

Interactive comment on “Oxycline oscillations induced by internal waves in deep Lake Iseo” by Giulia Valerio et al.

Anonymous Referee #1

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review of HESS 2018-542 Oxycline oscillations induced by internal waves in deep Lake Iseo by Valerio et al.

This manuscript contains very interesting material from a well designed field programme and good displays of measurements that should warrant publication. However, the text at its current quality is not good enough for publication. I hope the authors consider my points and do a proper internal review before submitting an improved version. (Comments see below)

The manuscript deals with observations of internal waves in Lake Iseo and the monitoring of the oxycline motion over sediment at depths around 95m. The varying redox conditions impact on the geochemical processes at the sediment. The impacted area was estimated to 3% of the total lake bed. At times, the oxycline moved synchronously

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with the thermocline V1H1 mode at one oscillation per day, but earlier in summer the oscillations of oxycline and thermocline were out of sync. The oxycline oscillated at 1 cycle in four days. Later in autumn, signals were not so clear but roughly the same fundamental oscillation period of close to 4 days can be seen at both depths.

The results are fascinating; these waves out of sync at various depth; after seeing Figs. 4,5,6, the reader is interested in hearing an explanation but the results section requires persistence to work one's way through the data processing details. In the end, I did not find an explanation for the a-synchronous behaviour.

comments on the content:

lines 271 and 272: should it be $1/4 * 1/\text{day}$ and $1/2 * 1/\text{day}$?

Table 2: how have the depths, which separate the layers, been chosen? This choice has a major impact on the results.

No density profiles have been shown for the three selected periods and no comparison with the discrete layer structure has been shown.

Figs. 4,5,6 would the projection of wind on the lake axis not be more instructive than speed and direction?

Fig. 10 writing too small. add display of area vs depth for entire lake

Fig.2 caption Electrical conductivity is "temperature compensated" not "normalized"

Fig. 3 could indicate the periods covered in Figs 4,5,6

Table 3: line of V2H1 xsi indices are wrong

line 505: J. Ilmberger is NOT Jorg Ilmberger

For modes in lakes, the authors may also see these papers on Lake Constance:
Boehrer 2000: modal response in a deep stratified lake: western Lake Constance
Apt et al 2004: basin scale motion in upper Lake constance

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comments on the text:

quite often the components of a sentence are not in the correct order: e.g. line 25 to just list one: "These basin-scale internal waves cause in the water layer between 85 and 105 m depth a fluctuation of the oxygen concentration between 0 and 3 mg L⁻¹ that, due to the bathymetry of the lake, changes the redox condition at the sediment surface."

there are unnecessary words: as example: the first sentence of the paper line 33 "The physical processes occurring at ... " in stead of "Physical processes at ..."

inconsistent names in line 116: SS-1 and SS-2 refer to LS-N and LS-S on Fig.1 ?

line 297 wrong reference Table 2 should be Table 3

often narrative style: examples for the results section: line 319 "For the discussion that will follow, it is worthy to underline that, ... line 334 "The analysis of the measured data previously shown suggests the presence of ..." line 360 "At this point, it is of interest to reflect upon, ..."

difficult sentences: one example in lines 402-405: "In Lake Iseo, a depth variation of the mineralization process along the water column generates a gravity driven segregation with a density gradient between the oxic mixolimnion and the anoxic monimolimnion, which favours the occurrence of large baroclinic motions at the interface of these layers, even if the water column is thermally homogenous."

not optimal choice of words: line 167 " we thickened the grid ..." is there no better choice? line 235 "stretching" ? is "widening" better? line 243 "strongly different"

line 468- 483 is this discussion material?

line 330 " the amplitude's reduction" ... "the lake's bathymetry"

line 144 "natural" modes? I know normal modes, or modes of the internal wave equation or Taylor - Goldstein eq.

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The presented material has the potential for a good paper, but the writing needs to be improved. My recommendation is to get the results and the discussion focussed on the message of the paper. Shorten the text of these sections considerably. Make a proper internal review and if necessary ask for language editing.

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