

This manuscript presents an event-based dataset of European low-wind events (LWEs) for the period 1979–2024, derived from hourly ERA5 reanalysis data. By utilizing wind speeds at both 10 m and 100 m, the authors introduce a novel two-height classification framework that distinguishes between surface-confined (shallow) and vertically extensive (deep) wind droughts. The topic is highly relevant, and the methodological advancement paves the way for future regime-aware climatological studies. The manuscript is generally well-organized. However, several points regarding the limitations and reliability of the dataset must be addressed before publication, particularly concerning the reliance on unvalidated ERA5 data and its known limitations in reproducing near-surface wind speeds and stable boundary layer dynamics.

Specific comments

1. The entire classification framework relies on the vertical wind shear between 10 m and 100 m derived from ERA5. The authors justify this by citing previous studies (e.g., Ramon et al., 2019), but omit that global reanalysis (including ERA5) struggle to represent near-surface weak-wind regimes, long-term wind trends, and generally underestimate surface wind speed. Furthermore, the parameterization of the ABL in the model underlying ERA5 could also introduce biases in the proposed dataset. Currently, the manuscript lacks a rigorous evaluation of how these model constraints affect the dataset. The authors must include a dedicated subsection in the Discussion to explicitly detail the structural limitations of ERA5 regarding both near-surface wind speeds and ABL parameterization. This new section must address how these known biases could skew the results of this study.
2. The authors present a dataset that is a purely model-derived product, but no baseline observational validation is provided to prove that the proposed shallow/deep separation is physically robust. Including an observational validation against tall-tower and surface measurements would be highly beneficial, as it would add significant rigor and solidity to the manuscript.
3. In Section 5.2, the authors dismiss large-scale forcing because absolute SLP distributions overlap between the two LWE types. However, SLP magnitude alone is an insufficient metric. It would be highly beneficial to explore the relationship between these events and large-scale atmospheric circulation. Including a brief synoptic analysis (such as weather regimes or spatial composites) would demonstrate how large-scale forcing interacts with local surface conditions to produce either shallow or deep LWEs.
4. The authors note in Figure 3a that deep LWE median durations are exceptionally long over mountainous regions. The physical explanation for this (ERA5's topographic smoothing and the omission of sub-grid local valley flows) is physically plausible, but it is relegated to Appendix B. Because this artifact dominates the spatial pattern of one of the main results (Fig. 3), the authors should move this discussion to the main text (e.g., Section 4 or 5). The authors need to explicitly warn readers in the main text that LWE durations in complex terrain are biased by reanalysis resolution.

Technical corrections

- **Line 84-95 (Section 2.1):** The review of existing LWE definitions heavily emphasizes energy-system approaches and fixed wind-speed thresholds. However, it largely overlooks the purely climatological perspective. It would be beneficial to briefly mention this climatological viewpoint in the Introduction to provide a more comprehensive overview of how wind droughts are defined across different disciplines.
- **Line 84:** Missing comma. Please change "LWEs often referred to as..." to "LWEs, often referred to as..."
- **Line 126:** Grammatical issue. "Low wind situation at the surface" should be corrected to "A low wind situation..." or "Low wind situations..."
- **Line 143 (Section 2.3):** The selection of a 48-hour duration threshold is currently insufficiently justified. Synoptic conditions driving persistent wind droughts often operate on longer timescales (3–7 days). The authors should briefly discuss why 48 hours is preferred over longer durations (e.g., 72 hours) and ideally provide a short sensitivity check in the Appendix to show how this temporal threshold impacts the event counts.
- **Lines 177-178:** There are several typographical errors in the subscripts of the cut-in wind speed threshold equations
- **Line 245:** The text references "Fig. 3c" ("ABL dynamics (Fig. 3c)"), but Figure 3 only contains panels (a) and (b). Please update the cross-reference.
- **Line 252:** Typographical error. Please change "The Seasonal behaviors" to "The seasonal behaviors".
- **Line 274:** Redundancy. Please change "stable atmospheric states cases" to "stable atmospheric states" or "stable atmospheric conditions".
- **Line 281:** Typographical error. The text repeatedly reads "small AU" and "larger AU", which should be corrected to the mathematical symbol for vertical wind shear.
- **Line 433:** Verb conjugation error. Change "Such localized flow effectively fragmenting" to "Such localized flow effectively fragments".