Soil erosion in Austria – from mean to extreme

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EROS-A Project : **Work packages**

WP 1: Characteristics and return periods of erosive rainfalls (BOKU-SoPhy; Institute for Land and Water Management Research, BAW; Czech Technical University, CTU)

WP 2: Mapping extreme rainfall erosivity across main agricultural production zones in Austria (BOKU-Stat)

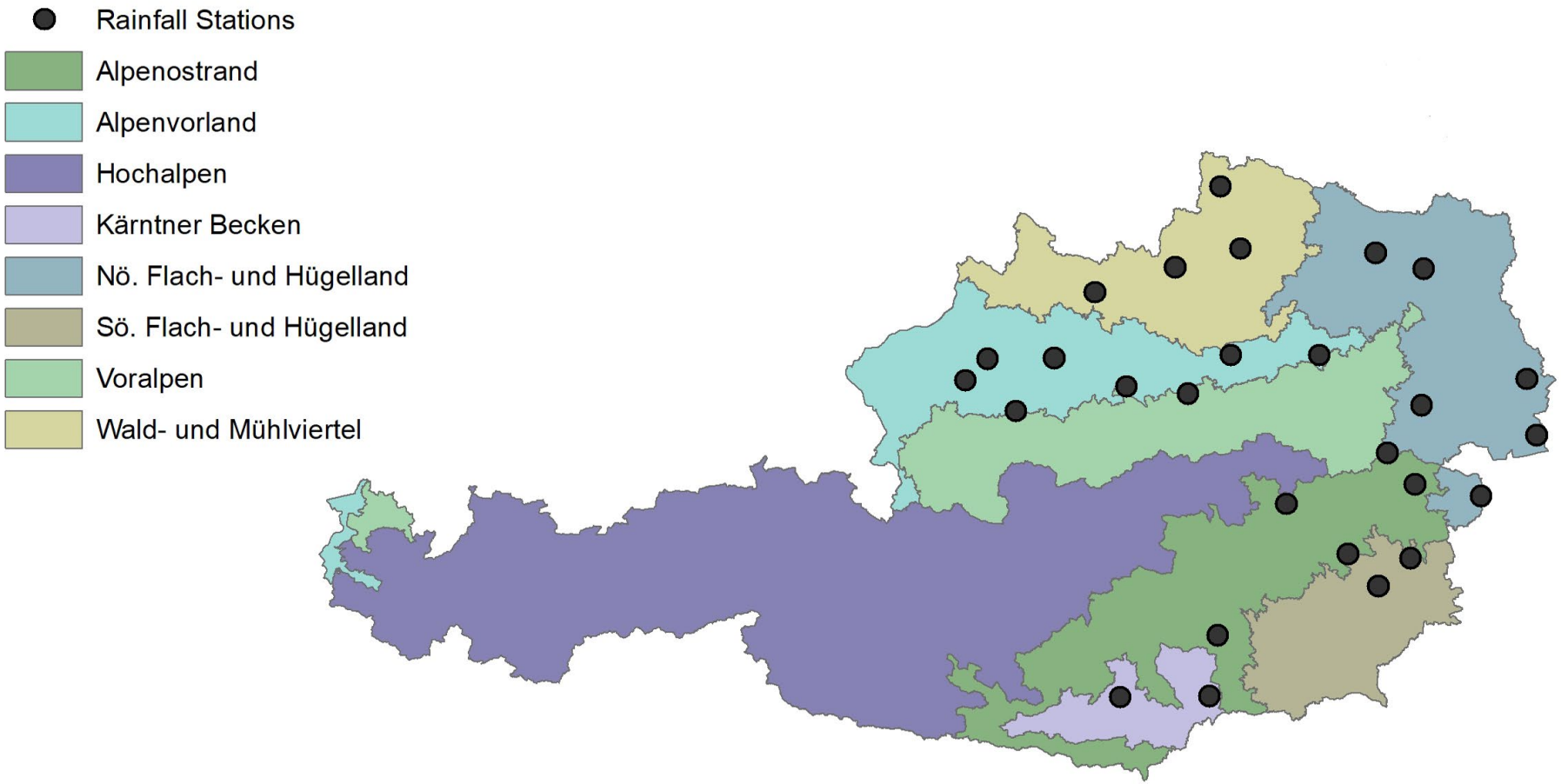
WP3: Modelling of extreme erosion of main agricultural production zones in Austria – empirical versus physical approach (BOKU-SoPhy; BAW; Czech Technical University; CTU)

WP:4 Regionalization of mean and extreme erosion to main agricultural production zones in Austria (Beijing Normal University, BNU)

WP 5: Validation of extreme erosion events by reported damage (Central Institute for Meteorology and Geodynamics, ZAMG)

Main Agricultural Production Zones (MAPZ) in Austria

Irregular topography < 250m to < 3500m



<u>27 stations</u>

Period: 27 – 78 years

Rainfall data (5 minutes)

Daily temperature data

Daily snow data

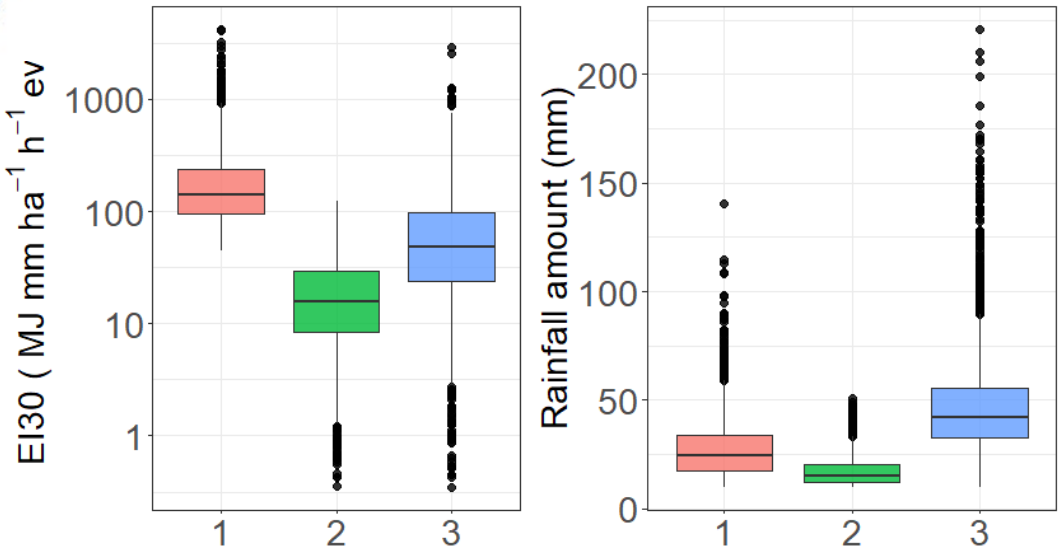


Fig. 1. Boxplots of rainfall erosivity and rainfall amount per cluster

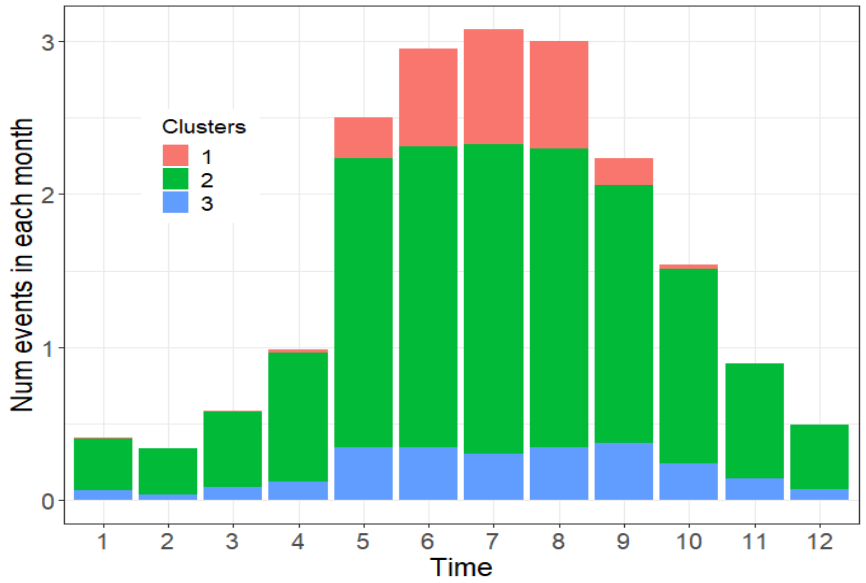


Fig 2. Temporal distribution of erosive events per cluster

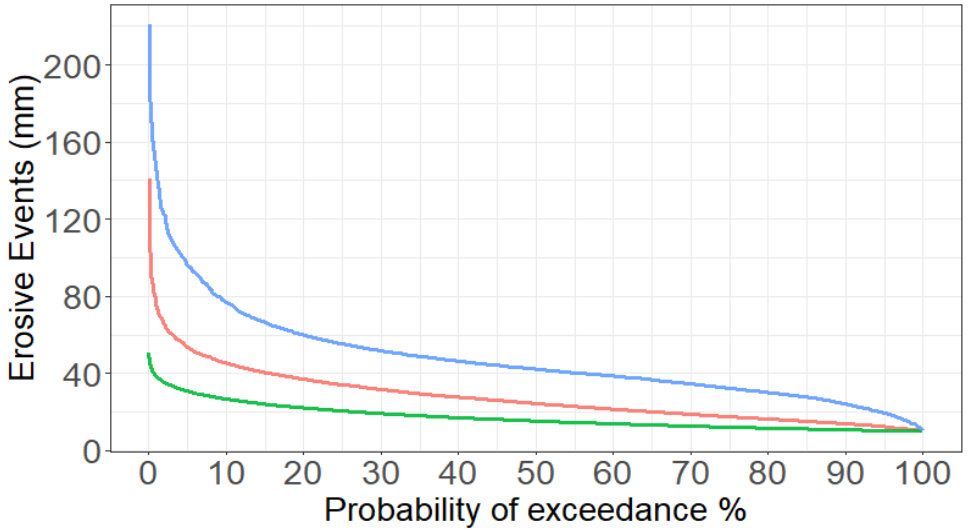
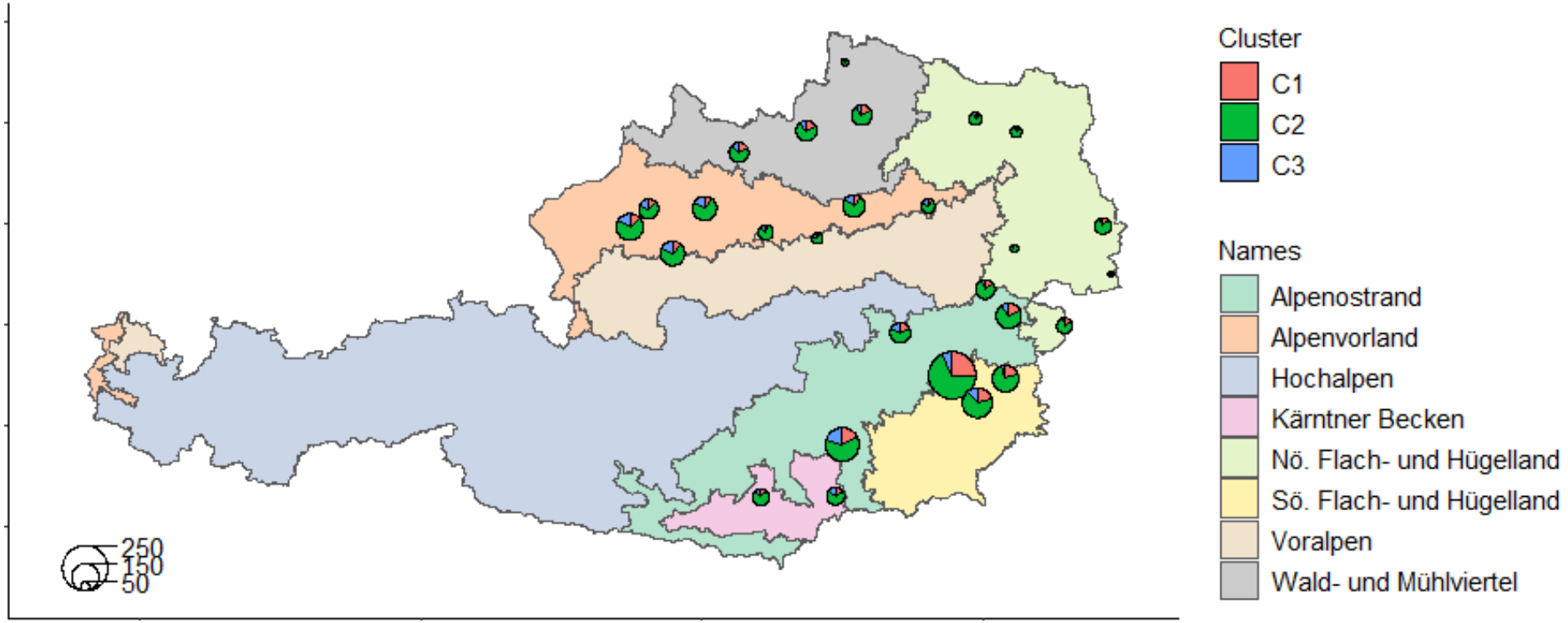
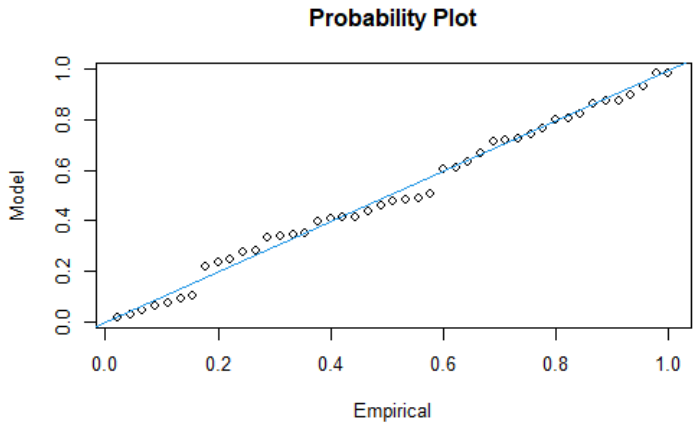
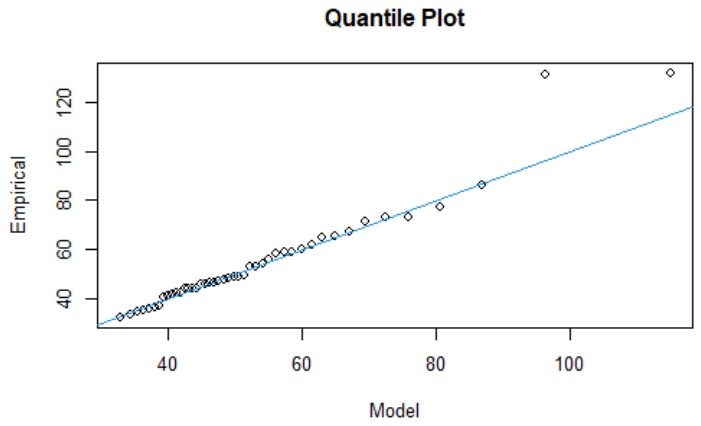


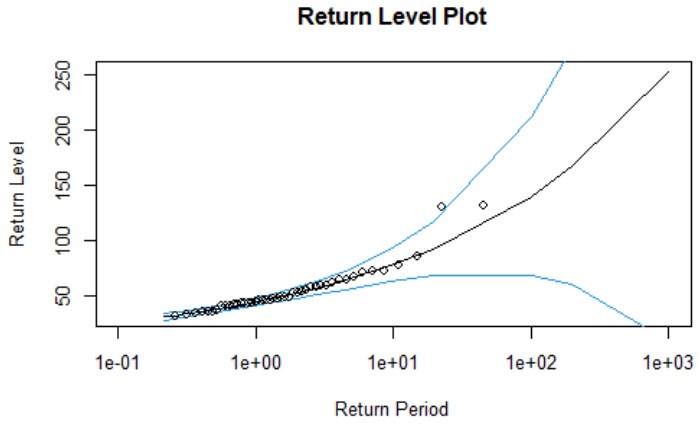
Fig.3. The exceedance probability curve of erosive rainfall events per cluster

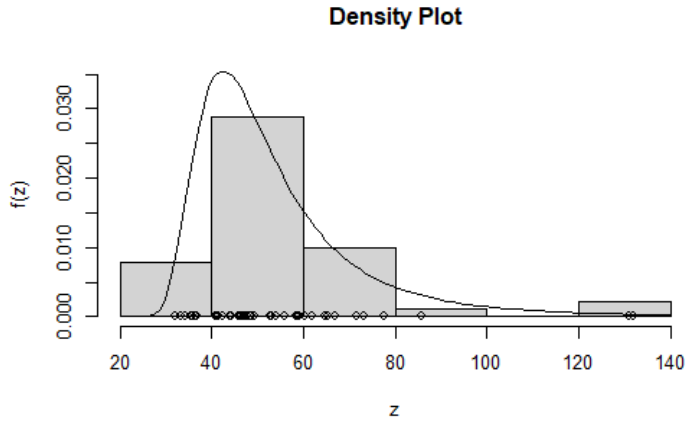
Spatial distribution of erosive events within selected agricultural areas in Austria











Generalized Extreme Value (GEV) distribution applied for long-term rainfall records of Petzenkirchen, Lower Austria

Conclusions

1. Rainfall data from the 27 stations represented the clustering of the erosive rainfall events
2. Main characteristics: I30, event duration, and rainfall amount
3. Three groups (clusters) of erosive events
4. Cluster 1 represents highly erosive events
5. Cluster 2 most frequent in all Austria
6. Temporal distribuition of clusters
7. Spatial distribution – North, South & East

Progress of the project

WP	Activity / Task	Performance (%)
WP1	Rainfall erosivity calculations and evaluation	67
		75
	Determination of return period	33
		40
WP2	Generation and analyses of rainfall erosivity time series	75
		50
	Extreme frequency analysis	25
		50
	Calculation of extreme rainfall erosivity return periods	25
WP3	Model selection, calibration and validation	100
		33
	Erosion modelling for long-term climate stations	29
	Definition of return periods of extreme soil erosion rates	
WP4	Compilation of grid based USLE factors	20
		20
	Simulation runs with modified USLE	
	Return periods of extreme soil erosion rates	
WP5	Presence-absence data set preparation	10
	Comparison of simulated extreme soil losses and damage reports	
	Feasibility assessment of early erosion warning system	

Table 1. Performance per Work Package and Task: proposed (grey) versus achieved progress (exceeding (green); slightly underperforming (yellow); underperforming (red))

May 2023

- Rainfall simulation
- Erosion plots
- WEPP model calibration

Description of dissemination and publication measures

Project meetings and workshops:

- Kickoff meeting (online) on January 20, 2022 – organized by BOKU-SoPhy; all project partners.
- 1st technical progress and update meeting (hybrid) on April 21, 2022 – organized by BOKU-SoPhy; all project partners.
- 2nd technical progress and update meeting (hybrid) on October 13, 2022 – organized by BOKU-SoPhy; only Austrian partners and CTU Prague.
- 3rd technical progress and update meeting (hybrid) on November 29, 2022 – organized by BOKU-SoPhy; all project partners.

Description of dissemination and publication measures

Description of project progress “highlights”

- Erosive rainfall event analysis tool (R-script)
- International linkage (Iowa State University, USA)
- Daily crop factors (C) (USLE modelling approach)
- Drought Impact on Remobilization of water polluTants from river sediments. (11.2022 - 12.2024, **another ACRP project**)
- **Abstracts for scientific presentations**:
  - Klimatag (April 2023)
  - European Geoscience Union (EGU) (April 2023)
  - IKT Petzenkirchen (April 2023)

Description of difficulties encountered in the pursuit of the targets during the reporting period

Challenges and adaptations

- Long-term and harmonized/comparable data
- Erosive rainfall event analysis tool (rainfall event interpretation)
- Time difference (large geographical distance)
- Delayed partner budget transfer

Thank you for your attention!