



Renewal of epilimnion water in Lake Tanganyika

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Lake Tanganyika 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. We present a method, based on the age and the residence time, the concepts of CART (Constituent-oriented Age and Residence time Theory), to study the water renewal in the epilimnion of Lake Tanganyika. But this method is sufficiently general that it can be easily applied to any semi-enclosed domain.

We split the epilimnion water into different water types. The initial water is the water initially present in the epilimnion and the renewing water is defined as the water entering it. Different renewing water types may be considered depending on their origin. So we separate renewing water into hypolimnion water, precipitation water and river water. We present the equations for computing the age and the residence time of these water types. The age of a parcel of renewing water is defined to be the time elapsed since this parcel entered the epilimnion. The residence time of a parcel of initial water in the epilimnion is defined as the time taken by this parcel to leave the epilimnion. These timescales are of use to understand the rate at which the water renewal takes place. Moreover, once a hydrodynamic model is built, computing these timescales can be achieved at an acceptable extra computer cost.