

Light stress in intertidal diatoms: a comparative ecophysiological study

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Despite being exposed to a highly fluctuating light climate, intertidal sediments belong to the most productive ecosystems on Earth. The main primary producers in this habitat are diatoms which can be divided in two functional groups: large motile diatoms (epipelon), which move freely in between sediment particles and smaller diatoms which live attached to sand grains (epipsammon). It is hypothesized that large motile diatoms can migrate within a vertical light gradient to the most optimal light climate whereas smaller attached forms must be able to cope with a fluctuating light climate using mainly physiological mechanisms. One of the main physiological mechanisms of photoprotection in diatoms is Non Photochemical Quenching (NPQ) and is associated with the xanthophyll cycle. In stressful light conditions the xanthophyll pigment diadinoxanthin is converted into diatoxanthin which safely dissipates excess energy as heat. Motile diatoms have a lower potential to perform this photoprotective mechanism than attached diatoms (Barnett *et al.*, in prep.). In this study we investigated the performance and kinetics of the xanthophyll cycle in one representative of each functional group during one hour of high light stress and one subsequent hour recovery. Our results not only confirm the higher NPQ potential of attached diatoms, but also demonstrate faster and more flexible pigment kinetics of xanthophyll cycle pigments. This ability enables them to tolerate and thrive in the fluctuating light climate of the intertidal.

References

- Barnett A., V. Melede, L. Blommaert, P. Gaudin, K. Sabbe, C. Dupuy and J. Lavaud. 2012.
Photoprotection capacity differs among microphytobenthic diatoms inhabiting intertidal mudflats: Possible consequences on their spatial distribution related to the light environment. (in preparation).