

SP 03: Modelling soil erosion and related organic carbon transport

Researchers

- Prof. Dr. Jürgen Schmidt
- Dipl.-Geogr. Marcus Schindewolf



Objective

In order to control soil degradation and organic carbon losses in the Southern Amazonia region effectively a Decision-Support-System (DSS) should be developed and implemented. As an integral component of the DSS this part of the project aims to adopt and validate an advanced soil erosion and deposition model EROSION 3D for the southern Amazonia region. Using the model it will be possible to:

- (1) identify the hotspots of soil loss or deposition on regional scale under present and future climate and socio-economic conditions
- (2) estimate the related nutrient and organic carbon losses/yields
- (3) locate the pass over points at which eroded sediments, particle-bound nutrients and particulate organic matter enter surface water bodies

Parameter Identification

- I. General parameters provided by existing databases or carbiocial-subprojects
- II. Erosion specific parameters

- Rainfall
- Relief
- Landuse
- Crops
- Soil management
- Soil type

Transfer by empirical functions

- Bulk density [kg/m³]
- Initial soil moisture [vol. %]
- Soil texture [%]
- Skinfactor [-]
- Erosional resistance [N/m²]
- C_{org} content[%]
- Hydraulic roughness [s/m^{1/3}]
- Soil cover [%]

Experiments

- III. Empirical functions need to be validated by simulated rainfall experiments

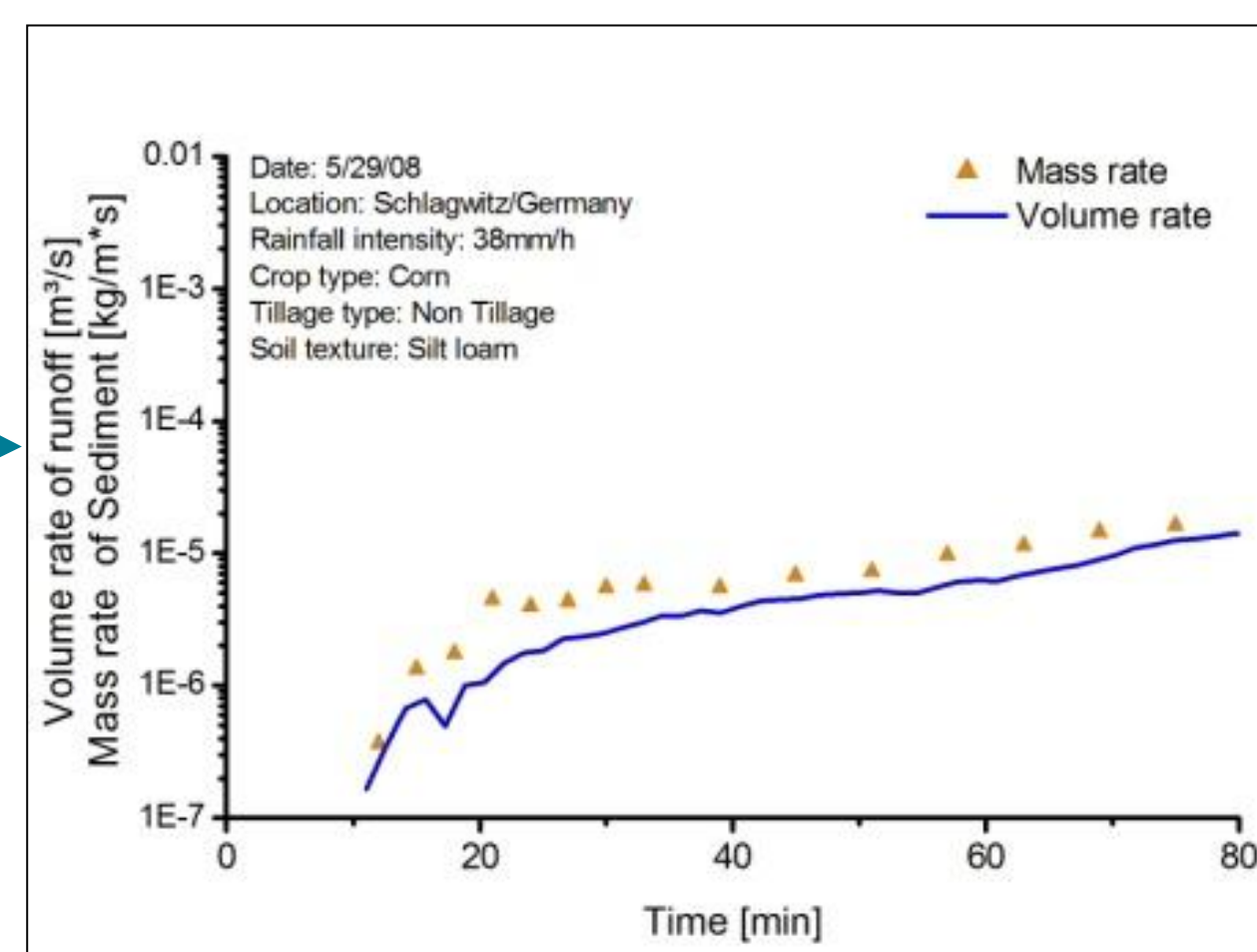
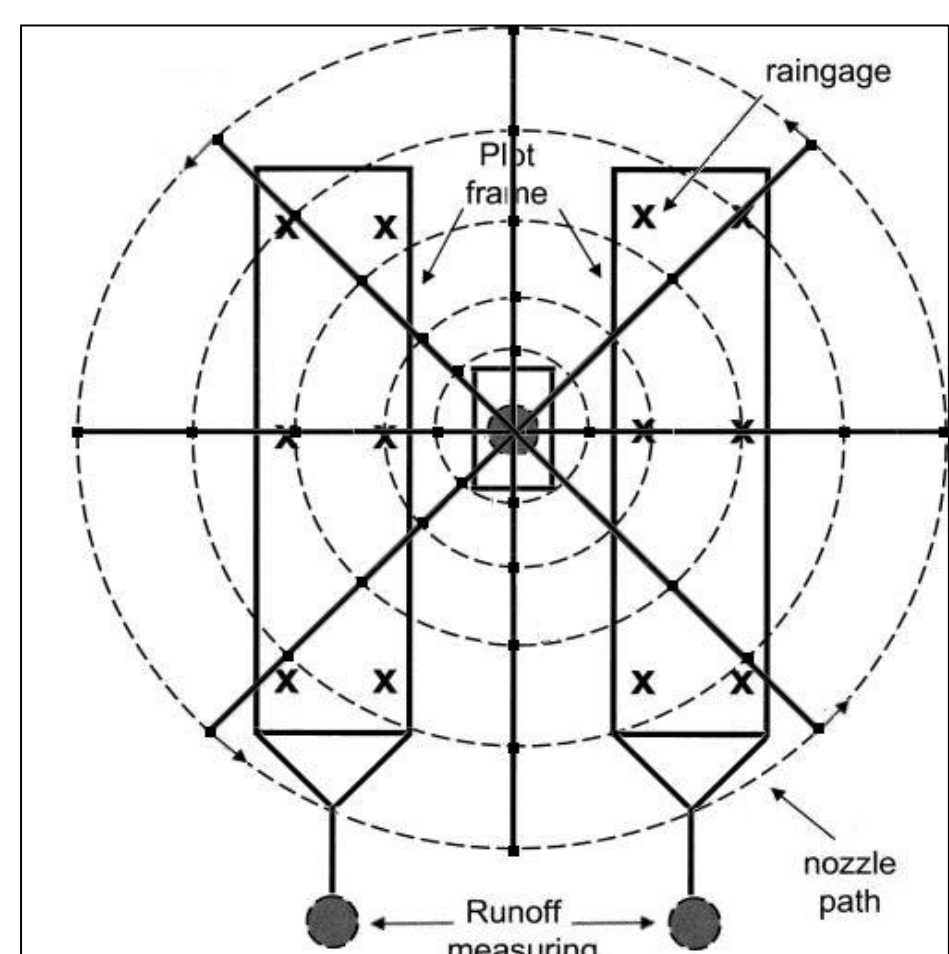


Fig. 1: Rainfall simulator Swanson type

Fig. 2: Experimental results

Laboratory Work

- IV. Distribution of organic carbon related to textural classes

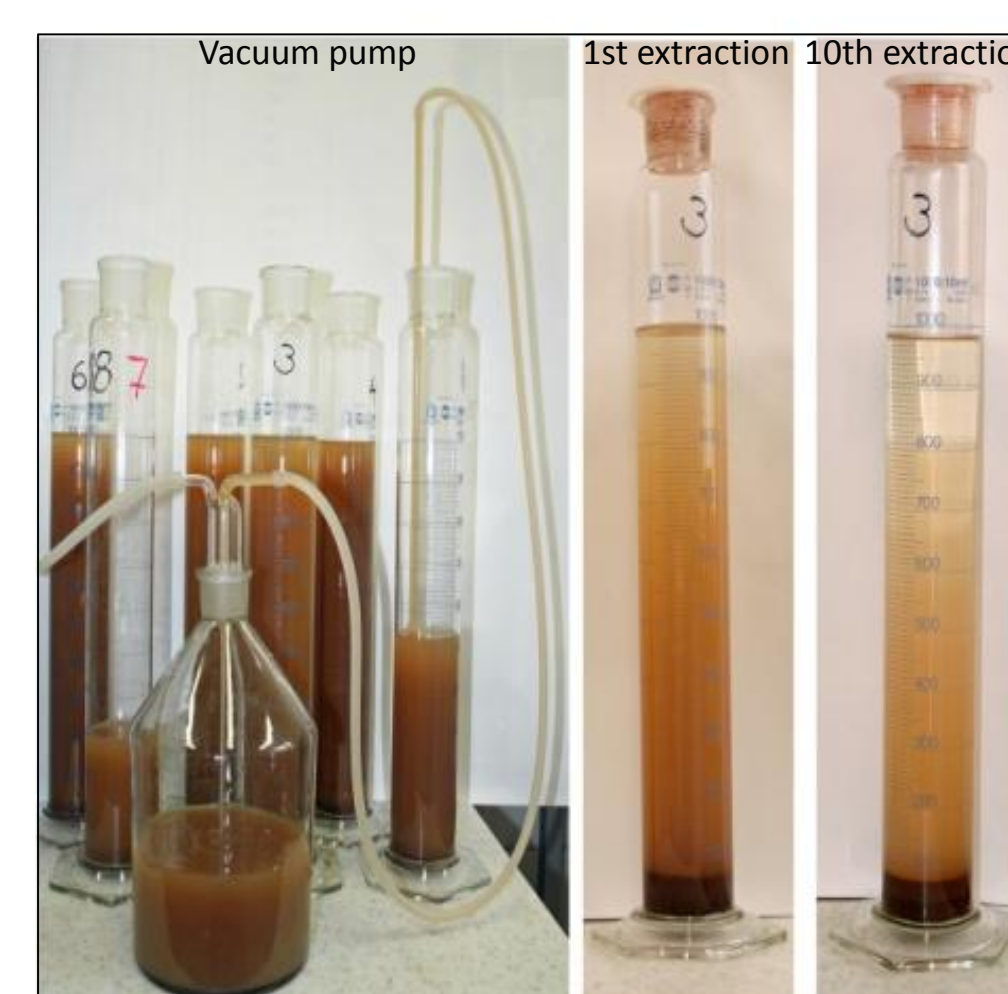


Fig. 4: Laboratory separation of textural classes

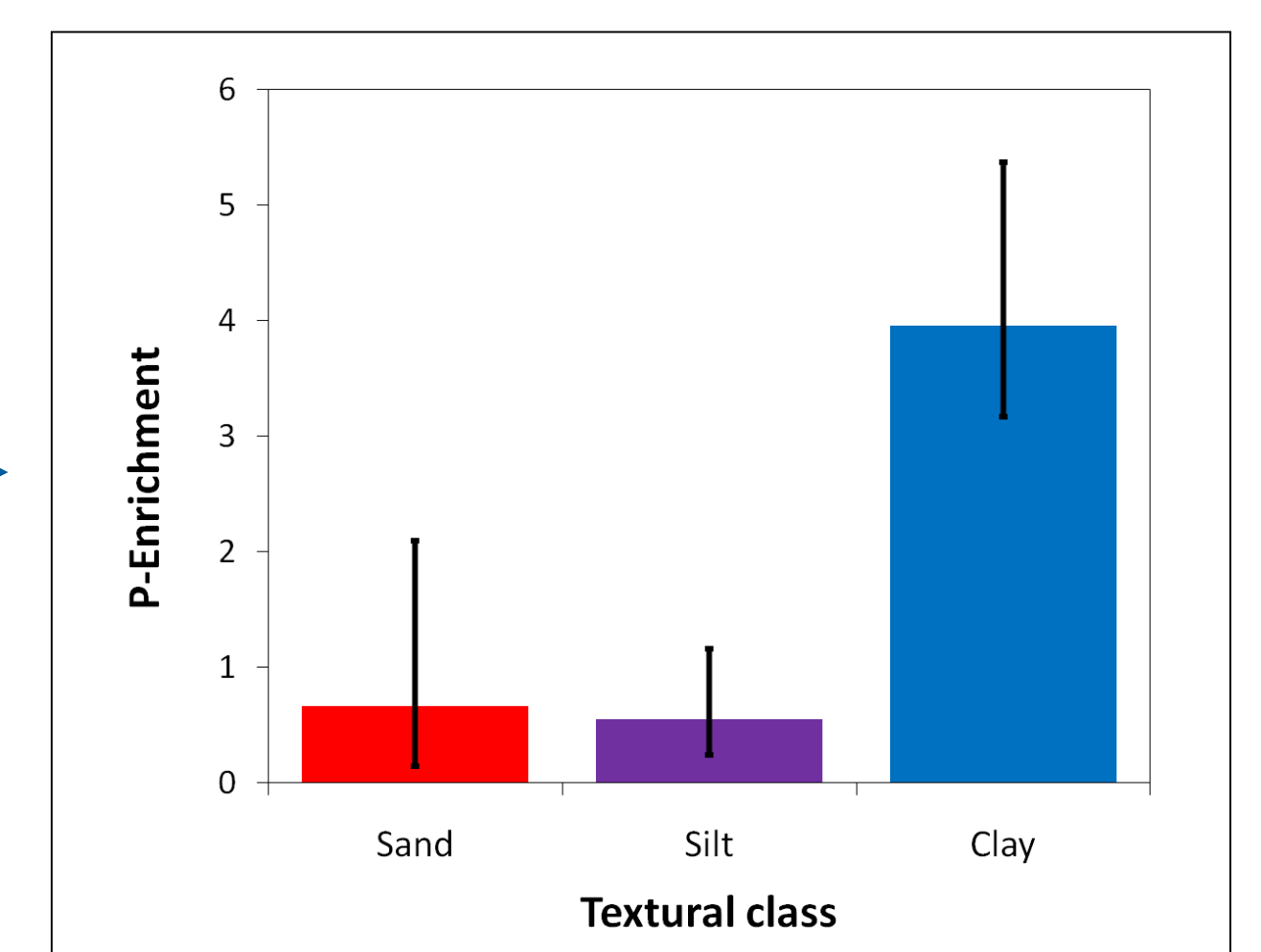
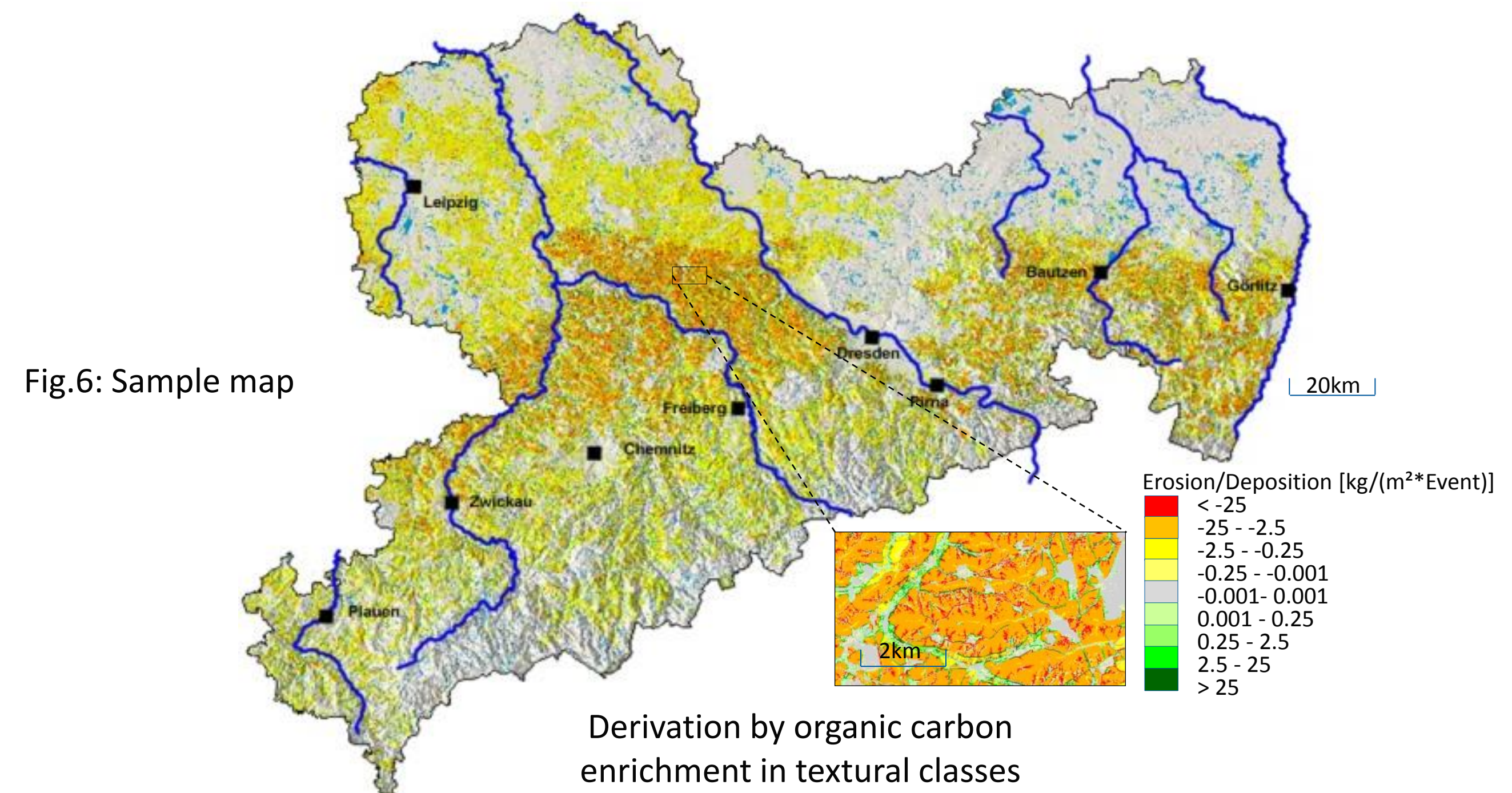


Fig. 5: Enrichment of Phosphorous related to textural classes

Expected Results

- V. Simulated soil loss and deposition



- VI. Organic carbon loss

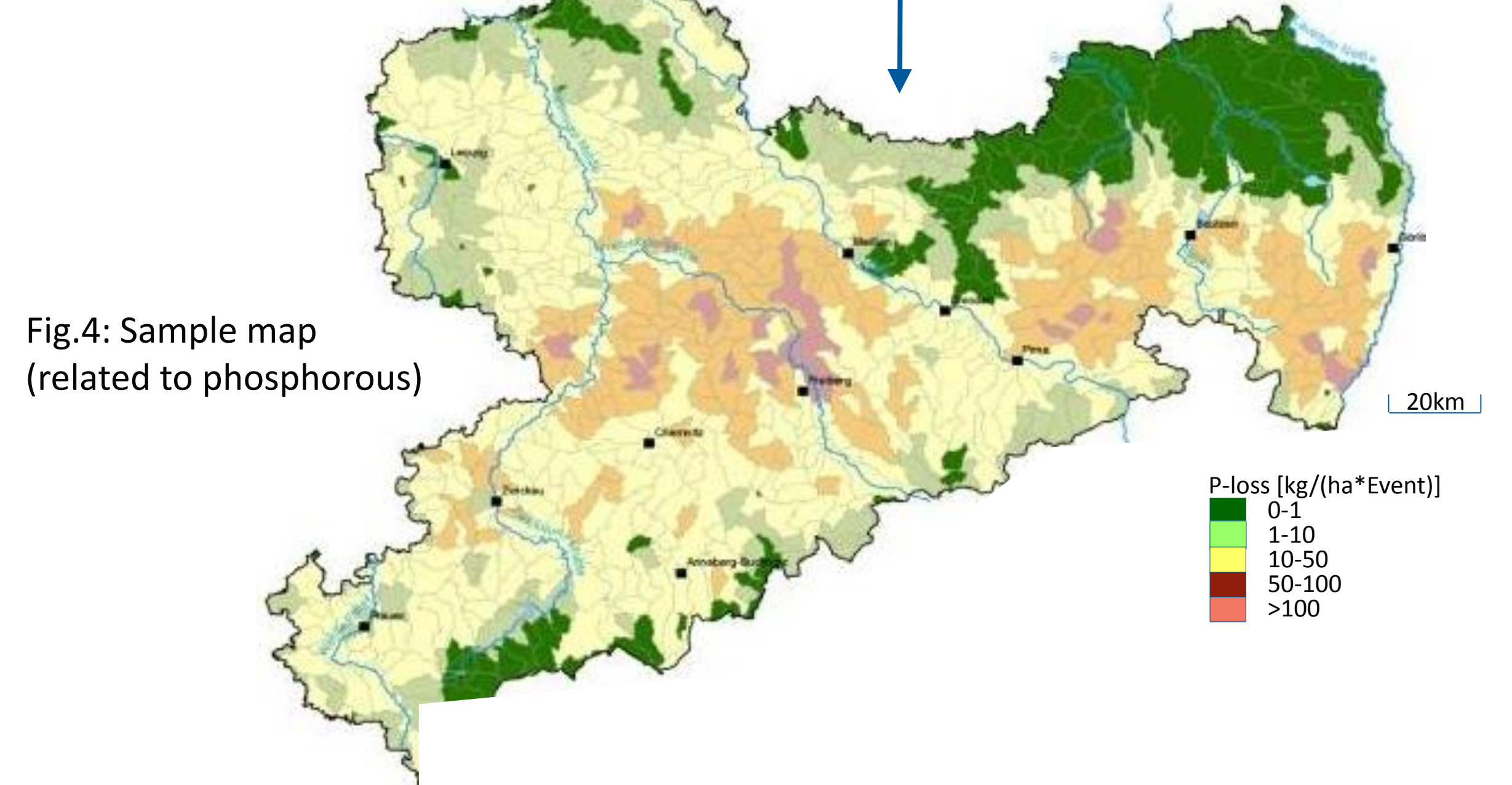


Fig. 4: Sample map (related to phosphorous)