

Interactive comment on “Are flood-driven turbidity currents hot-spots for priming effect in lakes?” by D. Bouffard et al.

Anonymous Referee #3

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General comments The MS "Are flood-driven turbidity currents hot-spots for priming effect in lakes?" proposed by Bouffard and Perga discusses a quite important process in lakes subject to partial overturn and oxygen depletion on their hypolimnion. It has long been assumed that flood-driven density current in such lakes can partly contribute to oxygen depletion of deep hypolimnion. In the present paper the authors describe the effect of a major single event in Lake Geneva that occurred in May 2015, on the oxygen concentration profile in the water column. To substantiate their hypothesis of a “priming” effect induced by the inputs of terrestrial OM, the author designed an experimental part to evaluate the respiration rate in various lake/river mixing assays. The paper presents a quite unique spatial and depth survey (in Lake Geneva) after a major event and thus these field results are very valuable. The presented evidences are relatively convincing that the effectiveness of flood-driven density currents is null or even neg-

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ative in the current situation. However in the literature the role of such currents have been stressed mainly in low to very low-oxygen hypolimnion, that is not the case here. What would be the effect of the current if the hypolimnetic O₂ concentrations were below 2 mg/L. I recognize that the authors are cautious about their results and want to show that “turbidity currents (not) necessarily increase hypolimnetic oxygen stocks”. So they should better discuss the various situations. A recurrent question is the uncertainty of the measurements. There is no mention of the reproducibility and repeatability of, for instance, the O₂ measurements; therefore it is difficult for the reader to evaluate if the observed variations are significant. I agree with the two anonymous reviewers about the small representativeness of the experiment to explain what happened during the main event.

Specific comments P1 L1 “. . . river water supersaturated. . . “Generally rivers are not supersaturated with oxygen. For instance data presented for the Rhone River show a 97% saturation. So “river water saturated with oxygen” may be better. P4L24. With 309m Lake Geneva is not the deepest Western Europe lake (Lago di Garda 346m, Como 410m, Maggiore 372m). P4L25 western basin? Traditionally, Lake Geneva is divided in two main basins, the Grand-lac to the east and the petit lac to the southwest. The two main rivers empty in the Grand-lac so eastern basin. P6L28. There is a discrepancy between the text (rainfall > 100mm) and fig 1a that show > 800mm. P7 L24-27. This sentence is not clear. Why an increase in temperature suggests that the density of water is affected by suspend matter? Do the authors mean that the suspended loads compensate the temperature effect on density in order to form a density current? P8L32 This cannot be the Veveyse river, or a remote effect of it, as the Veveyse location on the map (fig 2) is wrongly positioned. The Veveyse mouth is about 7km to the southeast (6.8350°E, 46,4610°N).

Fig captions and figures Fig 2a. It is not clear what is represented on fig 2. Maximum, average turbidity?. The interpolation seems quite hypothetical and loosely constraint in some areas. The map needs a scale. Coordinates of the map are in a different system

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of coordinates from the one given in appendix 4.

Technical comments P5 L19 25 sampling sites in the text, 24 on the map fig 2. Sampling site in the Eastern basin, not Western basin. P6 L5. "SHL2" site is not defined. This is the main monitoring site in Lake Geneva since decades. P9L21 Dissolved oxygen concentration units not homogenous throughout the text. Usually mg/L, and here g m-3. They are equivalent but confusing for the reader.

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