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Development of car-based accessibility in Switzerland from 1950 through 2000: First results

Philipp Fröhlich and Kay W. Axhausen

IVT
ETH
Zürich

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Introduction

Accessibility:

- Primary product of transport infrastructure
- Link between transport infrastructure and land use

Project: "Development of the Transit Transport System and its
Impact on Spatial Development in Switzerland"

within COST 340 "Towards a European Intermodal Transport
Network: Lessons from History"

Model

Road Network of Switzerland (2000)

- ~20,000 links
- ~15,000 nodes
- ~3,000 districts

The present model for the years of interest (1990, 1980, 1970, 1960, 1950) is accomplished by removing the motorways and adjusting the mean speed for the different road types.

"All-or-nothing" traffic assignment is used to calculate the travel time from each municipality to every other municipality in Switzerland.

Population Change (1950 - 1999)

Pop
- 0.28 - 0.95
- 0.95 - 1.21
- 1.21 - 1.52
- 1.52 - 2.10
- 2.10 - 18.37
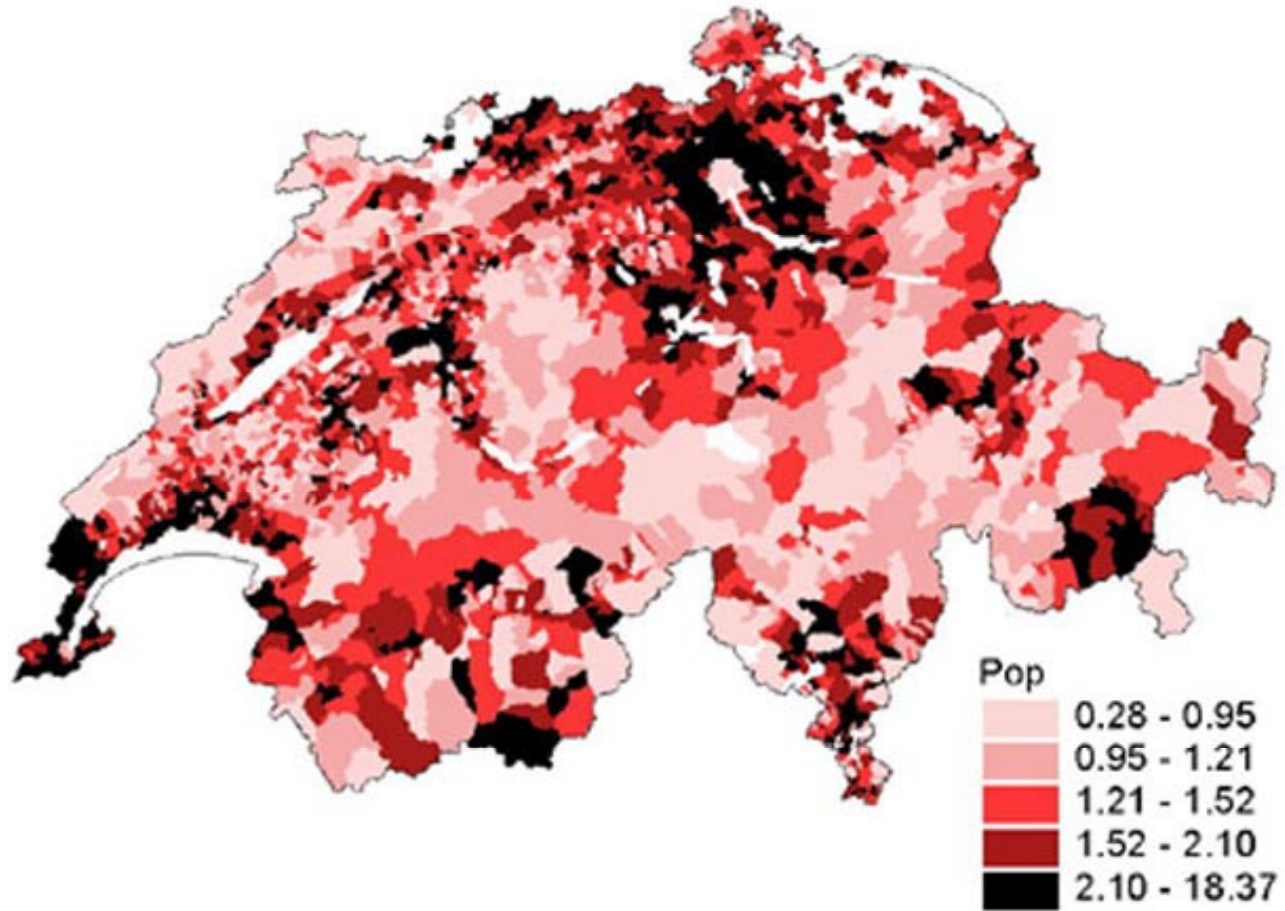
Accessibility

Accessibility is defined as (Geurs and Ritsema van Eck, 2001):

> …the extent to which the land-use transport system enables [groups of] individuals or goods to reach activities or destinations by means of a [combination of] transport mode[s].

Accessibility Measurements

Isochrone Approach:

- number of activity points that can be reached in a given time

- transparent method

- disregards activity points that are just outside the set travel time

- disregards the differential impact of the travel time between the reference point and the opportunity

Accessibility Measurements

Potential Accessibility:

- weights attractiveness of the activity points with the necessary travel time to these points by means of a negative potential function

- opaque results

Potential Accessibility

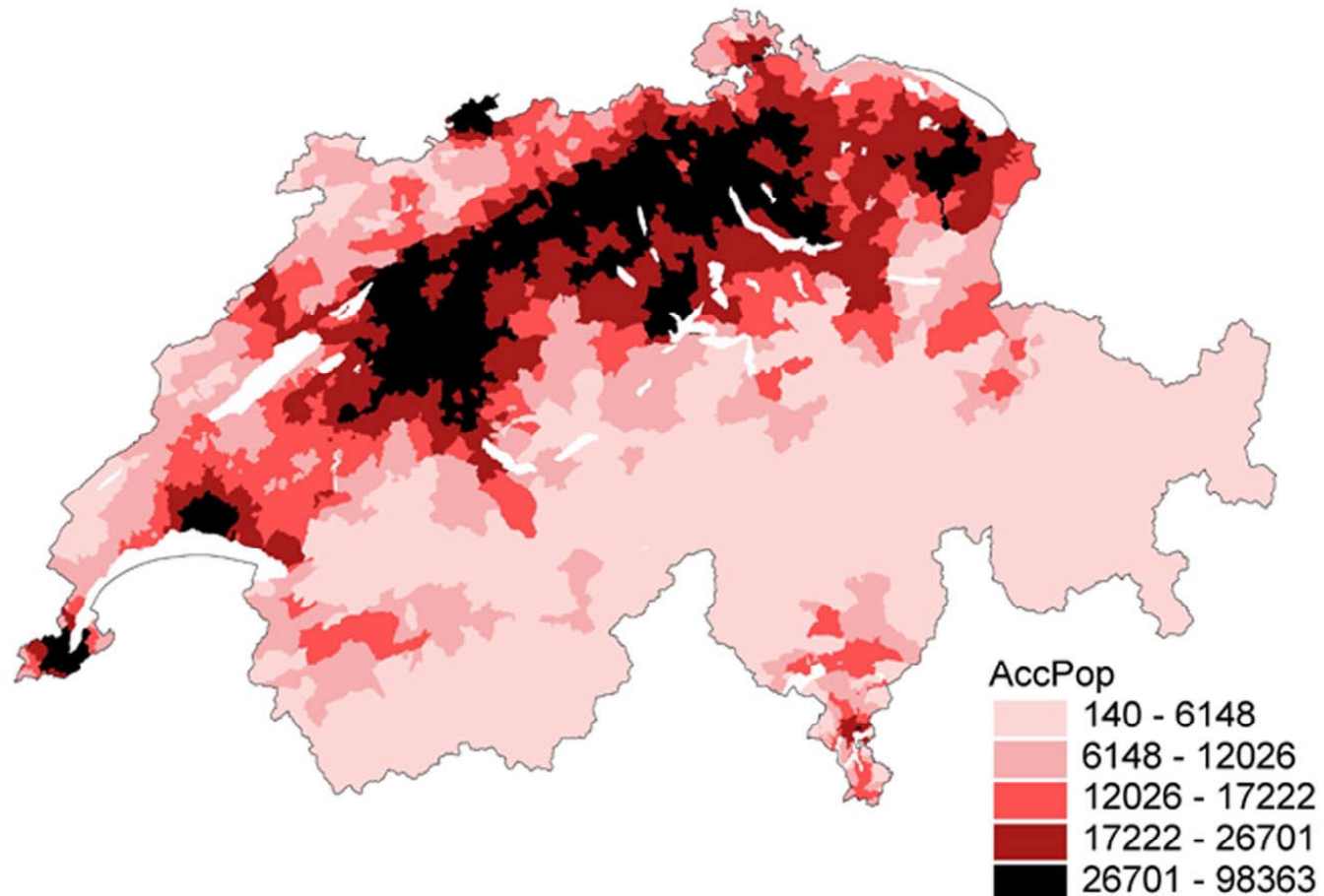$$AccPop_i = \sum_{j=1}^{j=2903} A_j * \exp(-\beta * c_{ij})$$

$AccPop_i$ accessibility to people living in municipality, *i*

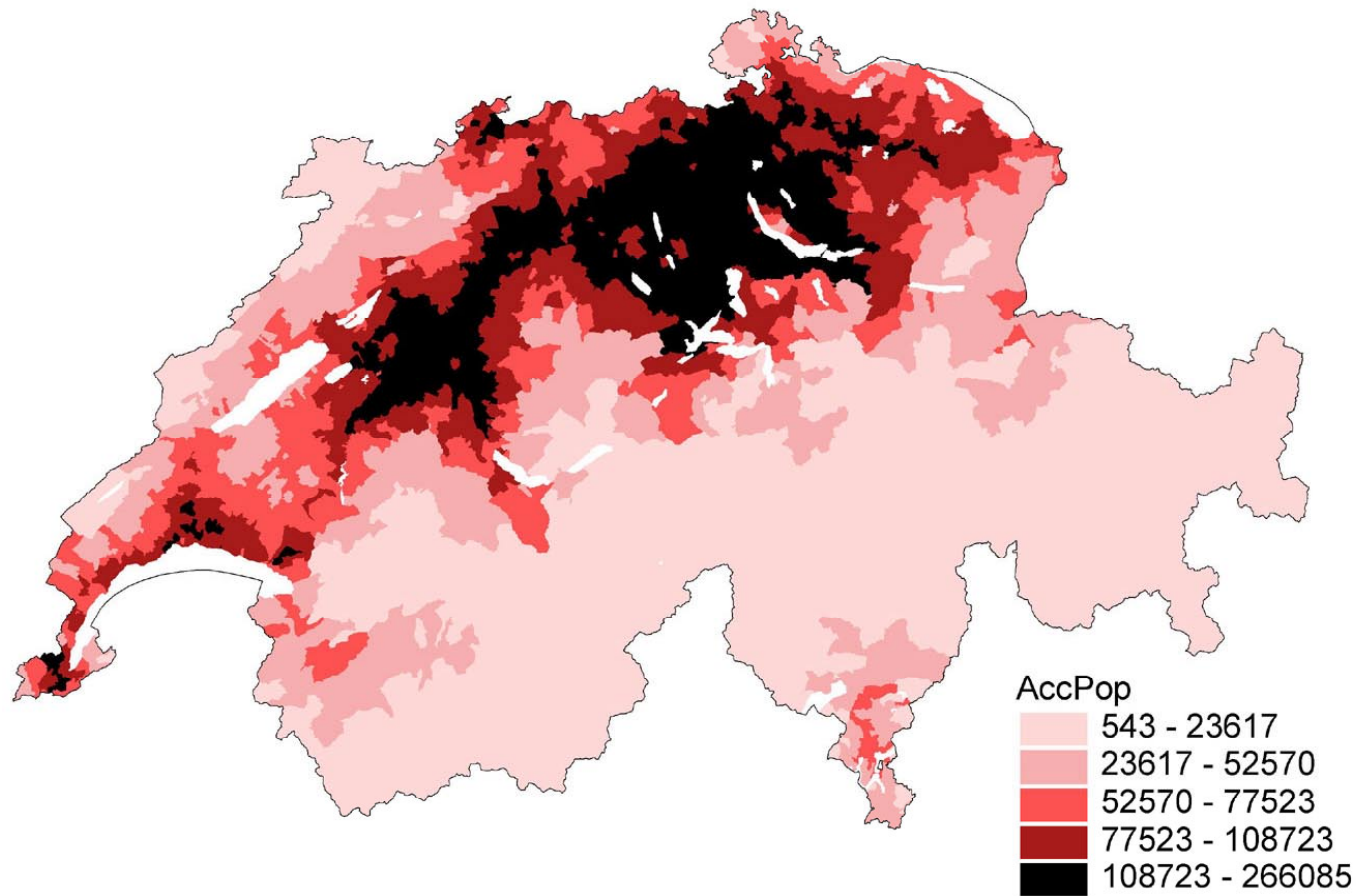A_j the number of residents of municipality, *j*

c_{ij} travel time by private vehicle between the municipality *i* and municipality, *j*
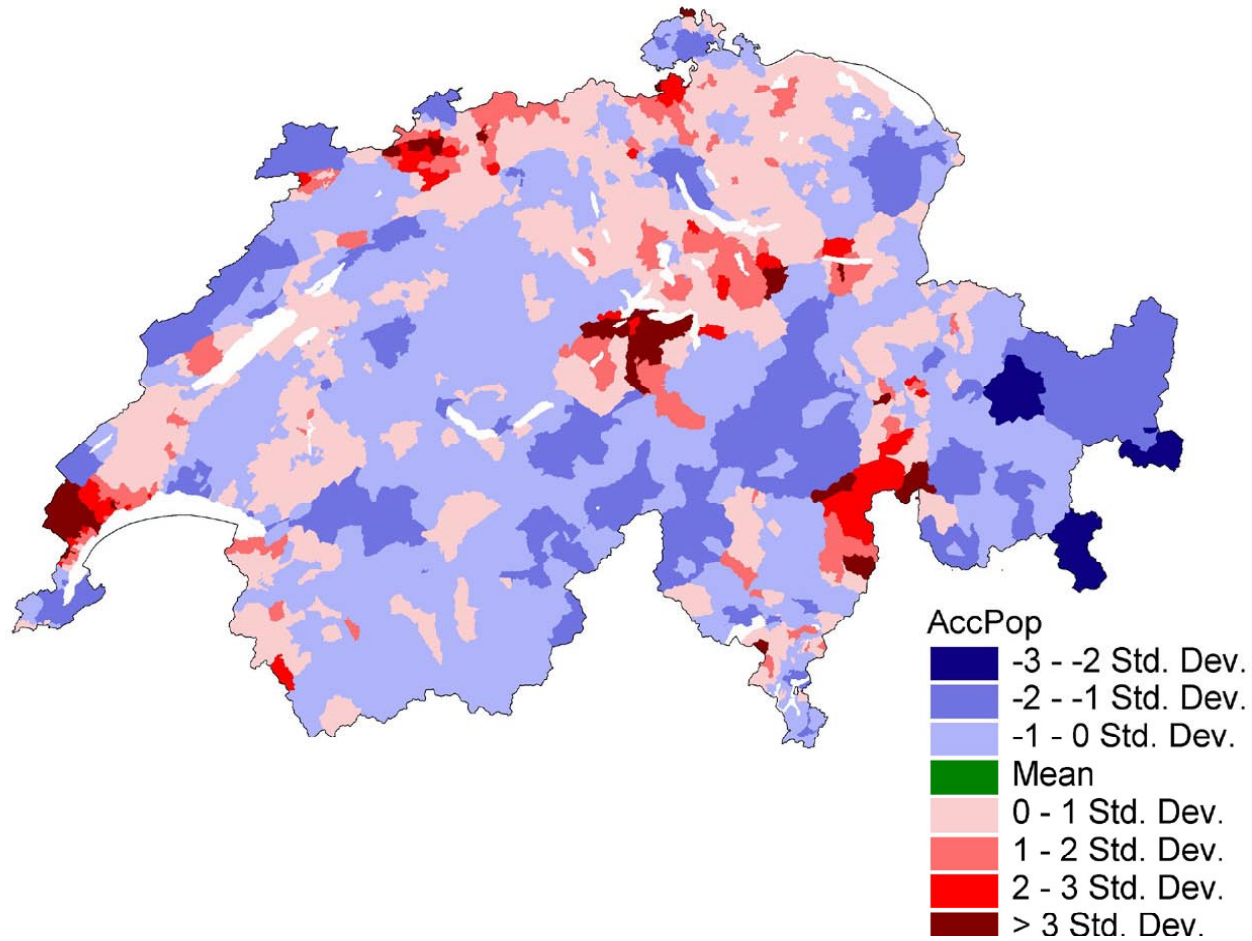
β exponent

Absolute Accessibility for the Year 1950 (by quintile)
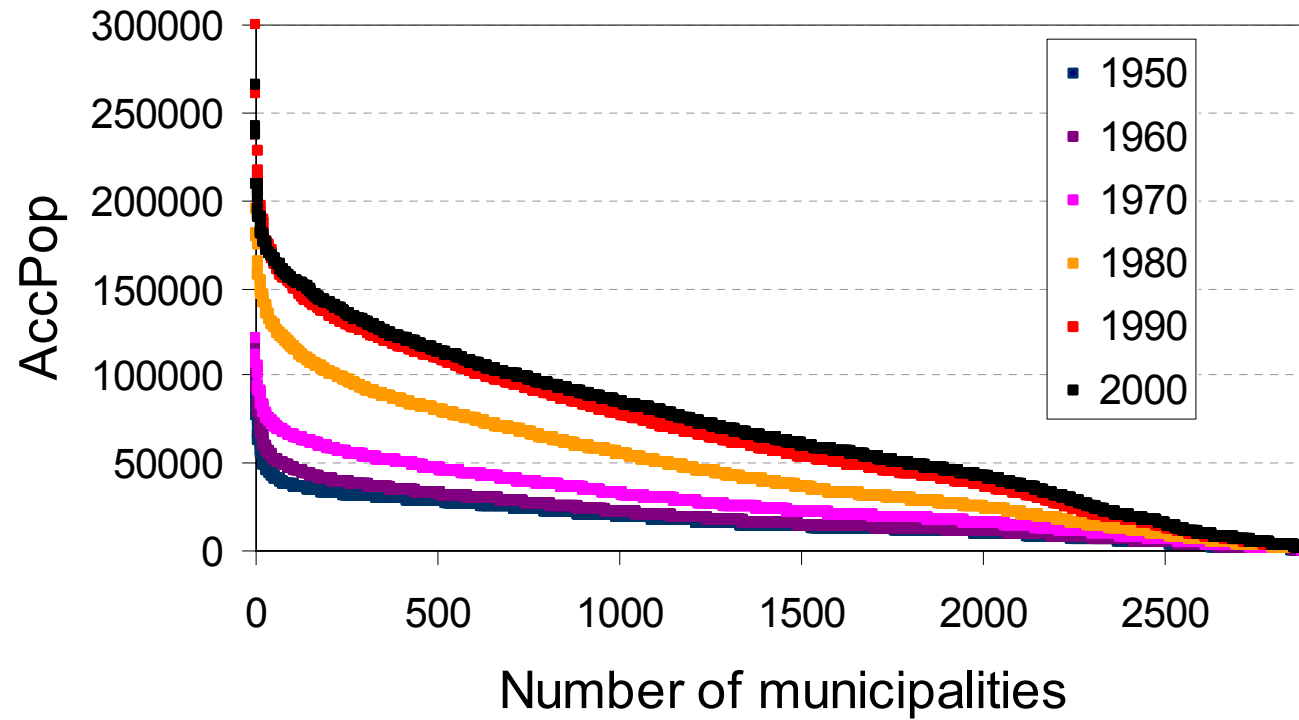

AccPop

- 140 - 6148
- 6148 - 12026
- 12026 - 17222
- 17222 - 26701
- 26701 - 98363

Absolute Accessibility for the Year 2000 (by quintile)

AccPop

- 543 - 23617
- 23617 - 52570
- 52570 - 77523
- 77523 - 108723
- 108723 - 266085

Relative Change in Standard Deviation (1950 - 2000)

AccPop

- ■ -3 - -2 Std. Dev.
- ■ -2 - -1 Std. Dev.
- ■ -1 - 0 Std. Dev.
- ■ Mean
- ■ 0 - 1 Std. Dev.
- ■ 1 - 2 Std. Dev.
- ■ 2 - 3 Std. Dev.
- ■ > 3 Std. Dev.

Distribution of Municipal Accessibilities (1950 - 2000)

Further Work

More precise road network, including the Hauptstrassen

Enlargement of the model to border areas in neighbouring
    countries

Accessibility based on public transport

Other activity points, such as places of work and shopping
    opportunities

Calibration of the factor, β, for the potential function across periods