

Dear Editor,

We have provided our responses to the reviewers' comments below. Our responses are marked in **green** and added/modified manuscript text with **bold green** in the response letter. The line numbers in the response letter refer to the track-changes version of the manuscript.

On behalf of all coauthors,

Kind regards,

Iuliia Burdun

Anonymous Referee, 18 August 2026

Line 67 and line 111: Could you please briefly explain what "sensor-independent climate data record" means? How does "climate" connect to "LAI"?

Thank you for this question. We added a short explanation in the Introduction (P3, L67): using a gap-filled, sensor-independent climate data record of leaf area index (LAI), **i.e. a consistently processed multi-decadal LAI time series merged from three satellite sensors**. The following sentence explains the link between LAI and climate, as LAI is an Essential Climate Variable (P3, L68).

We also explained the term in Section 2.2 (P4, L113): **A climate data record is a consistently processed, uncertainty-quantified time series that is long and stable enough for analyses at climate timescales (Merchant et al., 2017). The record is sensor-independent because, for each 8-day period, it combines high-quality retrievals from MODIS Terra, MODIS Aqua and VIIRS, which reduces biases tied to one sensor's calibration and overpass time. Remaining temporal gaps, e.g. due to clouds, aerosols or snow, are filled with a spatio-temporal tensor completion model (Pu et al., 2024).**

Line 113–114: Should it not say "fraction of photosynthetically active radiation absorbed by vegetation (FPAR)"?

We corrected the definition (P4, L119): It also includes data on the **fraction of photosynthetically active radiation absorbed by vegetation (FPAR)**.

Chapter 2.3.1: Could you state somewhere briefly how periods with snow cover were excluded?

We did not exclude snow-covered periods. We added an explanation to Section 3.1, where the extraction of anomalies is described (P8, L224): **We did not exclude snow-covered periods from the analyses. In the LAI records, snow-affected retrievals are removed during quality screening and replaced with gap-filled estimates (Pu et al., 2024). The seasonal-trend decomposition by Loess assigns these recurring winter estimates to the seasonal component, so winter anomalies are close to zero. In this way, we retained the full time series to keep a regular and consistent time base across pixels, which is important for decomposition and trend estimation methods.**

Line 173: Please define the abbreviation "SRTM".

We spelled out the abbreviation and specified the source of the elevation data. Because Shuttle Radar Topography Mission data do not cover areas north of 60°N, we also named the dataset used there (P6, L179): **We derived the elevation for each centroid of the studied pixels from the WorldClim 2.1 elevation layer (Fick and Hijmans, 2017), which is based on Shuttle Radar Topography Mission data and, north of 60°N, on the GTOPO30 global elevation model.**

Line 243–244: Here you define the variables of the equation in a different style than for the other equations. Please align the definition of equation variables.

We aligned the definitions of Eq. 4 with the other equations (P9, L256): where x_t is a time index in fractional years, standardised to zero mean and unit variance, **b_0 is the intercept, b_1 is the linear trend coefficient, b_2 is the curvature coefficient, and ε_t is Gaussian noise with variance σ^2 .**

We applied the same style to Eqs. 5 and 6, where the variables were previously defined in a separate sentence (P10, L270): **where r_t is the LAI anomaly at time t , x_t is the standardised time index, b_0 is the intercept, b_1 is the slope before the breakpoint, b_2 is the change in slope after the breakpoint, q is the bent-cable basis function, τ is the central**

location of the breakpoint in scaled time, γ is the half-width of the transition zone around the breakpoint, and ε_t is Gaussian noise with variance σ^2 .

We also added the reference for the bent-cable model (Chiu et al., 2006; P10, L264) and corrected the last branch of Eq. 6 (P10, L269).

Please unify throughout the text how you cite R packages and functions.

We unified the citation of R packages and functions. At first mention, each package is now given as the package name, version and "in R", followed by its reference. Functions are given with brackets and preceded by "the function":

- P7, L184: from the **rnatureearth** package v. 1.2.0 in R (Massicotte and South, 2024)
- P8, L221: implemented in R's base **stl** function (Cleveland et al., 1990; R Core Team, 2022)
- P9, L231: using the **ppcor** package v. 1.1 in R (Kim, 2015)
- P9, L254: with **LaplacesDemon** package v. 15.1.6 in R (Statisticat LLC, 2021)
- P10, L281: using the **remotePARTS** package v. 1.0.4 in R (Ives et al., 2021; Morrow and Ives, 2025)
- P10, L284 and L288: using the function **fitAR_map()** and the function **fitGLS_partition()**

The corresponding references were added to the reference list.

Line 354: Please refer to Fig. 6 at the end of this sentence or somewhere else. Otherwise the figure could be moved to the appendix.

Thank you, we added the reference to Fig. 6 (P14, L369): Nevertheless, pixels overlapping drained lakes showed a higher proportion of increasing LAI trends: 94.5% of overlapping pixels had increasing trends, comprising 1,185 pixels with linear increasing trends, 758 with cup-shaped increasing trends, and 256 with hat-shaped increasing trends (**Fig. 6**).

Table A1: Maybe state only 3 to 4 decimal places and not 6.

We reduced the number of decimal places to three in Table A1 (P23) and, for consistency, in Table A2 (P25). We also rounded the model fit statistics in the caption of Table A1 (P23, L557).