

README: Whole-growing-season TTC trend NetCDF file

Directory: *Trend_NetCDF*

Item	Description
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Temporal coverage	1950-2025
Source data	E-OBS daily mean 2-m air temperature, 0.1° (~11-12 km) grid

Scientific background

These NetCDF datasets describe potato thermal exposure across Europe using daily mean air temperature. The workflow classifies each daily temperature value into one of seven Thermal Threshold Classes (TTCs), ranging from drastic cold to drastic hot, using potato-relevant temperature thresholds. The resulting counts represent the number of days in each class for each grid cell, year, and, where relevant, phenological stage.

The regional growing-season windows used in the analysis distinguish northern, central, and southern Europe. The stage-wise datasets further split the growing season into four phenological stages, allowing thermal exposure to be interpreted during agronomically important periods rather than only as a whole-season summary.

Dataset content

This directory contains the whole-growing-season Mann-Kendall trend analysis results for annual TTC frequencies. The file summarizes the direction and p-value of monotonic trends for each grid cell and thermal class.

Aspect	Description
Expected file	TTC_whole_growing_season_trend.nc
Temporal basis	Annual TTC time series over 1990-2020
Trend method	Mann-Kendall test
Main variables	MK_trend(latitude, longitude, thermal_class); MK_p_value(latitude, longitude, thermal_class)
Trend code	-1 = significant decreasing trend; 0 = no significant trend; 1 = significant increasing trend
Units	dimensionless
Missing value	-9999
Dimensions	latitude x longitude x thermal_class

Coordinate and index variables

Variable	Description	Units / type
longitude	Longitude coordinate	degrees_east
latitude	Latitude coordinate	degrees_north
thermal_class	Integer class index from 1 to 7	int32
MK_trend	Mann-Kendall trend direction for whole-growing-season TTC frequency	int16; dimensionless
MK_p_value	P-value from the Mann-Kendall trend test	single; dimensionless

Thermal class definitions

Index	Code	Class name	Temperature range
1	DC	Drastic Cold	$T \leq 5 \text{ degC}$
2	SC	Severe Cold	$5 < T \leq 11.5 \text{ degC}$
3	MC	Mild Cold	$11.5 < T \leq 18 \text{ degC}$
4	Opt	Optimal range for production	$18 < T \leq 20 \text{ degC}$
5	MH	Mild Hot	$20 < T \leq 25 \text{ degC}$
6	SH	Severe Hot	$25 < T \leq 30 \text{ degC}$
7	DH	Drastic Hot	$T > 30 \text{ degC}$

Interpretation notes

- A decreasing cold-class trend indicates fewer cold-class days or a shift toward warmer thermal categories.
- An increasing hot-class trend indicates a rising frequency of heat-related thermal exposure.
- The p-value layer should be used together with MK_trend to evaluate statistical support.
- Trend results should be interpreted with caution where time series are short, autocorrelated, or affected by local crop-calendar uncertainty.

Citation, acknowledgement, and use terms

Recommended citation

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