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Abstract book

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Physical constraints on periphyton growth in proglacial lakes

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This study investigates the physical constraints on periphyton growth in Alpine proglacial lakes, focusing on a cluster of lakes in the Ortles-Cevedale Massif (Italian Alps). The lakes represent different stages of deglaciation, providing a gradient for comparative analyses. We analysed the lake ecosystems by integrating field data and hydrodynamic modelling to assess how physical factors influence benthic algal communities. While hydrochemistry across the lakes was relatively uniform, strong physical gradients in turbidity and temperature were observed. Ice-distal lakes exhibited daily thermal stratification during warm and dry days, with stratification more stable in the most distal lake compared to upstream lakes. Model results showed that thermal stratification can influence the distribution of suspended glacial flour, reducing the light limiting effect of turbidity in shallow layers through enhanced sedimentation. Quantitative analyses of biofilms confirmed that periphyton biomass (estimated by chlorophyll *a*, organic content, and diatom density) was highest during warm and dry periods conducive to stratification. These results suggest the presence of summer windows of opportunity for primary production, even during sustained glacier ablation. Diatom assemblages also exhibited diversity gradients, with different ecological guilds distributed according to the degree of glacial influence and physical disturbance.