



AEOLUS: studying AEOLian macroalgal forests structure and functioning to Support biodiversity under ocean acidification

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Canopy-forming macroalgae are engineer species of the Mediterranean, creating complex underwater forests that provide food and shelter for countless marine species. As ocean acidification threatens marine life, submarine CO₂ vents in the Aeolian Islands offer a glimpse into the future, acting as natural laboratories to study how these vital habitats respond to environmental stress. Our research explores the metabolic health of *Ericaria brachycarpa* marine forests along natural acidification gradients. We found that macroalgae living near CO₂ vents show a significant boost in photosynthetic performance, likely fueled by the extra carbon. Interestingly, their respiration rates remained stable, suggesting a metabolic "surplus" that allows them to thrive despite lower pH levels. This metabolic resilience could be a crucial aspect in the maintenance of the associated biodiversity. By maintaining high productivity, canopy-formers could act as a biological buffer, regulating oxygen and pH levels within their dense fronds. This creates a localized "refuge" for the associated fauna, such as invertebrates and juvenile fish, that might otherwise struggle in acidified waters. However, our findings also show that local environmental factors play a major role in these responses. Our ongoing work aims to understand how this individual algal "boost" scales up to protect entire communities. Protecting these carbon-rich marine forests is essential, as their ability to adapt will determine the survival of the diverse ecosystems they support in a changing ocean.