SONDAR CZ-AT & ELSA international conference

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Soil Erosion Development

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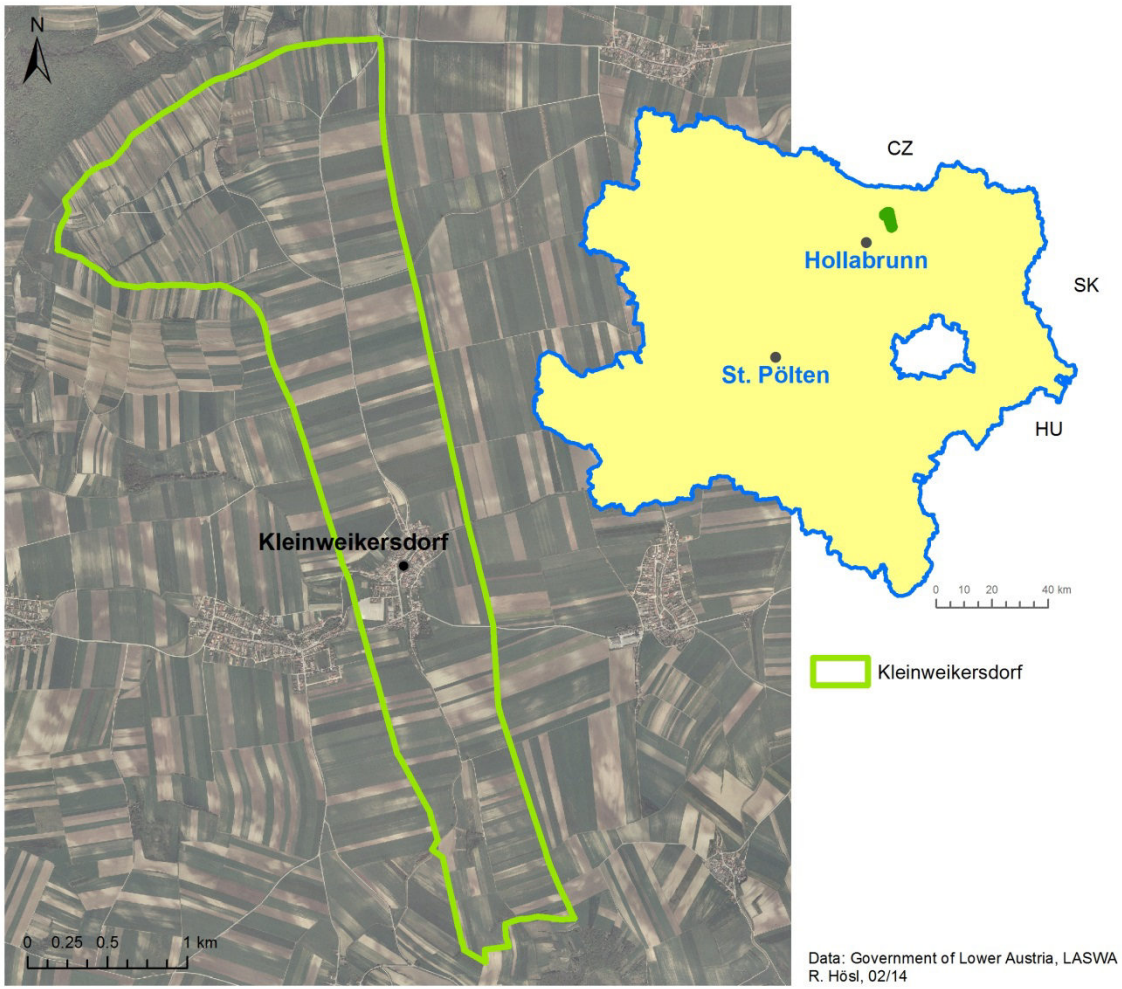
Sondar CZ-AT

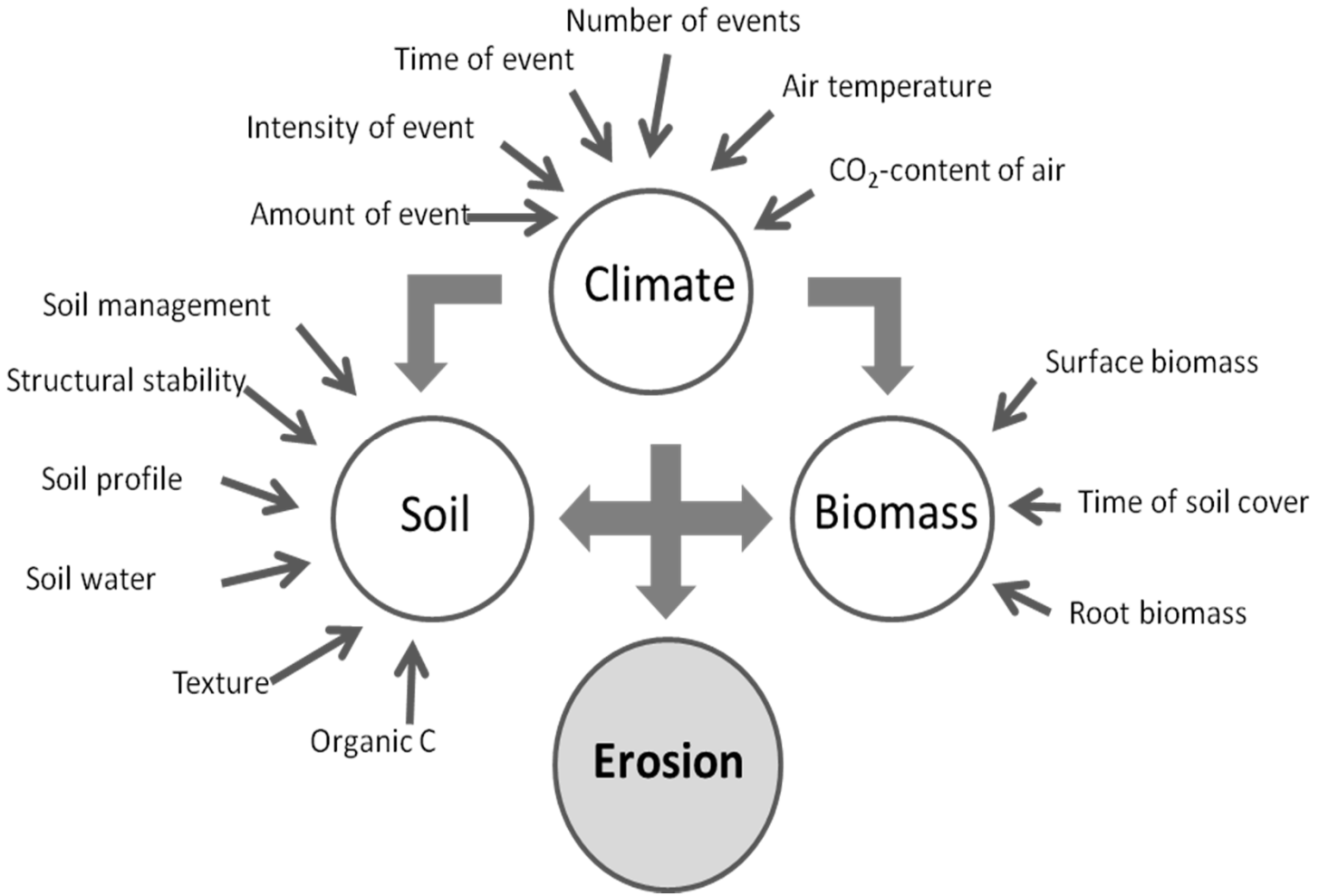
- Main aims:
  - Study land use changes and their impact on soil erosion in the study area Kleinweikersdorf (near CZ border)
  - Quantitative analyses of historical soil erosion development for the study area
  - Comparision with a czech study area

Study Site



- Mean annual precipitation 500 mm
- Mean annual temperature 8.8°C
- Main soil types Chernozems derived from Loess material
- Mean slope 7.2 %
- Intensive agricultural use

Soil Erosion Risk I



Soil Erosion Risk II

$$A = R * K * LS * C * P$$

Land Structure

- 1945: aerial photographs from flights of Alleys
- From 1966 on: decadic available aerial photographs

➢ Digitalisation

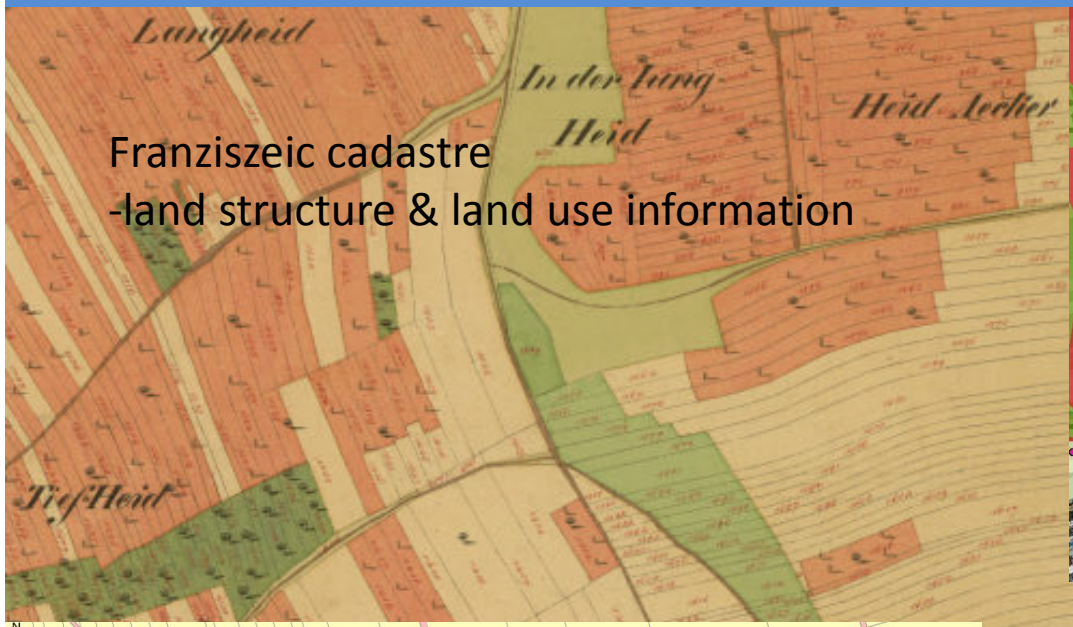
Land Use

- From 1874 on: yearbooks from k&k monarchy (Ackerbauministerium),
- From 1949 on: statistical agricultural surveys

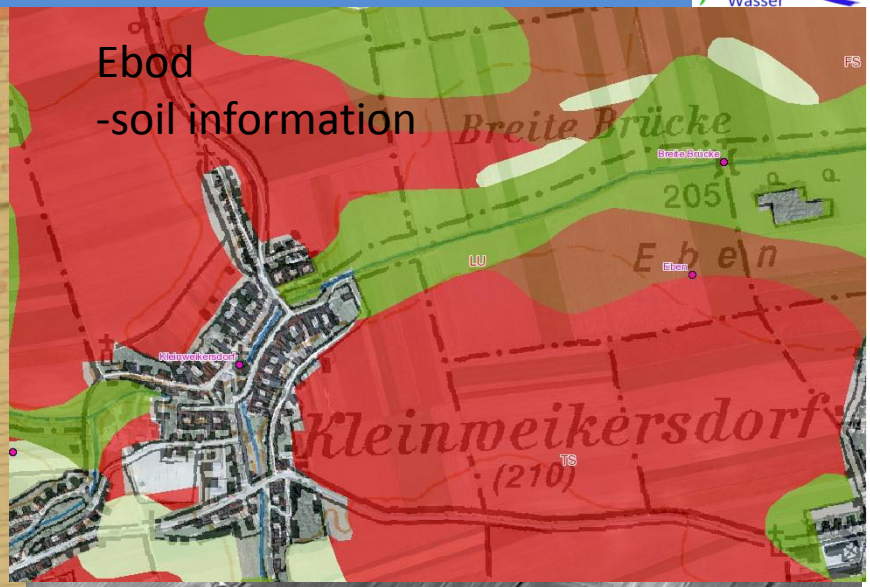
Used data base

Land Structure	Land Use	Scale	Note (data derived from)
1822	1874-1877	1:2880	Franziszäic Cadastre, K&K agricultural annual book
1945	1949	1 m	Historical aerial photos from World War II, black/white Agricultural land use statistics
1966	1969	0.5 m	black/white, Agricultural land use statistics
1986	1990	0.5 m	black/white, Agricultural land use statistics
2008	2008	0.25 m	true colours, Agricultural land use statistics

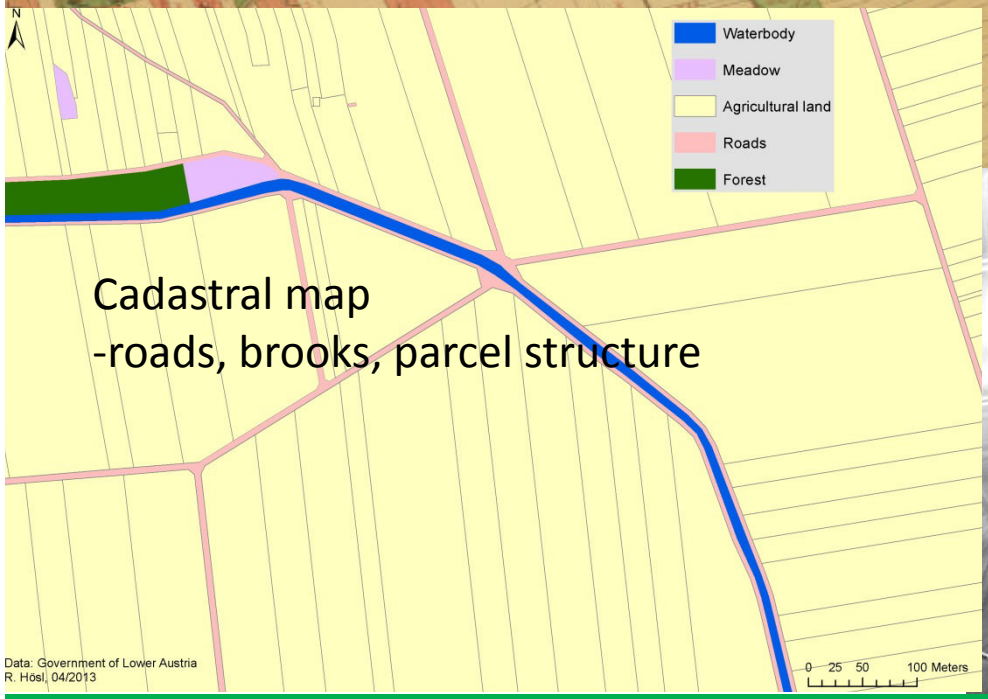
Additional:
Digital cadastral map
Historical literature



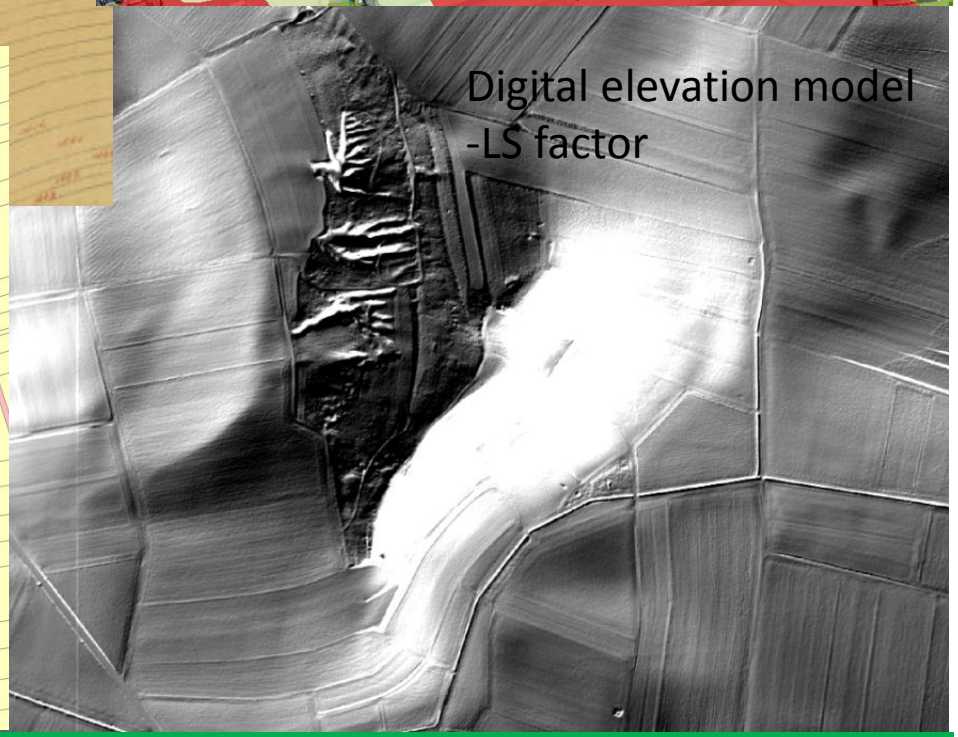
Franziszeic cadastre
-land structure & land use information



Ebod
-soil information

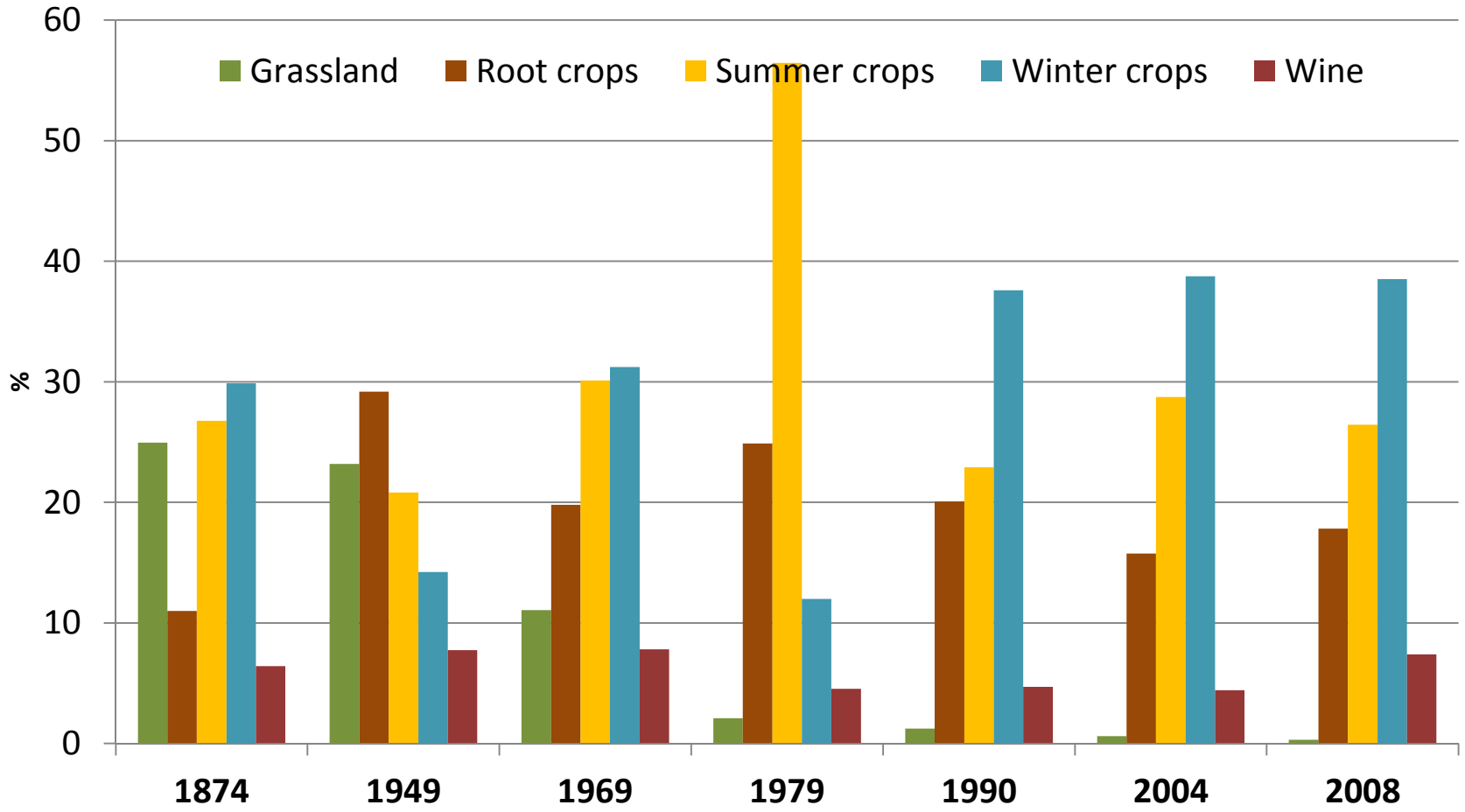


Cadastral map
-roads, brooks, parcel structure



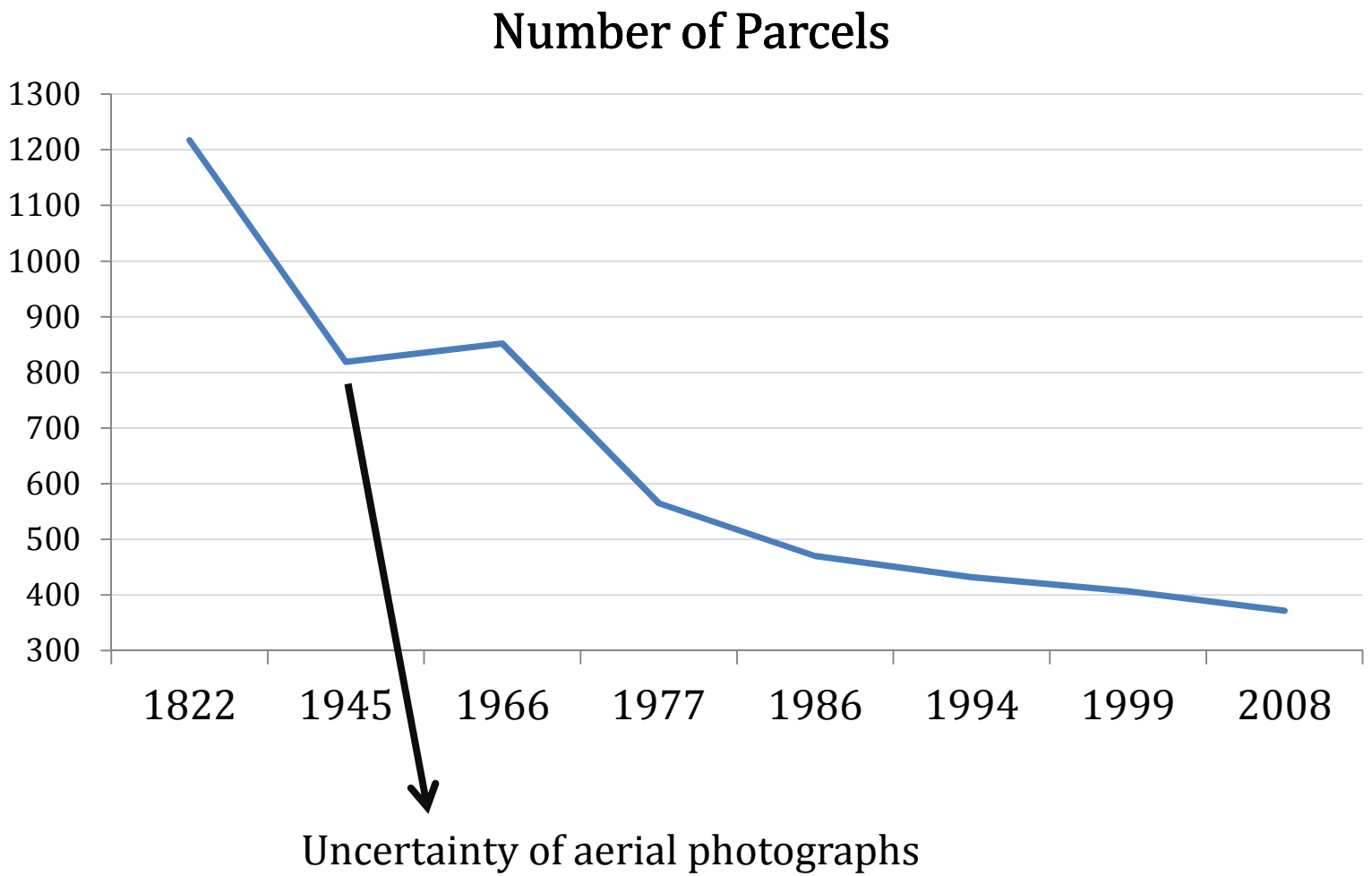
Digital elevation model
-LS factor

Land use I



Derived from k&k annual yearbook and land use statistics (www.statistik.at)
Crops were classified from 38 to 5 categories, problems with comparability, Data from 1874 not nearly as detailed as 2008, other categories….

Land structure



Parcel Structure

1822

2008

C Factors

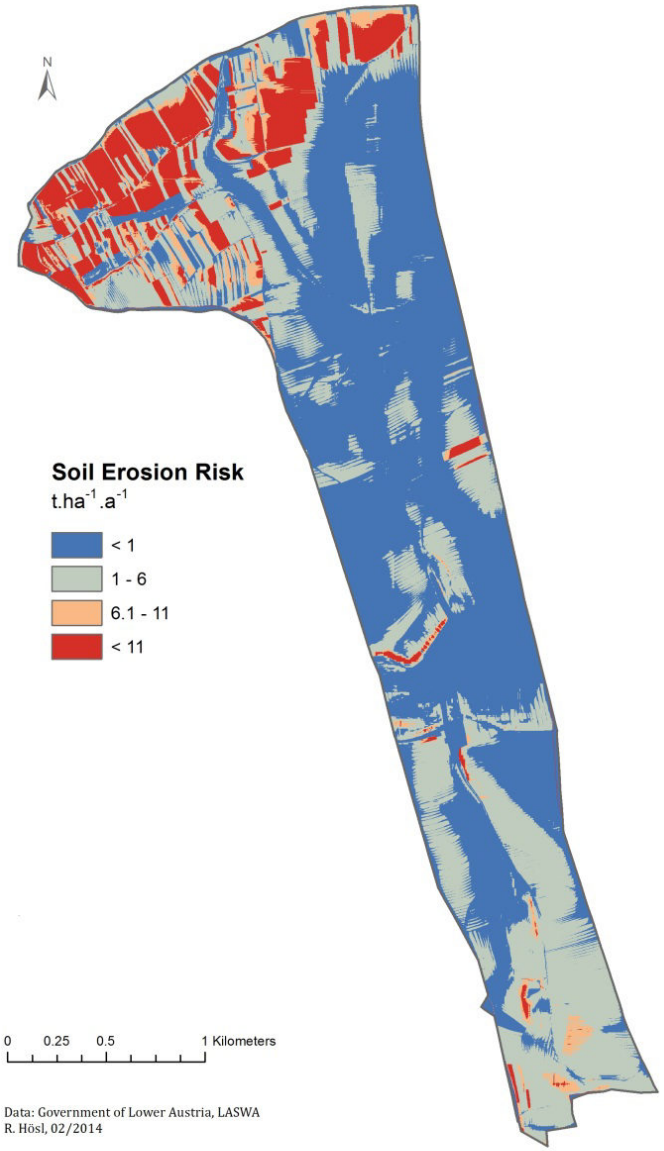
Year	Land Use	C Factor	Calculation Method/Literature
	Farmland	**0.07**	Bobb
1822	Vineyard	**0.46**	Auerswald & Schwab, 1999
	Grassland/Waste Land	**0.01**	Bargiel et al., 2013
	Farmland	**0.13**	Bobb
1945	Vineyard	**0.46**	Auerswald & Schwab, 1999
	Grassland/Waste Land	**0.01**	Bargiel et al., 2013
	Farmland	**0.1**	Bobb
1969	Vineyard	**0.46**	Auerswald & Schwab, 1999
	Grassland/Waste Land	**0.01**	Bargiel et al., 2013
	Farmland	**0.13**	Bobb
1990	Vineyard	**0.46**	Auerswald & Schwab, 1999
	Grassland/Waste Land	**0.01**	Bargiel et al., 2013
	Farmland	**0.15**	Bobb
2008	Vineyard	**0.1**	Auerswald & Schwab, 1999
	Grassland/Waste Land	**0.01**	Bargiel et al., 2013

Three-Field Rotation

Conservation measure in vineyards – greening over whole year

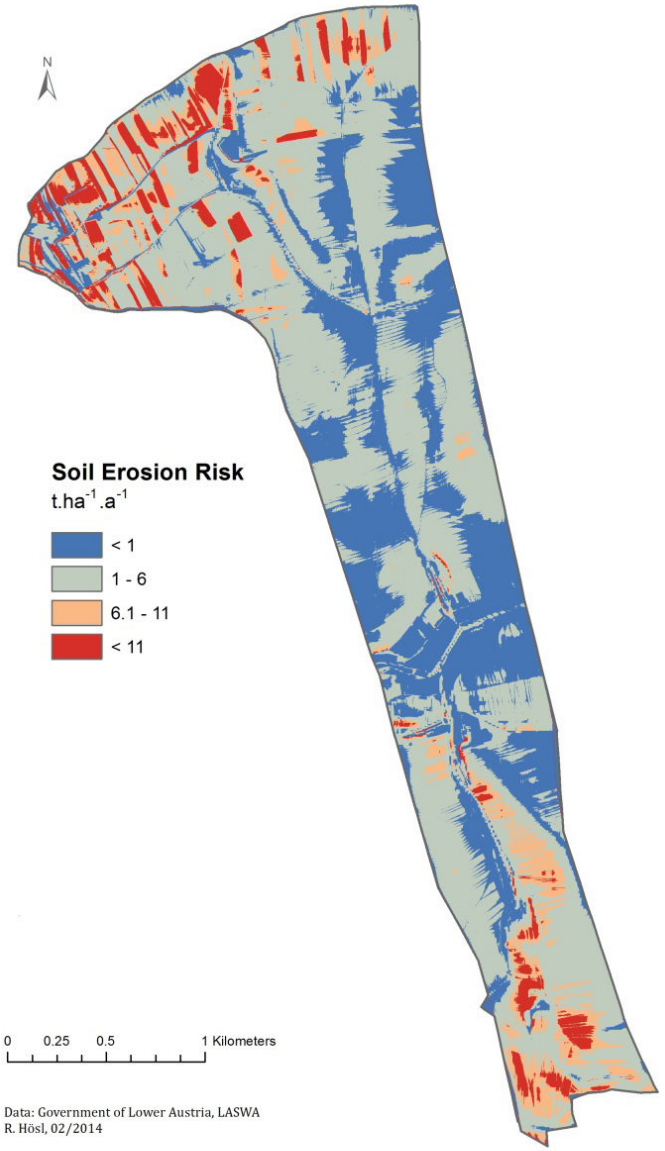
1822

- Soil erosion risk
  - Mainly within vineyards (northern part)
  - Low erosion rates for farmland > three field crop rotation with one year bare land



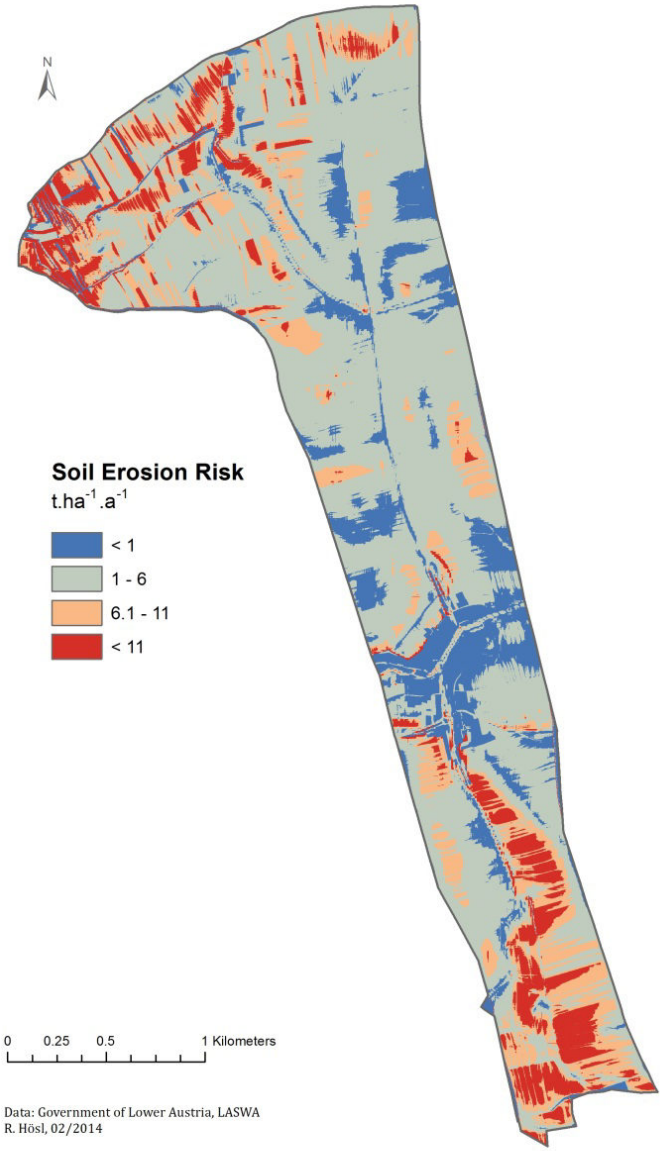
1945

- Soil erosion risk
  - Vineyard area decreasing
  - No year with bare land within crop rotation any more



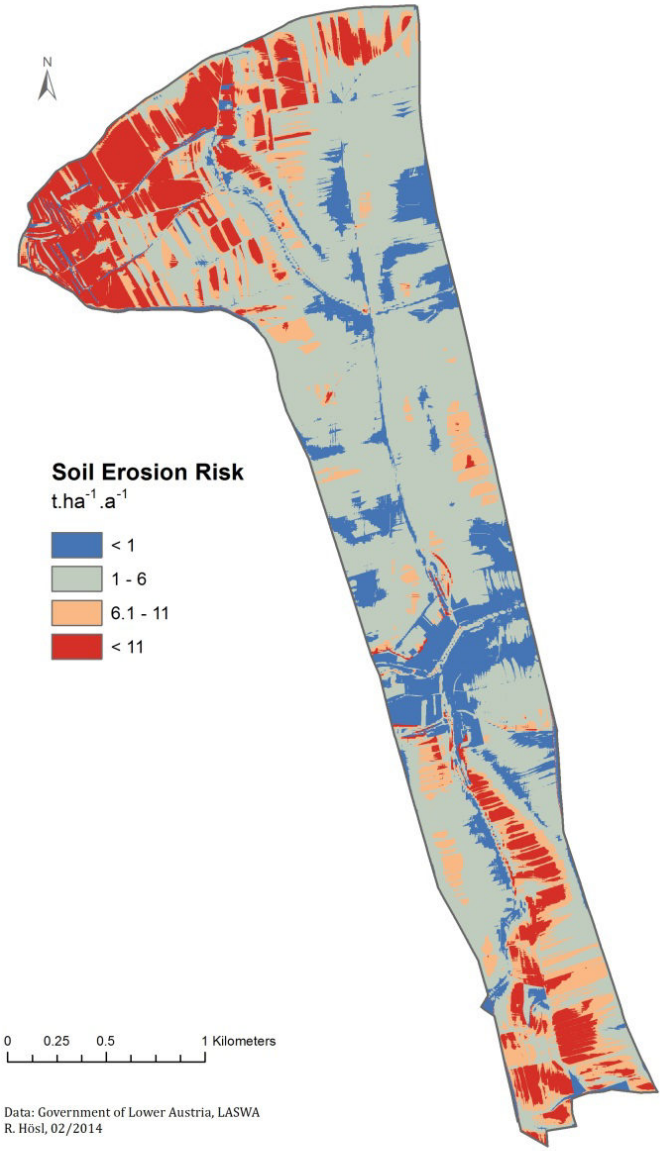
1966

- Soil erosion risk
  - Intensification of crop rotation



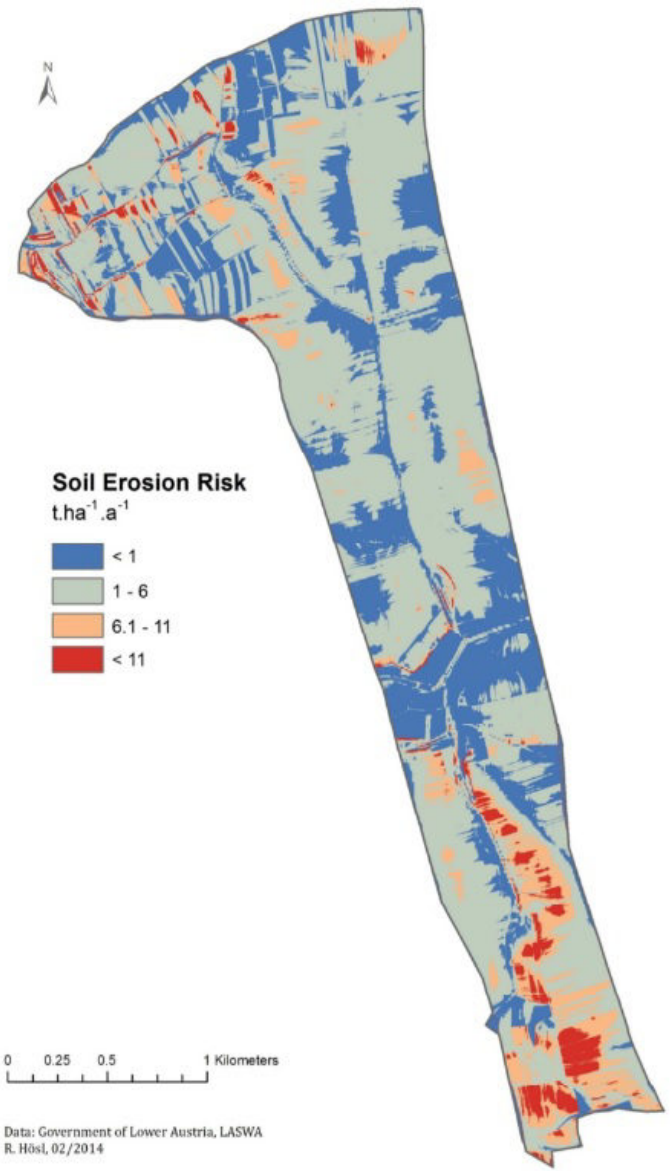
1990

- Soil erosion risk
  - Intensification of crop rotation
  - Vineyard area increases again



2008

- Soil erosion risk
  - Erosion control measures in vineyards – greening between rows over the whole year
  - Low contribution of farmers for erosion control measures on farmland



Conclusions…

- **One: Continuous change in field sizes from 1822 – 2008**
- **Second: Continuous decrease of grassland**
- **Third: Wine growing area**
- **Fourth: Management of vineyards**

Measures to combat soil erosion

- **Vineyards**
- The greening of vineyards is an effective erosion control measure which is already implemented at Kleinweikersdorf, this must be an ongoing process.
- Cultivating wine across the slope, especially for new viticulture.

- **Farmland**
- **No till**. Minimum of soil disturbance, (organic) residues remain on the field and may protect soil from erosion processes.
- **Mulching**. Sufficient soil cover from living or dead mulch residues of major importance.
- **Grassed Waterways**. Cultivation of thalweg situations with permanent vegetation.
- **Strip cultivation**. Parting long slopes by grass strips reduces slope length, especially recommended for long steep slopes with monocultures.
- **Strip tillage.** Soil cultivating with non-inversion tillage techniques, conserves soil moisture, crop residues remain on the field to protect soil against erosion.
- **Catch crops.** By cultivating catch crops in late summer / early autumn soil is covered during autumn and winter and prevents soil from erosion during this period.

SONDAR CZ-AT
Soil Strategy Network in the Danube Region

BAW

BOKU
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Land schafft Wasser

Thank you!

Lednice, Czech Republic, 15. 5. 2014

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