

## ***Interactive comment on “ Eutrophication and warming effects on long-term variation of zooplankton in Lake Biwa” by C. H. Hsieh et al.***

**Anonymous Referee #2**

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**General comments** The paper presents an interesting analysis of a long-term database of zooplankton and environmental data (including phytoplankton) obtained in the largest lake in Japan: Lake Biwa. The paper is globally well written and the analyses and methods developed are appropriate. However the relatively high number of methods used by the authors and the different initial matrices (obtained after the aggregation of original data), I suggest that the authors make a general schematic representation of their methodology (i.e., a global diagram showing all steps of the analyses and the connections between them). When the methodology will be clear and the options used at each step justified (as mentioned in M&M section) this will help the reader to capture the key messages from the methodological aspects. The results obtained by the

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RDA analyses are very interesting. They show the importance of the aggregation of either phytoplankton or zooplankton data. But it is surprising that environmental factors explained the highest percentage of variance of zooplankton matrices. This result could be due to the construction of the different matrices in this study. I do not think that using only phytoplankton biomass (even if taxonomic groups were separated) is the best descriptor for zooplankton dynamics. It is better to involve additional factors (cell size, presence or not of colonies, etc.) for trophic interactions. Moreover the authors confirmed a change of the trophic status of the lake during eutrophication and re-oligotrophication processes. Maybe the use of the complete time series is not appropriate. In addition the phytoplankton time series is short (1978-2003) compared to zooplankton time series (1962-2005). It is clear that some changes on species composition and/or their phenology occurred during this period. Even if the paper focussed on the inter-annual variability it would be nice to know (at least in the discussion) if some phenological changes and/or species composition occurred during the study period. We need such additional ecological information to try to better explain the observed pattern. The ratios of zooplanktonic groups used here are good indicators of environmental variability. What are the consequences on carbon fluxes? Because lakes can be considered as simplified oceanic systems (a very simplistic representation) what can we learn from this analysis to improve (or criticise) existing biogeochemical models (i.e. NPZ family models)? If the authors include such aspect in the discussion the paper will be more widely interesting for oceanographers and limnologists.

**Minor comments** Figure 3 to 5 could be combined in a single or two figures. Particularly figures 4 and 5 should make a single composite figure. Page 2, line 17: ‘affect’ instead of ‘affects’ Page 5, line 20: ‘in response to’, to is missing here

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