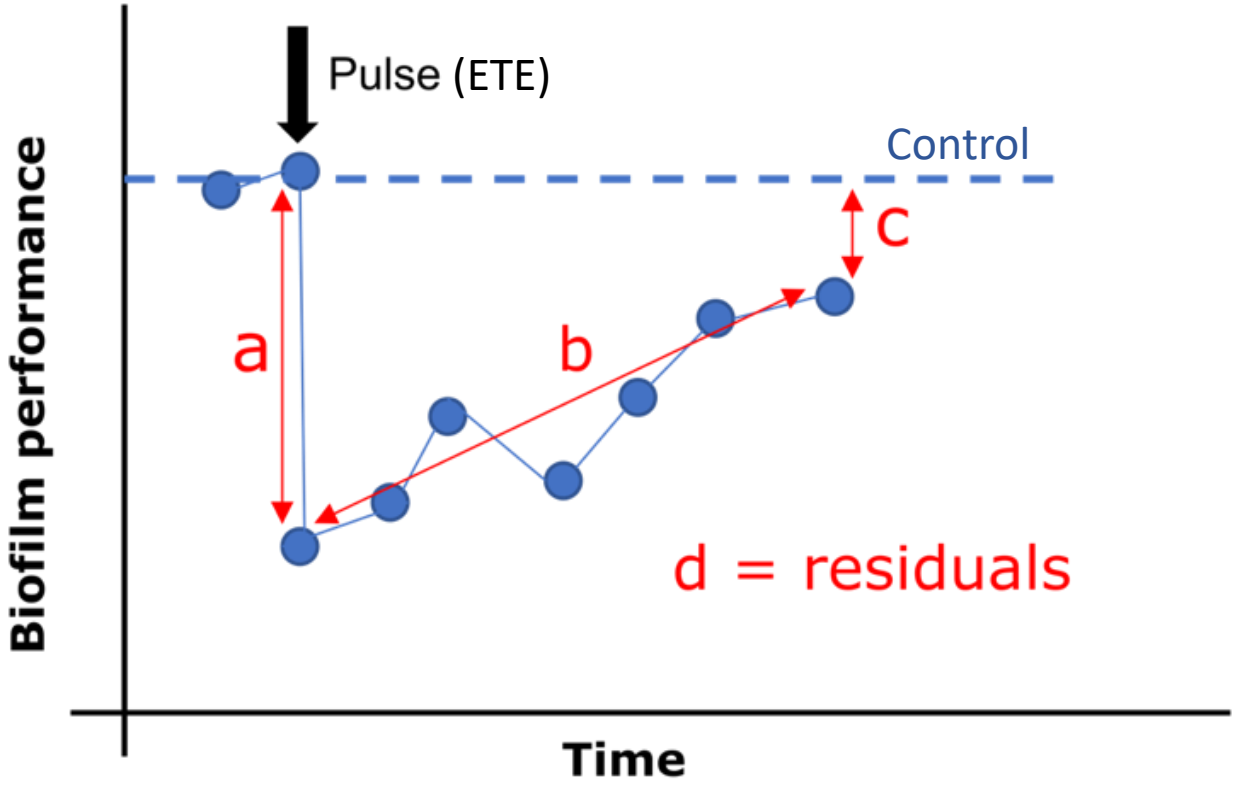
Biofilm biomass was sampled through a remote sensing camera

Photographed using the infrared camera (RVI=NIR/red)

Laboratory determination of the amount of chl *a* (μgcm^{-2})

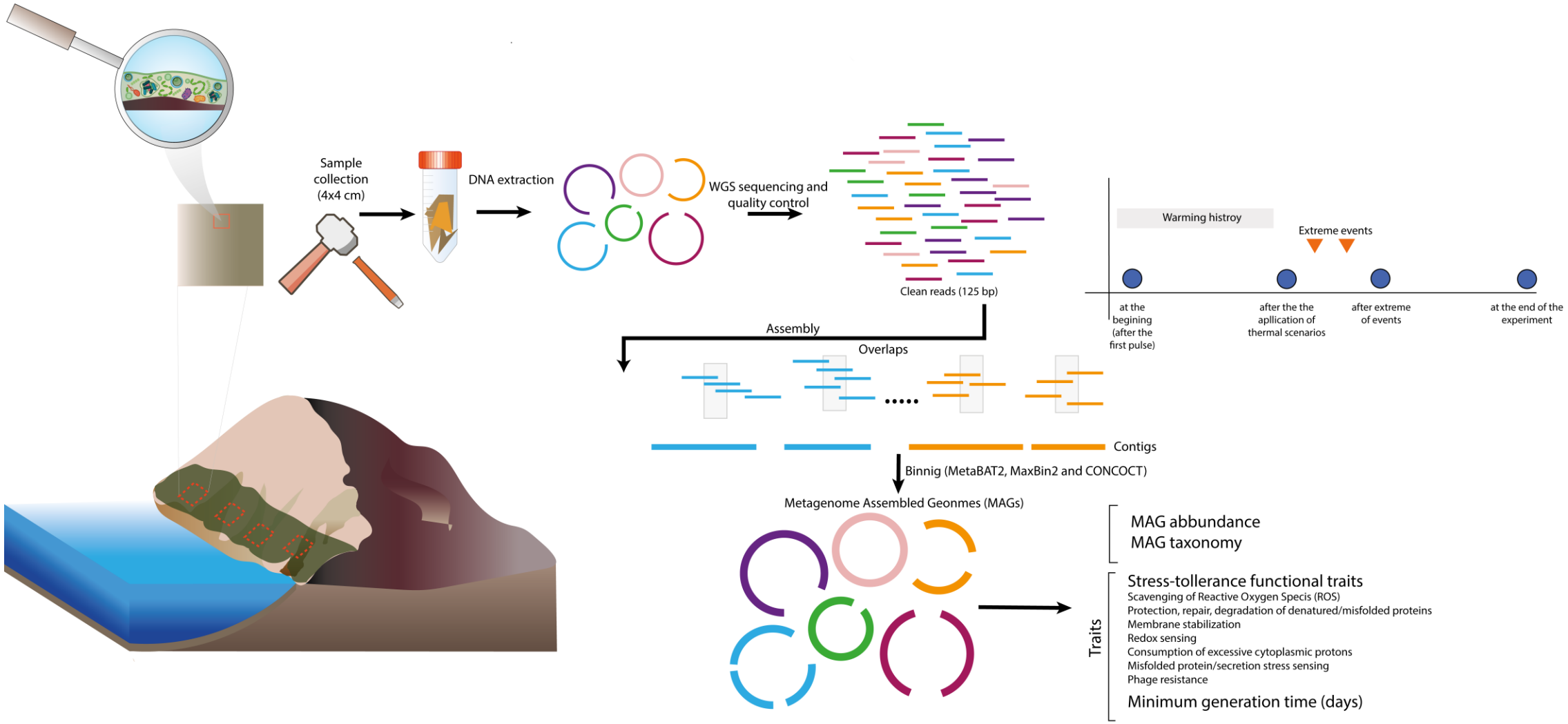


Multiple components of ecological stability

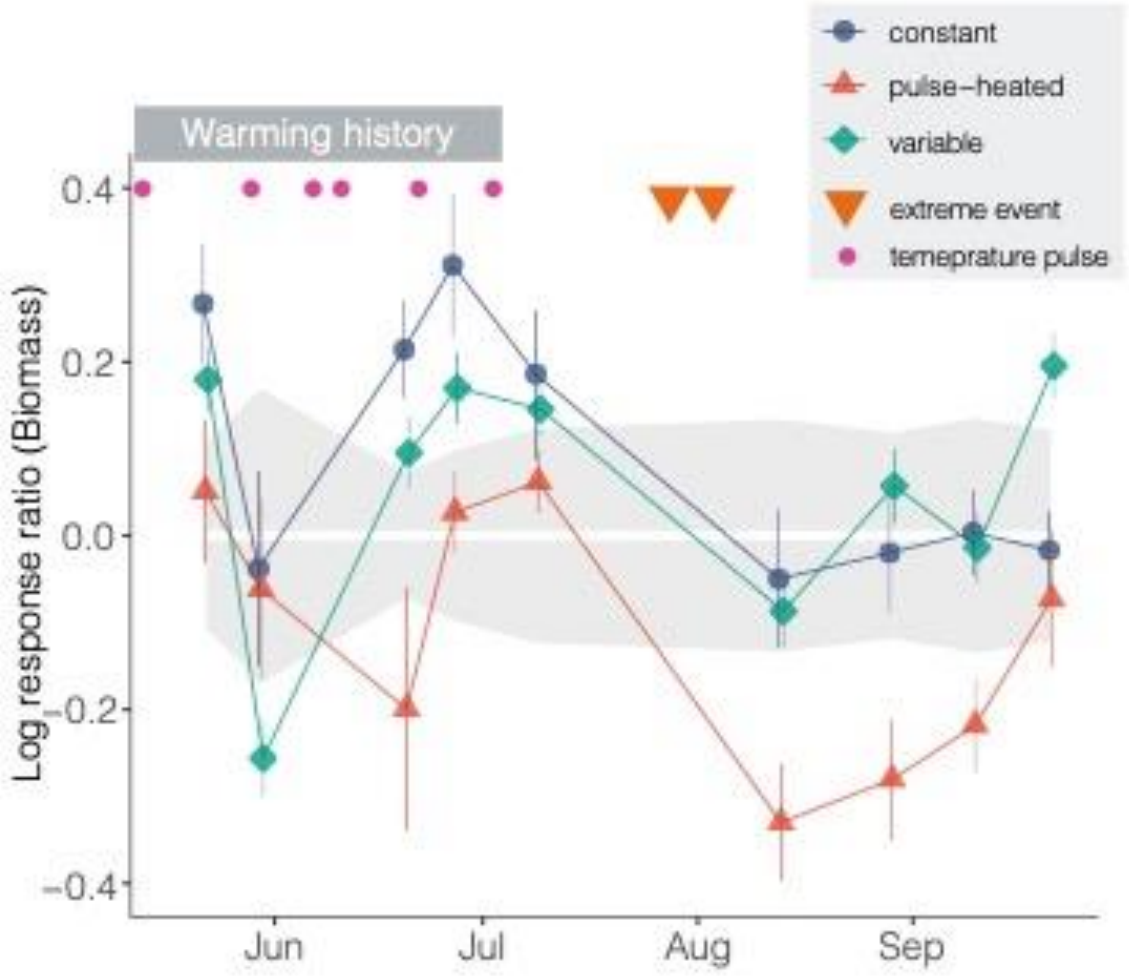


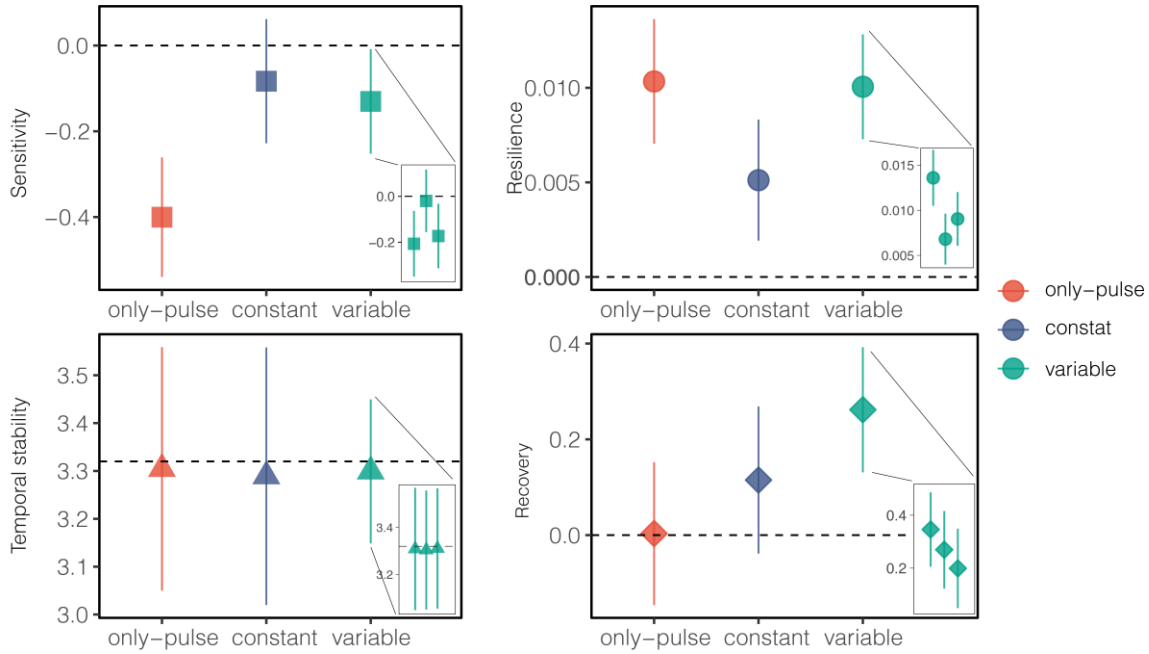
a. Sensitivity (or 1/Resistance)
b. Resilience (recovery rate)
c. Recovery (deviation at end of the experiment)
d. Temporal stability (1/SD(Residuals)

Compositional and functional changes assessed through WGS and Metagenomic analysis

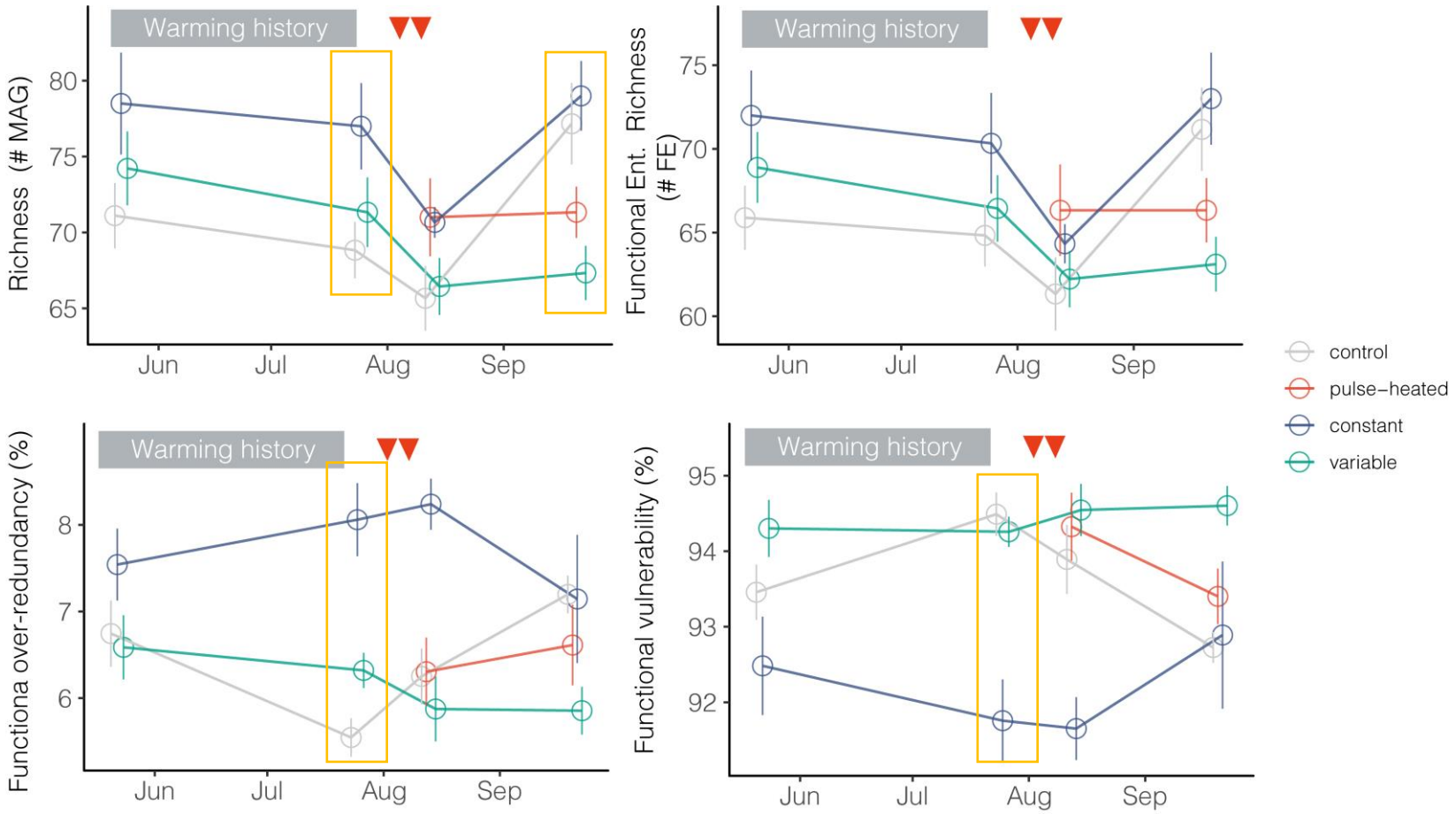


Warming history provides stability by reducing sensitivity and enhancing resilience

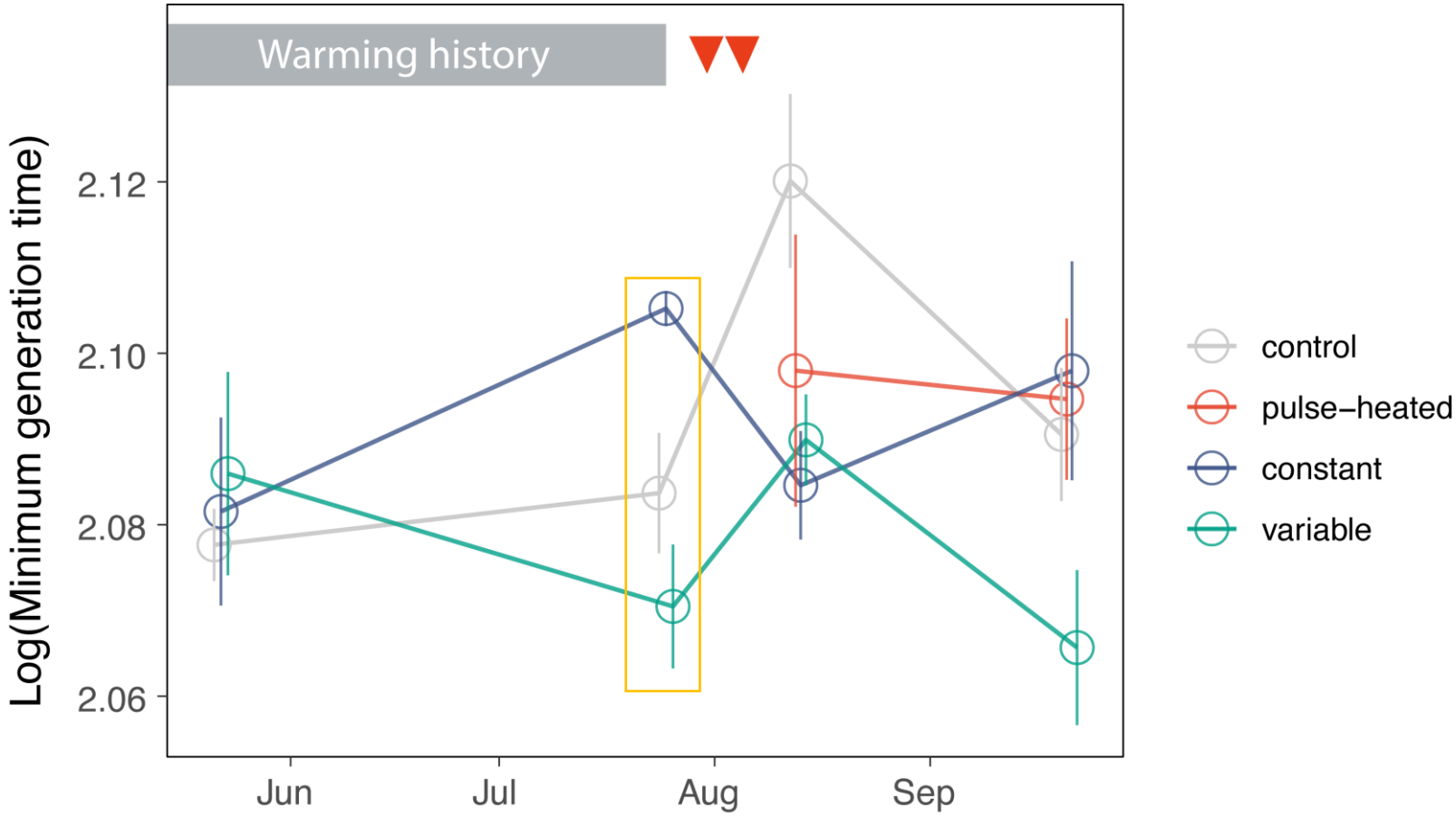




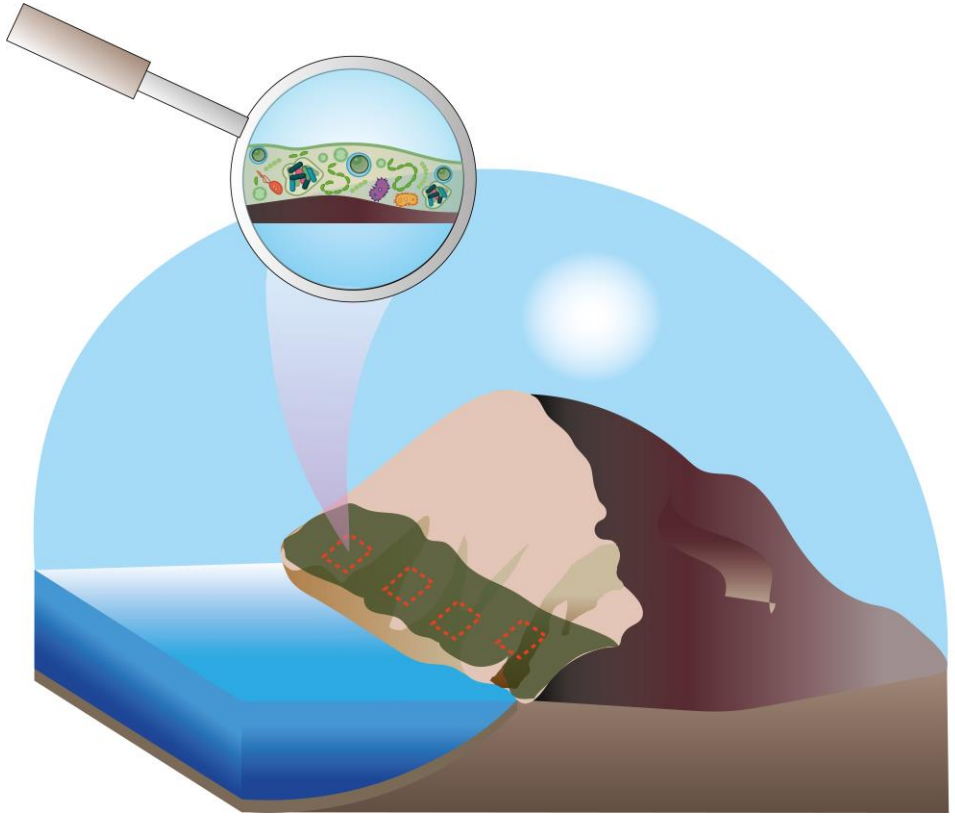
Constant conditions sustain diversity and promote functional redundancy

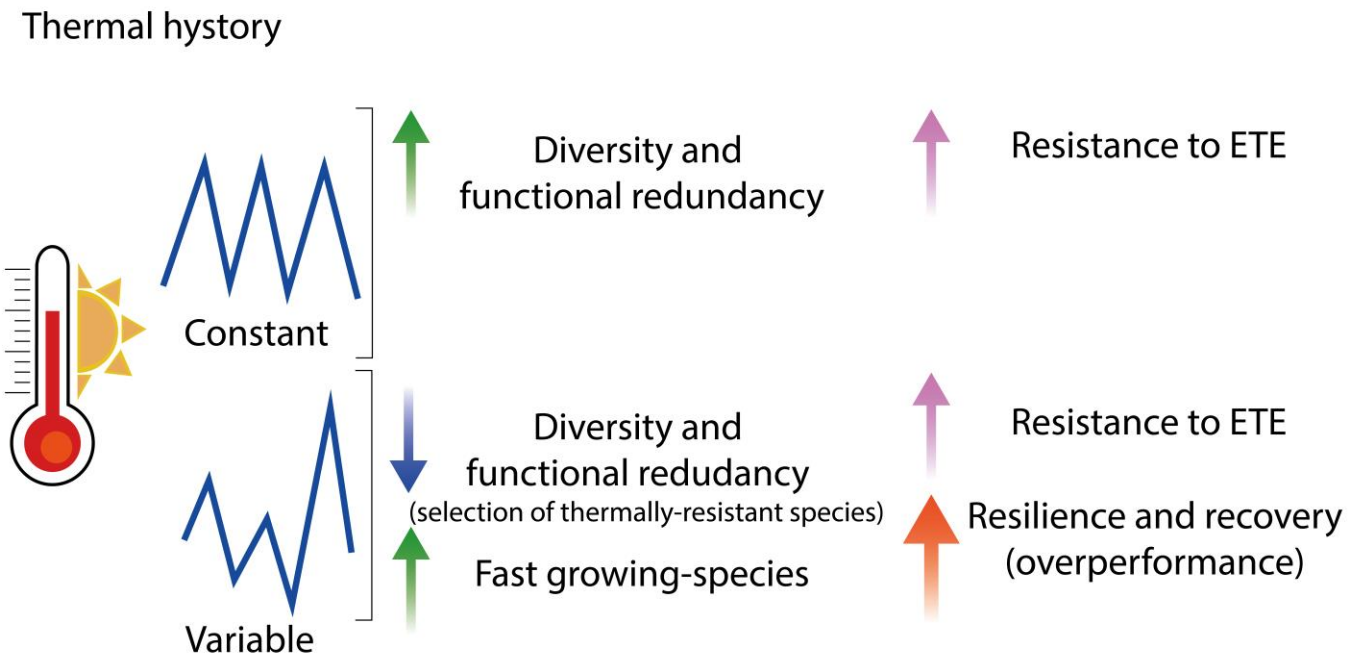


Thermal variability promotes fast-growing taxa



To summarize





Acknowledgments

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Temperatures profiles under different experimental conditions