Review:

Nogovitcyn, A., Shakhmatov, R., Morozumi, T., Tei, S., Miyamoto, Y., Shin, N., Maximov, T. C., and Sugimoto, A.: Historical variation in normalized difference vegetation index compared with soil moisture at a taiga forest ecosystem in northeastern Siberia, EGUsphere [preprint], https://doi.org/10.5194/egusphere-2023-279, 2023.

In "Historical variation in normalized difference vegetation index compared with soil moisture at a taiga forest ecosystem in northeastern Siberia" the authors investigated the variation in NDVI among forest conditions (typical mature, TF; regenerating-1, RF-1; regenerating-2, RF-2; and damaged forests, DF) and field-observed parameters (from 1998 to 2019) such as RWI, soil moisture, changes of larch needles (δ 13C, δ 15N, C/N), air temperature, and precipitation. The authors determined that prior to the 2007 extreme wet event, wet areas like DF and RF had higher NDVI values than dry TF sites due to greater water availability. However, following 2007, the TF had a greater NDVI than the DF and RF, although being visibly unaffected by the wet event.

Studying historical variations in NDVI compared with soil moisture at a taiga forest ecosystem in north-eastern Siberia is important for several reasons. Firstly, NDVI data can provide valuable information about temporal and spatial changes in vegetation distribution, productivity, and dynamics, which allows for the monitoring of habitat degradation and fragmentation. Secondly, the comparison of historical variations in NDVI with soil moisture can provide insights into the impact of extreme weather events on vegetation, such as the extreme wet event in 2007, which resulted in high tree mortality and a decrease in NDVI at affected sites. Understanding the ecological effects of climatic disasters such as drought or fire can be assessed using NDVI data, making it a valuable tool for monitoring changes in vegetation due to climate change. Overall, studying historical variations in NDVI and soil moisture in a taiga forest ecosystem can provide valuable insights into the impact of extreme weather events on vegetation and the effects of climate change on vegetation dynamics. Therefore, this paper has the potential to make an important contribution to the body of knowledge concerning the impacts of global change on sensitive and complex permafrost ecosystems.

It is my opinion that the authors used sound methods to address the study aims and presented the research findings clearly and concisely and they used appropriate figures to illustrate the NDVI values of the forest types and the trends in the transect and 10-km plot, which could be useful for researchers and policymakers. However, I agree with referee 1 about their main points raised as well as the minor comments provided. To avoid repetition and in the interest of brevity, I will not be going over them again in this review, but I strongly advise the authors to make the corrections already

suggested. Instead, I will just add a few points concerning the discussion section that I would like to see addressed before publication. When the authors revise these issues, I recommend the study for publication in Biogeosciences.

In the discussion, the authors considered the probable reasons for the differences in NDVI values among the forest types, such as the change in vegetation and the presence of surface water and saturated soil. However, the section could benefit from a more critical evaluation of the results and their implications. For example, the article does not address the limitations of using NDVI as a proxy for vegetation health and productivity, which could impact the accuracy of the results. NDVI measures the amount of chlorophyll in the uppermost layers of vegetation. This means that it may not accurately represent the health and productivity of plants with lower canopies or those that are hidden from view. The limitations of using NDVI as a proxy for vegetation health and productivity may be particularly relevant in taiga/permafrost ecosystems due to their complex vegetation structure and sensitivity to environmental changes.

Additionally, the article does not explore the broader ecological implications of these findings, such as how changes in vegetation health and productivity may impact ecosystem services or the ability of forests to sequester carbon. Finally, while the article notes the potential for using the observational data for analyses of ecosystem changes at the plot and regional scales, it does not explicitly state what these analyses might entail or why they would be valuable. A more explicit discussion of the practical applications of the research could make the findings more accessible to a wider audience.