

Review of Seven centuries of rainfall reconstructed from Scots pine ring width in sub-Arctic Sweden.

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This is a solid and carefully prepared manuscript that presents the longest and northernmost tree-ring-based precipitation reconstruction from Sweden. The work contributes valuable new data to Scandinavian hydroclimatology. The methodology is rigorous, and the discussion is broad and well connected to previous studies.

The main strengths are:

- Long and well-dated chronology
- Thorough methodological approach using mRCS and validation statistics
- Clear comparison with previous reconstructions
- Well-documented site and regional context

This is a valuable and well-executed contribution. The manuscript would be substantially improved by a clearer statement of objectives, tighter structure, explicit figure references, and more careful separation of data-supported results from speculative interpretations. After these major revisions, the paper will be suitable for publication.

General

Length and structure

The manuscript is rather long for a paper of this type, spanning 36 pages including extensive appendices and detailed methodological descriptions. While the length reflects the thoroughness of the work, the readability could benefit from some condensation. I suggest that the authors consider shortening or restructuring parts of the introduction and discussion to improve focus and flow, and moving some of the more technical details (for example the full description of the mRCS procedure) to the Supplementary Material. This would help highlight the key results and interpretations without compromising the study's scientific depth.

Introduction and aims

The introduction provides a clear and well-structured background and rationale for the study, but the specific research questions or objectives are not stated explicitly. I recommend adding a short paragraph at the end of the introduction (after line 91, ending with "...relied on living trees.") that clearly formulates the main aims of the paper, for example:

"The specific objectives of this study are to (1) assess whether Scots pine (*Pinus sylvestris* L.) growing under drought-stressed conditions at the High Coast in northern Sweden record a robust precipitation signal suitable for hydroclimate reconstruction; (2) develop and evaluate a May–June precipitation reconstruction extending as far back as possible using both living and subfossil material; (3) analyse the temporal stability and spatial extent of the climate–growth relationships to determine the regional representativeness of the signal; and (4) identify possible multidecadal cycles and compare the reconstructed variability with other Scandinavian and European hydroclimate records."

The main research questions are all addressed in the discussion, though not explicitly referenced back to the aims. It would strengthen the paper if the authors clearly link each subsection of the discussion to the corresponding objectives, ensuring closure on each question.

Precipitation data and spatial heterogeneity

Because precipitation is inherently heterogeneous, its spatial coherence is much lower than that of temperature. Consequently, gridded datasets such as CRU TS or E-OBS, with resolutions of 0.5° and 0.1°, may not capture local-scale variability relevant for a coastal and topographically complex area like the High Coast. The weaker correlations between the tree-ring chronology and CRU precipitation compared with the local Härnösand station data likely reflect this limitation.

It also remains unclear which meteorological stations underpin the gridded datasets in this region. A brief inspection suggests that the CRU grid cell covering 62.5–63.5° N, 18–19° E may include data from both Norwegian and Finnish stations, introducing potential biases due to differing precipitation regimes. I recommend that the authors clarify which stations contribute to the grid, or at least acknowledge that the cell likely averages over multiple climatic zones. A short discussion noting that locally observed data (Härnösand) provide a more representative calibration target for hydroclimatic reconstruction at this spatial scale would strengthen the argument and contextualize the correlation differences between datasets.

Specific

Figures 1–11

Not all figures are explicitly referenced or discussed in the main text. Each figure should be clearly cited at least once in the narrative, ideally where the corresponding result is described. For instance, Figure 10 is not mentioned in Section 4.3 even though the discussion refers to the spectral features it presents, and Figure 9 is only indirectly discussed. Consistent figure referencing is essential for clarity and for guiding the reader through the results. I recommend that the authors carefully check that all figures are cited and briefly explained in the text, ensuring that their relevance to the argument is clear.

Section 4.3

Line 464 ff European harvest failures and drought sensitivity

The discussion suggests that periods of reduced growth in the Skuleskogen chronology coincided with major European harvest failures (for example the 1690s famine). Given that the reconstruction represents May–June precipitation variability from a single site in northern Sweden, and that precipitation is spatially heterogeneous, such continent-wide connections should be expressed with more caution. I recommend that the authors rephrase this passage to emphasize that any apparent temporal overlap with European harvest crises is coincidental rather than implying a direct climatic correspondence.

The statement “This emphasises the drought-sensitivity of the Skuleskogen tree-ring chronology” (L467) is ambiguous. The preceding sentences describe enhanced growth during periods of reduced solar activity and cooler conditions, which would imply higher moisture availability rather than actual drought. I recommend rephrasing to clarify that the chronology reflects tree growth being limited by moisture (that is increased growth under wetter conditions), rather than suggesting that these cool periods themselves demonstrate “drought sensitivity.”

Lines 474 ff Comparison with 1867

The comparison between the 1690s and the 1867 harvest failure reads as speculative. The argument that the lack of a growth minimum in 1867 “highlights the exceptional nature” of the 1700 CE minimum is not clearly supported by data. It is uncertain whether the absence of a signal in 1867 reflects genuinely different climatic conditions (for example wetter weather) or simply that tree growth at Skuleskogen is insensitive to temperature-driven short growing seasons. I suggest softening this interpretation and acknowledging the speculative nature of this comparison.

Lines 481 ff Figure 10 and spectral interpretation

The paragraph discussing the multidecadal oscillations appears to refer to Figure 10, but the figure is never explicitly cited. Every figure presented should be clearly referenced in the text, and its relevance briefly explained. The text should explicitly direct the reader to Figure 10 and describe what it shows (the 34- and 64-year peaks and their temporal variation).

Moreover, the argument that these periodicities correspond to large-scale modes such as the AMO or PDO is not convincing. The comparison is based solely on similar timescales, without any statistical or mechanistic evidence of linkage. Unless quantitative support (for example correlation or coherence analysis) is provided, I recommend removing the speculative reference to the AMO and PDO altogether.

Section 4.4 Undated material

Section 4.4 discusses the presence of numerous undated deadwood samples and suggests that some may predate the established chronology, implying potential for further extension. However, the text does not specify the proportion of material that remained undated or excluded. For readers to evaluate the true potential for extending the chronology, it would be important to quantify this, for example by stating the number (or approximate percentage) of collected samples that could not be cross-dated, and whether these were excluded due to poor preservation, missing sapwood, or non-overlap with the master chronology.