

## ***Interactive comment on “Humic surface waters of frozen peat bogs (permafrost zone) are highly resistant to bio- and photodegradation” by Liudmila S. Shirokova et al.***

### **Anonymous Referee #2**

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Major suggestions If I understand the description of the experimental design correctly 4 sets of experiments were carried out, one experiment in each chosen geographical location and all during late summer (end of July). The authors focused on the biological and photochemical degradation of dissolved organic matter in these 4 locations. I think the experimental design for the photodegradation experiments was logic and reproduceable. For the microbial degradation experiments I had a few reservations/concerns. In many studies investigating the degradability of DOM people have used an inoculum to jump start the incubation as well as nutrient additions in order to exclude nutrient limitation as the dominant factor controlling DOM decomposition. The question is was the bacterial population reduced too much and nutrient limited, arti-

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cially reducing the degree of degradation relative to natural conditions. Because the authors have data on DAPI counts of bacterial cell numbers they should present the actual cell numbers they found in the experiments and compare that to the number of bacteria found in the natural environment before filtration. Total counts are more informative than CFU in this case. I also suggest that the authors state the concentrations of inorganic nutrients like phosphate, nitrate and ammonia. The major weakness of the current manuscript is the fact that all experiments were performed in one season only. The late summer has been shown to be a low activity period for these aquatic systems and many studies about DOM degradation have been published for this time period. We know that the fraction of degradable DOM is very low during the late summer but we also know that high latitude carbon fluxes are mainly driven by the release of organic matter during, and shortly after, snow melt. The major general conclusions need to be adapted to that fact and digging a little deeper into the existing literature would also be beneficial for the manuscript. On the other hand, the finding of extremely low rates of photodegradation, even with very high DOC, is a very important finding contradicting high profile publications pounding on the dominating importance of photodegradation for DOM removal (flocculation and decomposition) from these high latitude aquatic systems. This observation is somewhat less effected by seasonal differences in DOM quality in frozed peat bog systems. The current general and far fetching conclusions are not substantiated by the seasonally biased data set and are therefore not representative for the pan Arctic boreal environment. This needs to be adjusted accordingly.

Minor comments Include a map showing the sampling/experimental sites and the areal extend of representative ecosystems in terms of the field experiments. Line 469: find instead of found Line 478: hours instead of ours

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