Interactive comment on "Holocene phototrophic community and anoxia dynamics in meromictic Lake Jaczno (NE Poland) using high-resolution hyperspectral imaging and HPLC data" *by* Stamatina Makri et al.

Anonymous Referee #2

Received and published: 24 November 2020

The paper by Makri et al makes use of a high resolution, laminated lake sediment record from Poland, which covers the last 9500 years. The authors use high-resolution (mm-scale) Hyperspectral Imaging pigment data together with low resolution (dm scale) chlorophyll and caretonoids data to document the impact of humans into the lake and nearby environment. The lake is particularly suited for such a study, because pollen evidence document that the region is used by humans only since about 500 years. The region was in a natural state apparently for most of the Holocene. The lithology is presented as three main units, which are visually apparent. The authors

have quantified these lithological units by major element geochemistry, which match the visual apparent units. The 14C dating of the core is excellent. About 20% of the record appears to be in addition varve counted. The paper is well written and organized. The figures are clear. My main concern is about the data itself. The presented multiproxy data show all very similar structures, but I have to confess, that I don't see an interpretable pattern in the downcore data or time series, except those features, which are related to the apparent lithological changes. A well visible change of k-myxol at 4500 BP is the only specific change beyond those features that may be explained by the lithological units. The first prerequisite for a convincing interpretation must thus be a full documentation of the lithology. It is given as a side bar to Figs. 2, 3 and 6, but this is hardly readable. I suggest to stretch Fig. 2 on the depth scale and to document all litholological units with fotos of the sediment. This is indeed the crucial information before one can decide, if the interpretations of the many proxy curves are sound. The multiproxy time series shows the major changes in the depth interval of the section with many slumps. The slumps should be deleted from the figures on age scale. In addition the source of the lithogenic matter and its sedimentation processes should be inferred before the start of paleoenvironmental interpretations. Another clear signature is a spike of almost all organic components at about 2000 BP and in the year 1996. What happened in 1996? Was it a climatic anomaly? Was there any construction work in the catchment? The authors should make use of this historical information to "calibrate" their signals. The authors should also present the main pollen records in direct comparison to their two main organic proxies. All interpretations might become much more convincing just by an appropriate visualization. In summary, I don't feel capable of coming to a final evaluation of this manuscript. I suggest the authors add the missing information (lithology with details, fotos of sediments, pollen profiles) and provide convincing explanations for the spikes near 2000 BP and 1996 AD. It would need a new figure with only those 5 or 7 proxies, which allow a convincing synthesis. Such a synthesis figure could show a well readable lithology, two pollen demonstrating the absence of humans, two high resolution HSI and three HPLC records, all well scaled

– to indeed document the major changes - and not just many, many similar organic records. If this figures shows a clear pattern, and the signal of 1996 is understood, the study might become an excellent record from a beautiful site.

C3