

## ***Interactive comment on “Droughts in the area of Poland in recent centuries” by Rajmund Przybylak et al.***

### **Anonymous Referee #1**

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Dear authors, I highly appreciate the approach of combining and complementing available tree-ring width chronologies, written documentary accounts and instrumental data to investigate droughts, i.e. their occurrence, frequency and intensity, in Poland back to ca. 900 CE. An amazing 200 documented drought accounts for the period 1451–1800 were collected and categorized into three classes of severity. In addition, 22 tree-ring width chronologies were used to detect years of extreme low annual growth, so-called negative pointer years, which were attributed to drought events. The extension into the industrial period was done using the Standardized Precipitation Index (SPI) with different seasonal lengths and which was calculated on eight long precipitation records.

Overall, the comprehensive analysis of drought events and duration using existing proxy data is needed, especially under current climate change. However, the amount

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of statistical approaches applied make the study partly difficult to understand. Moreover, there are several shortcomings in the manuscript regarding the structure and content. Substantial improvements should be made prior to publication and I strongly recommend that the English be revised by a professional service or a native English-speaking scientist working in the field.

#### General comments

- The title is not reflecting the study very well, maybe include that a multi-proxy approach was used or highlight the main result, for example.
- The abstract needs shortening and a clear structure by including a motivation of the study which is followed by data, methods, results and conclusion/significance of the study. The abstract should not be too long and should not include references.
- The introduction needs improvement by 1) removing unnecessary information e.g. reduce p.3, l. 17-20, 2) write in a more precise way e.g. p.2, l.10. “statistical analyses” of what?, and 3) provide more information e.g. p.3, l.21. in which areas is drought the most stressful factor – to only provide a few examples. Also, I was wondering why the authors cite four lines of a publication on l. 18-21? This can be summarized.
- Structure of the Data and Methods chapters needs improvement. A straightforward description of the documentary data is missing. After reading the chapter 2.1, it is not entirely clear what data from whom were used. Maybe start with the summarizing paragraph (p.5, l. 30 – p.6., l.18) and add some (and only) important information from the paragraphs before. For the dendrochronological data, no information about the quality of the individual tree-ring width chronologies is provided. Information of the number of samples, inter-series correlation, mean segment lengths can be easily added in Table. 1. Information on the sample replication in a tree-ring width chronology is essential to evaluate drought events that were detected during a low replicated time period.

For the Method chapter, the examples of the individual drought classes in chapter

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3.1 are quite long. Please, consider reduction to only 2 to 3 examples and place the remaining examples in the supplementary material.

On page 19, chapter “2.3 Instrumental data” needs to be moved into “2. Data chapter”. Instead there should be a clearly written paragraph about the detection of the climate-growth relationships of all tree-ring width chronologies, for which period and for what climate variables. Why not use the SPI data for the analysis of the climate response of the trees which would simplify the entire study a lot and at the same time, prove your hypotheses (p.18, l.9)?

- Description of the methods lacks detailed and important information. For example, on p. 18, l. 14 “climate monthly precipitation and temperature” were used to evaluate the climate growth relationship. However, only results for precipitation are shown in Fig. 2 and information of the period over which the correlation was done is missing.

- Methodology for the evaluation of the climate-growth relationship is not sufficient. Firstly, it is not clear if the age trend from the individual tree-ring width series is removed and what method was applied. Secondly, it is questionable if daily precipitation data need to be used given 1) that this led the authors to a generalization which might be not true (p.19, l.4) and 2) the description and mention of the droughts in the documentary data are not on daily resolution either. Moreover, I would like to see a comprehensive climate-growth analysis of all tree-ring width chronologies with information of species, Pearson correlation coefficients, period of correlation etc., at least in a Table. This is very important since a publication by Przybylak et al. 2005 used a tree-ring width chronology from pine (*Pinus sylvestris*) to reconstruct mean January – April air temperature for Poland.

- Please avoid repetitions, e.g., on p.19, l.7-11: the two sentences are the same.

- P.19, l.11-16: please rephrase and clarify this entire paragraph since it is not clear what was done and why.

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