



## Characteristics of turbidity current events in Lake Geneva, Switzerland

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Turbidity currents represent a distinctive type of subaqueous density currents, characterized by a density excess that is due to the sediment load. Turbidity currents are important in lakes, reservoirs and oceans and have implications on hazard management, reservoir sedimentation and water quality. The existence of turbidity currents has been inferred in the 19<sup>th</sup> century from the existence of canyons on lake bottoms and in the 20<sup>th</sup> century from successive cable breaks of telecommunication cables on the ocean floor. From the 1990s on, Acoustic Doppler Current Profiler's (ADCP) have allowed measuring vertical profiles of the velocity in turbidity currents. Most measurements were made in oceanic environments, however, and detailed measurements in lakes remain very scarce.

This study reports field measurements of turbidity currents in Lake Geneva, Switzerland, performed in 2016, 2017, 2018 and 2022. The measurements cover a broad range of control parameters and include an entire hydrological year. Additional data were obtained from simultaneous measurements with high-resolution thermistors in vertical profiles or along the lake bottom.

A total of twenty one turbidity current events were identified over the measurement period. For each event, characteristics such as the average and maximum flow velocity, the height, the duration and the dispatched volume of water were extracted from the ADCP velocity record. In addition, the suspended sediment concentration was estimated from the ADCP backscatter record and yielded estimations of the dispatched sediment volume.

The twenty one turbidity currents can essentially be separated in three classes: strong short-term events with velocities above  $1 \text{ m s}^{-1}$  that last up to approximately 24 hours, weak long-term events with velocities below  $0.3 \text{ m s}^{-1}$  that last several days, and weak short-term events with velocities below  $1 \text{ m s}^{-1}$  that last less than 12 hours.