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climatrends: Precipitation and temperature indices for climate variability analysis in R

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Software

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- Repository
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Summary

Understand how climate variability drives ecological processes is a key approach to provide recommendations for climate adaptation and biodiversity conservation. **climatrends** aims to provide the R (R Core Team 2020) toolkit to compute extreme precipitation and temperature indices that serves as input for climate and crop models (van Etten et al. 2019; Kehel, Crossa, and Reynolds 2016), trends in climate change (Aguilar et al. 2005; de Sousa et al. 2018) and applied ecology [**add-reference**].

Methods and features

Implementation

Four main functions are provided, `ETo()`, `GDD()`, `rainfall()` and `temperature()` with methods (R Core Team 2020) for classes 'data.frame', 'matrix' (or array), and 'sf' (Pebesma 2018).

Growing degree-days

By default the function `GDD()` applies the following equation.

$$GDD = \frac{T_{max} + T_{min}}{2} - T_{base}$$

variant A

$$GDD = max\left(\frac{T_{max} + T_{min}}{2} - T_{base}, 0\right)$$

variant B, changes T_{base} to T_{min} if T_{base} is lower than T_{min}

$$T_{min} < T_{base} \rightarrow T_{min} = T_{base}$$

Evapotranspiration

Applies the Blaney-Criddle formula. This is theoretical method used when no measured data on pan evaporation is available locally.

$$ETo = p \times (0.46 \times T_{mean} + 8) \times Kc$$

Examples

Common beans

Replicate part of the analysis in van Etten et al (2019) with the beans data to show how we can use this package to capture the influence of climate variability on crop performance. The idea is to show the same PlackettLuce Tree.

Time series

Pick some random points in Norway (or Scandinavia??) and check how the trends on temperature indices over the last 20 years.

Further development

Integration with other datasets as they become available in `R` via API client packages. New indices related to the physiology of crops to be implemented while I work on the rice data.

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