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Formation and Rapid Expansion of Double Diffusive Layering in Lake Nyos

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No signs of double-diffusive convection have been reported from Lake Nyos since the catastrophic CO2 eruption in 1986. In December 2002, however, 26 well mixed layers with thicknesses of 0.2 to 2.1 m and sharp interfaces were discovered. Such fascinatingly pronounced steps are characteristic of double-diffusive convection. It was probably triggered by an exceptional cooling in early 2002. The double-diffusive heat fluxes, calculated by heat budgeting, agree within the uncertainties with laboratory-based flux-laws. The heat fluxes increased by an order of magnitude since the establishment of double-diffusive convection and reached values of the heat input of the deep and warm CO2-enriched source water at maximum lake depth. Because the double-diffusive heat fluxes are higher in the upper part of the double-diffusive zone, the temperature gradient doubled, whereas the salinity gradient remained almost constant. This process reduces the staircase stability and leads to rapid expansion of the double-diffusive zone

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