Comments on "Spatial variability of recent sedimentation in Lake Ohrid (Albania/Macedonia) – a complex interplay of natural and anthropogenic factors and their possible impact on biodiversity patterns" by H. Vogel, M. Wessels, C. Albrecht, H.-B. Stich, and B. Wagner, Biogeosciences Discuss., 7, 3911-3930, 2010.

**General comments:**

The paper provides spatially distributed surface sediment composition data of Lake Ohrid. The presented study includes novel data which clearly contributes to a better understanding of the recent sedimentation processes in Lake Ohrid and therewith fits well into a quantity of articles focused on Balkan lakes Ohrid and Prespa. The authors have analysed selected proxies (e.g. geochemical parameters, element concentrations, and grain-size distribution) to support the given interpretations and conclusions. However, it is not stated why these used proxies were chosen, and the reader somehow gets the impression that these data were specifically chosen to support some stated conclusions (e.g. a counter-clockwise surface current).

A major issue of this paper is the incomplete presented grain-size data. This hampers a comprehensive discussion of the observed sediment composition and its spatial distribution. Figure 3 should therefore be replaced by a complete series of sub-figures showing all gathered data of this study (see detailed comments on Fig. 3) and the text should be supplemented with an elaborated discussion including grain-size data and other controlling processes than a surface current (e.g. turbidity currents or bottom currents). The chosen title of this paper allows expectation of an extensive discussion on the 'possible impact on biodiversity patterns' of Lake Ohrid, deduced from the data gathered in this study. The corresponding chapter, however, includes a general literature discussion without using the new surface sediment data. Please include your data in this discussion (see detailed comments on P3921 L1) or change the title of your paper accordingly.

In summary, a major revision with regards to content and several technical corrections (see below) is suggested.

**Detailed comments and technical corrections:**

P3912 L23: Albrecht et al., 2009 is correct, not "2006"

P3913 L3: "Cvijic, 1911" is not in reference list!

P3913 L27: please referrer to Fig. 1 here (see comment on Fig. 1)

P3914 L9: change notation to $m^3\ s^{-1}$

P3914 L15: what do you mean with "irregularly every seven years"?

P3914 L20: $mg\ l^{-1}$

P3914 L24: What do you mean with "higly oligotrophic"? Oligotrophic refers already to environments with (very) low nutrient levels. Give a value to confirm the term "highly" or remove it. (c.f. Wagner et al. 2009, J Paleolimnol 41)

P3915 L3: Give reference for this statement (e.g. meteorological data)

P3915 L12: referre to Fig. 1 here

P3915 L16: better also indicate sampling positions in Fig. 2, as Fig. 3 is hard to read (see comment on Fig. 3)

P3915 L18: use "plexiglass" or "Plexiglas®" or "acrylic glass", not "Plexiglas"

P3915 L22: "X-ray", not "x-ray"

P3915 L25: "Total carbon (TC)", not "TC"

P3915 L25:   "infrared (IR) detector", not "IR detector"

P3916 L3:   add something like "… with an IR cell in order to determine the total inorganic carbon (TIC) content."

P3916 L5:   Full word for Al, Cr, and Ni are not necessary; you already used "Cl" on P3916 L2

P3916 L7:   what did you use nitrous acid ($HNO_2$) or nitric acid ($HNO_3$)? To avoid further confusion, I suggest to use molecular formula only.

P3916 L10:   again, what did you use boric acid ($H_3BO_3$) or borat acid ($H_3BO_4$)?

P3916 L17:   I guess you mean Fig. 3, not "Fig. 2"

P3916 L20:   "X-ray diffractometer", not "X-ray-diffractometer"

P3916 L28:   change to "CCD camera" or "CCD element" or "charge-coupled device (CCD)", not just "CCD"

P3916 L28:   quote at least minimum and maximum values for your grain size classes

P3916 L29:   "Calculation of grain-size parameters and statistics …" where are these data? (see general comments)

P3917 L1:   give used version number of GRADISTAT if there is one

P3917 L1:   "Blott and Pye, 2001" is not in reference list!

P3917 L2:   give version number of SURFER; did you use SURFER only for visualisation or also for interpolation? What interpolation method (kriging, inverse distance weighting, …) was applied?

P3917 L13:   "… with its maximum in the silt size fraction (>80 vol%; Fig. 3)." This is not shown in Fig. 3! (see also detailed comment to Fig. 3)

P3917 L20:   "… point to a significant transport by wind induced surface currents." What about other current systems e.g. sub-surface currents, bottom currents, turbidity currents or external factors as common wind directions, … ?

P3917 L22:   use ">0.4 m $s^{-1}$"

P3917 L23:   use m $s^{-1}$

P3917 L24:   use m $s^{-1}$

P3917 L25:   "These own observations …" How did you do your flow velocity measurements? These measurements/data are mentioned neither in chapter 2 nor in chapter 3.

P3918 L1:   use m $s^{-1}$ (two times)

P3918 L4:   use g $kg^{-1}$

P3918 L11:   Why do you give Al concentrations in "g $kg^{-1}$" but Cr and Ni concentrations in "mg $kg^{-1}$"? Use a uniform unit for all elements (Al, Cr, and Ni) if possible (e.g. "g $kg^{-1}$").

P3918 L14:   "Based on the distribution of feldspar …" Why don't you state this in P3918 L10 right after "… catchment is significantly lower."?

P3918 L27:   "The common pattern of transport … is primarily driven by a counter-clockwise current in Lake Ohrid." What about grain-size effects?

P3919 L9:   I guess you mean "wt%".

P3919 L19:   "overall low C/N ratio (<12) …" but in Fig. 3h you show C/N values of 12.2-14.5. What is correct?

P3920 L5:   High TOC values and C/N ratios? What about reduced degradation of OM in the deepest parts of the lake?

Have you noticed the positive correlation of TOC and C/N over the entire lake basin; signal of terrestrial input (e.g. by soil)?

Beside that grain-size data are not proper presented, can you see any grain-size effects on TOC or TN?

P3920 L10: remove either "total inorganic carbon" or "(TIC)"

P3921 L1: Chapter 4.3 should represent one major part of your study (see title "… and their possible impact on biodiversity patterns". But this chapter is only based on references and not on a discussion of your data. It is hard to follow your arguments without any figure or table. Why don't you show for example some data of Hauffe et al., 2010 or Matzinger et al., 2007 in combination with your own data?

P3921 L9: do you mean Hauffe et al. (2010)? If not: "Hauffe et al., submitted" is not in reference list. Avoid citing unpublished studies and data.

P3922 L4: "Albrecht, unpublished data": do not cite unpublished data, it is not present for the reader and hence not valid for further discussion

P3922 L19: do you mean Kostoski et al. (2010) (see comment on P3925 L18)? If not: "Trajanovski et al., submitted" is not in reference list. Avoid citing unpublished studies and data.

P3923 L1: "Based on the grain-size distribution pattern, …" This pattern is not shown. How can you draw conclusions on data that are not present for the reader?

P3923 L5: "… a counterclockwise rotating surface current can best explain …" It is your only explanation. There is no discussion of other possibilities than a surface current.

P3923 L17: "… pose real threats to the primarily benthic endemic biodiversity of Lake Ohrid." This conclusion is not based on the data presented in this study. It is just drawn by a literature discussion in chapter 4.3.

P3924 L4: correct title is "Mollusc biodiversity and endemism in the potential ancient Lake Trichonis, Greece"

P3924 L13: correct names are "Donohue, I. and García-Molinos, J." Change citation in text accordingly

P3924 L15: reference for Hauffe et al. 2010 has changed completely and is now "Hauffe, T., Albrecht, C., Schreiber, K., Birkhofer, K., Trajanovski, S., and Wilke, T.: Spatially explicit analyses of gastropod biodiversity in ancient Lake Ohrid, Biogeosciences Discuss., 7, 4953-4985, 2010."

P3924 L21: correct title is "Speciation in ancient lakes"

P3925 L15: update reference if available

P3925 L18: correct is "Kostoski, G., Albrecht, C.,Trajanovski, S., and Wilke, T.: A freshwater biodiversity hotspot under pressure – assessing threats and identifying conservation needs for ancient Lake Ohrid, Biogeosciences Discuss., 7, 5347-5382, 2010."


Fig 1: As you are referring to the watershed area, please mark individual catchment areas of Lake Ohrid and Lake Prespa here (c.f. ILEC, 2005. Lake Basin Management Initiative (LBMI) Final Main Report - Managing lakes and their basins for sustainable use: A report for lake basin managers and stakeholders. International Lake Environment Committee Foundation, Kusatsu, Japan.)

Fig. 1: "Reicherter et al. (unpublished)" Do not cite unpublished data; the reader can not verify it. You can cite geological maps for example.

Fig. 1: "… including discharge rates …" What kind of discharge rate do you referrer to (annual or daily averages, maximum, …)?

Fig. 1: Change "t/yr" to "t $a^{-1}$" and "$m^3$/s" to "$m^3$ $s^{-1}$"

Fig. 2: Give a reference for this/these figure/data (e.g. Wagner et al. 2009, J Paleolimnol 41)

Fig. 3: This figure is your main figure but it is definitely too small. Why don't you separate it into at least three individual figures each with four sub-figures (e.g. grain-size data / Al-Fsp-Cr-Ni data / TIC-TOC-C/N-Chl a data)? The phrase "Simplified bathymetric maps showing…" is unfavourably chosen here. You show 'interpolated spatial distribution maps' including the bathymetry for orientation, don't you? Explain the different legend types in the figure caption(s).

Fig. 3a: vol% or wt%? Why does your 'single sample' legend (dots) end with 26 % but your 'spatial distribution' legend (colour gradient) included one class above that 26 % boundary? What is your correct maximum value?

Fig. 3b: change to "g $kg^{-1}$"; Again, your 'dot' legend starts with "21" but your 'gradient' legend with "22". What is your correct minimum value?

Fig. 3c: Why does the 'gradient' legend of this sub-figure is the only one showing a red coloured class? Why does your 'dot' legend include values >2.2, while your figure shows only green coloured samples?

Fig. 3d: Why do you change the scale of the unit here (Al was g $kg^{-1}$)? Change to "g $kg^{-1}$" (and rescale values of course); Again, maximum value of the 'gradient' legend exceeds the highest measured sample!

Fig. 3e: Change unit to "g $kg^{-1}$" (see comment above). Again, given minimum value of the interpolation does not fit to data legend (dots).

Fig. 3f: I guess you mean "wt%".

Fig. 3i: Why does your 'dot' legend include classes >6.6, while your map shows only green and blued dots, and why does your interpolation exceeds the 6.6 µg $g^{-1}$ too (figure and legend)?

Fig. 4: Please explain briefly what is shown by a "radar satellite image" in your figure caption. What (suspension load, wave height, etc) causes the visible colour differences (darker/lighter colours)? Do you have an idea what causes these fan-like structures near the shoreline in the south and east? As you discuss surface water current speeds (see P3917L20-P3917L1) it would be helpful to state current velocities or some meteorological data for the 30th September 2009. Is this possible for you?

Andreas Dehnert
Palaeontological Institute and Museum, University of Zurich