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A finite element reduced-gravity model of Lake Tanganyika

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Within the framework of the development of SLIM (Second-generation Louvain-la-Neuve Ice-ocean Model), we have built a finite element reduced-gravity model of Lake Tanganyika. This lake is stratified all year round, so we may define two main layers (the epilimnion at the top and the hypolimnion at the bottom) separated by a thin thermocline. This thermocline undergoes oscillations due to wind stress. The wind stress may be decomposed between a seasonal component and an intraseasonal one, respectively responsible for the free and forced oscillations of the thermocline. The first part of this work was to evaluate the relative importance of these two types of oscillations.

The second part of this work is the study of the renewal of epilimnion water, with a method based on the age and the residence time, the concepts of CART (Constituent-oriented Age and Residence time Theory). We split the water in the epilimnion into different water types. Computing the age and the residence time of these water types is of use to understand the rate at which the water renewal takes place. Moreover, it can be achieved at an acceptable extra computer cost and this method is sufficiently general that it can be easily applied to any semi-enclosed domain (like an estuary for example).