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MACROALGAE IN EAST ANTARCTICA: PHOTOPHYSIOLOGY AND RESPONSES TO POLLUTION

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At Casey Station, East Antarctica the impact of waste from a disused tip on the nearshore marine environment is the subject of ongoing multidisciplinary research. Benthic surveys indicated that macroalgae, common elsewhere, were virtually absent from the seabed adjacent to the tip. We have developed techniques which measure physiological characteristics of Antarctic macroalgae to determine whether this is likely to be a response to pollution from the tip or is simply the result of natural variation.

We examined the responses of marine macroalgae to naturally varying environmental conditions both near to and far from the tip site, and exposed macroalgae to pollutants under controlled conditions in order to characterise their response to contaminants known to be present in the tip leachate. *In situ* measurements using custom-built programmable modulated fluorometers demonstrated that Antarctic macroalgae are not only able to maximise their photosynthetic efficiency when in low light conditions, but can rapidly acclimate to high light exposures such as experienced during sea ice breakout. There is no significant reduction in photosynthetic performance of macroalgae close to tip site and algae collected near the tip do not contain elevated levels of toxic metals, however, long term laboratory exposures to low Cu concentrations show a significant decline in photosynthetic efficiency with EC_{50} values of 61 $\mu g\ l^{-1}$. Our recent observation of epilithic macroalgae much closer to the tip site than previously observed suggests that the use of effective remediation technologies may have enabled an increase in settlement success closer to the tip. Implications of these findings and the use of *in situ* macroalgal physiology measurements to indicate pollution in the field is discussed.