



Institut für Kartographie und Geoinformatik | Leibniz Universität Hannover

Spatial delineation of geographic objects using an online knowledge repository

Tobias Dahinden



Purpose

M o n t i
Sakarya A / t o p i a n o K i z i l i r m a k
Ankara d e , P o n t o K a c k a r
T U d e l l ' A n a t o l i a A r m e n i a
R L a g o T u z R Murat
C E r c i y a s H
I L a g o B e y s e h i r T a u r o o r i e n t a l e
Ak D a g u r o Firat K u r d i s t a n N I N I V E

(Spiess, 2002)

Overview

- ▶ Spatial delineation of vague places
- ▶ Structures in Wikipedia
 - Coordinates
- ▶ Localisation of Geographic Objects in Wikipedia
- ▶ Range Estimation
 - Relationship Between Point Sets
- ▶ Résumé



Spatial delineation of vague places

Common methods

- ▶ Definition by an Agency or a Specialist
 - Landschaften Bundesrepublik Deutschland (Liedkte, 2002)
 - Mitteleuropa (Jordan, 2005)

Common methods

▶ Empirical methods

- Where's Downtown (Montello et al., 2003)
- Neighbourhood Cognition (Davies, 2009; Clough/Pasley, 2010)

Common methods

► Internet search

- Google search (Jones et al., 2008; Waters/Evans, 2010)
 - Internetsuche + Ortsnamendatenbank + NER/NLP
- Wikipedia, Flickr, Google Places, GeoRSS, Twitter
 - Gazetteer
 - Flickr (Holenstein/Purves, 2010)



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Leine

From Wikipedia, the free encyclopedia

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- Gerd Lüttig: *Neue Ergebnisse quartärgeologischer Forschung im Raum Alfeld-Hameln-Elze*. In: *Geologisches Jahrbuch* Band 77, Seite 337–390. Hannover, Juni 1960.

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- Bundesamt für Naturschutz: *Landschaftssteckbrief "Leine-Ilme-Senke"*
- Bundesamt für Naturschutz: *Landschaftssteckbrief "Leine-Niederung"*

Leine basin

Categories: Leine drainage basin | Rivers of Thuringia | Rivers of Lower Saxony

Coordinates: 52°43'22"N 9°35'38"E

Leine

The Leine in Hanover.

Origin Thuringia

Mouth Aller

Basin countries Germany

Length 281 km

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Leine near Nordstemmen

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Leine basin

v · d · e	
First order streams	Garte • Grindau • Ilme • Ilme • Innerste • Lutter • Rhume
Second order streams	Grane • Nette • Oder • Söse
Third order streams	Apenke • Epenke • Lutter • Ospenke • Sieber • Sperrlutter
Forth order streams	Breitenbeck • Goldenke • Grade Lutter • Große Steinau • Kleine Steinau • Krumme Lutter • Kulmke • Lonau • Wäschegrund
Fifth order streams	Große Kulmke • Große Lonau • Große Schweimke • Kleine Kulmke • Kleine Lonau
Lakes	Silberteich
Moors	Teufelsbäder
Springs	Rhume Spring • Teufelsloch

Categories: Leine drainage basin | Rivers of Thuringia | Rivers of Lower Saxony

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Categories: Leine drainage basin | Rivers of Thuringia | Rivers of Lower Saxony

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Third order streams: Apenke • Epenke • Lutter • Ospenke • Sieber • Sperrlutter

Forth order streams: Breitenbeck • Goldenke • Grade Lutter • Große Steinau • Kleine Steinau • Krumme Lutter • Kulmke • Lonau • Wäschegrund

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Leine basin

Categories: Leine drainage basin | Rivers of Thuringia | Rivers of Lower Saxony

Coordinates: 52°43'22"N 9°35'38"E

Leine in Hanover.

Origin Thuringia
Mouth Aller
Basin countries Germany
Length 281 km

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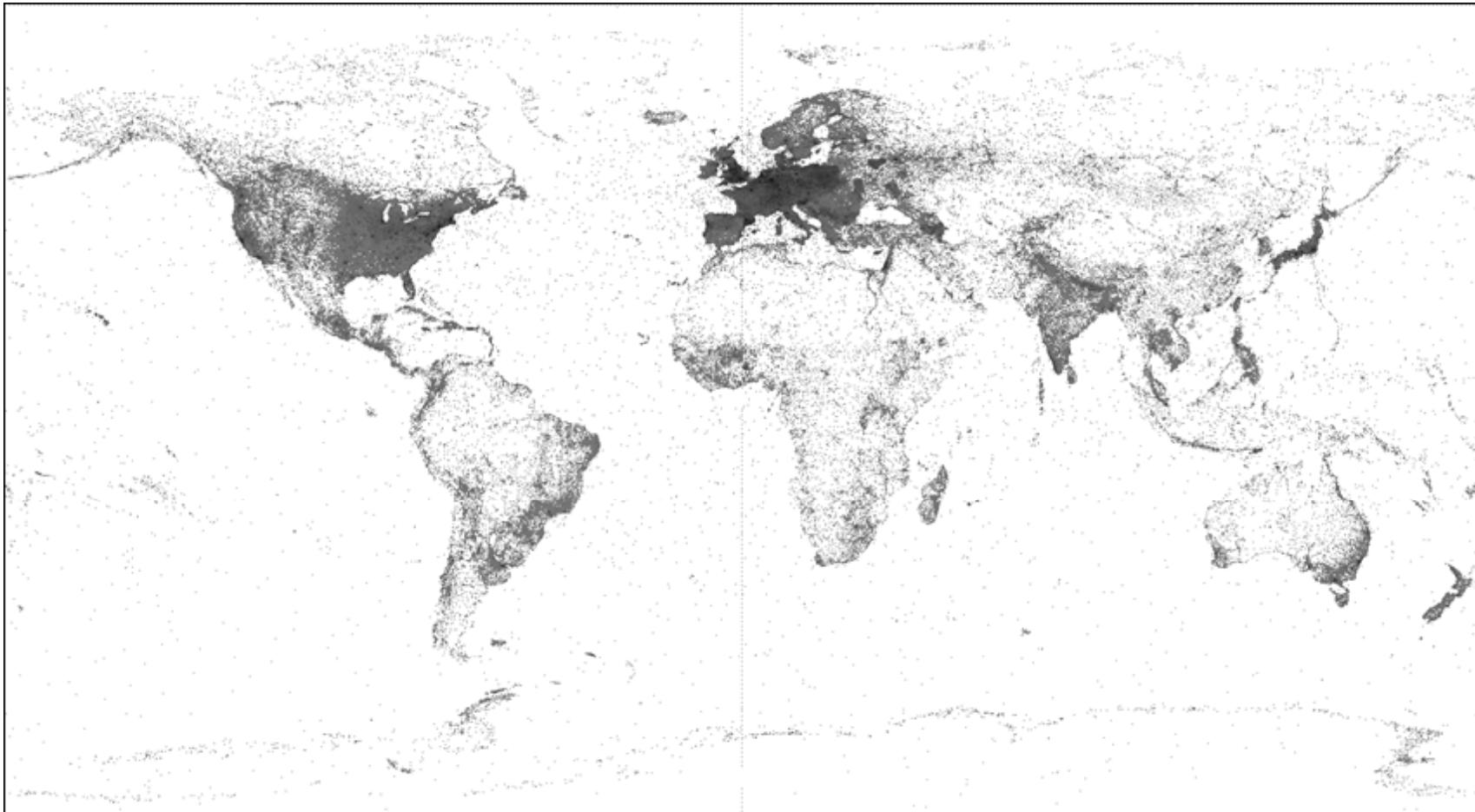
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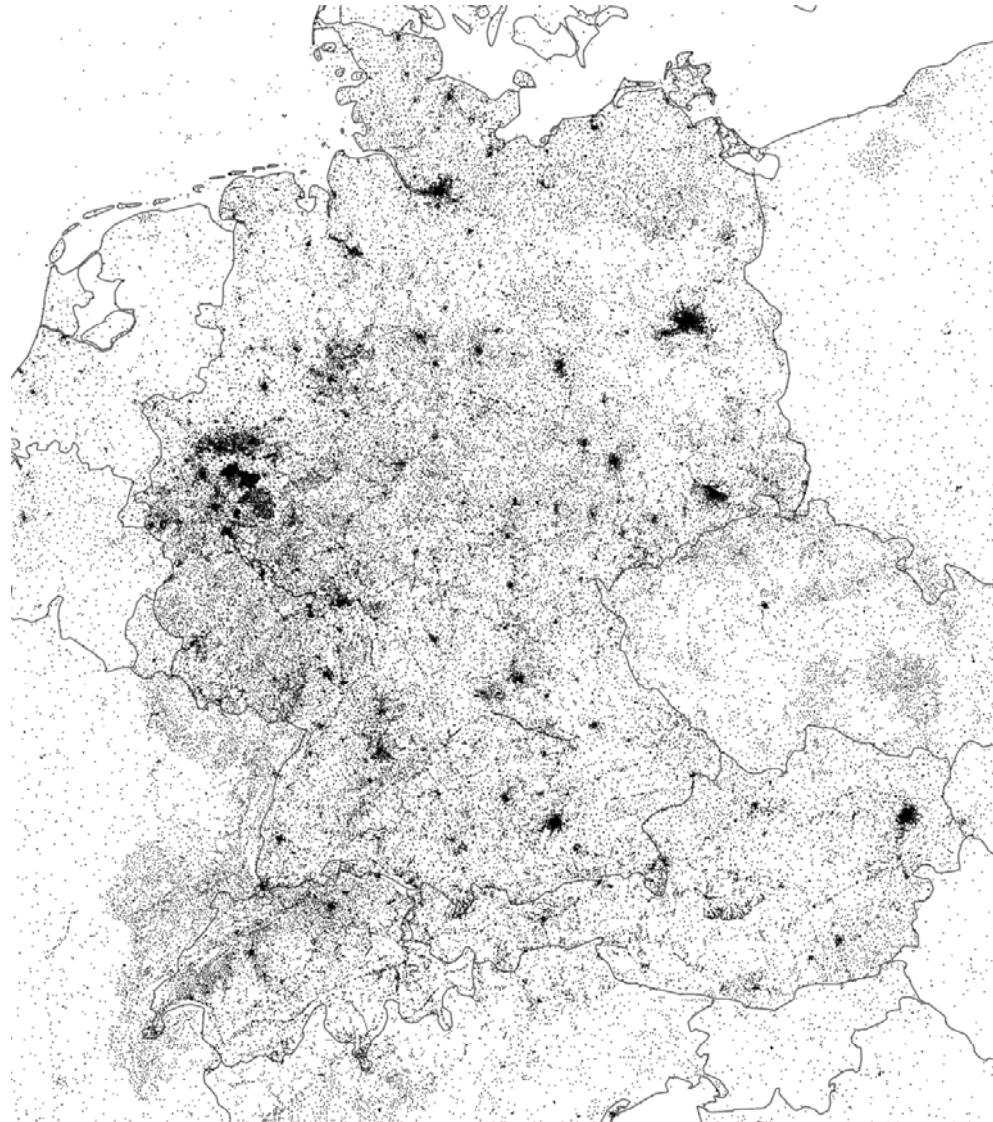
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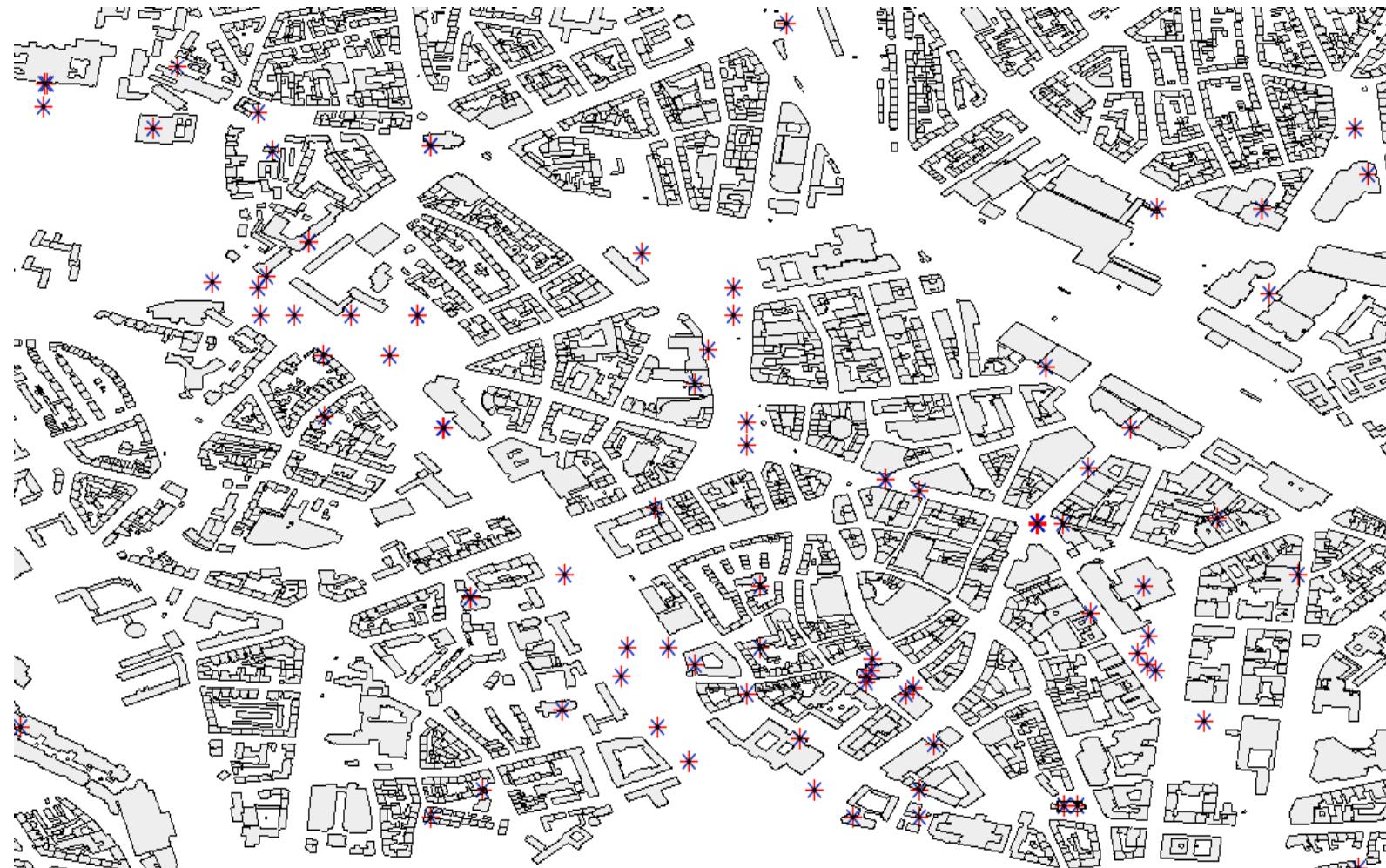


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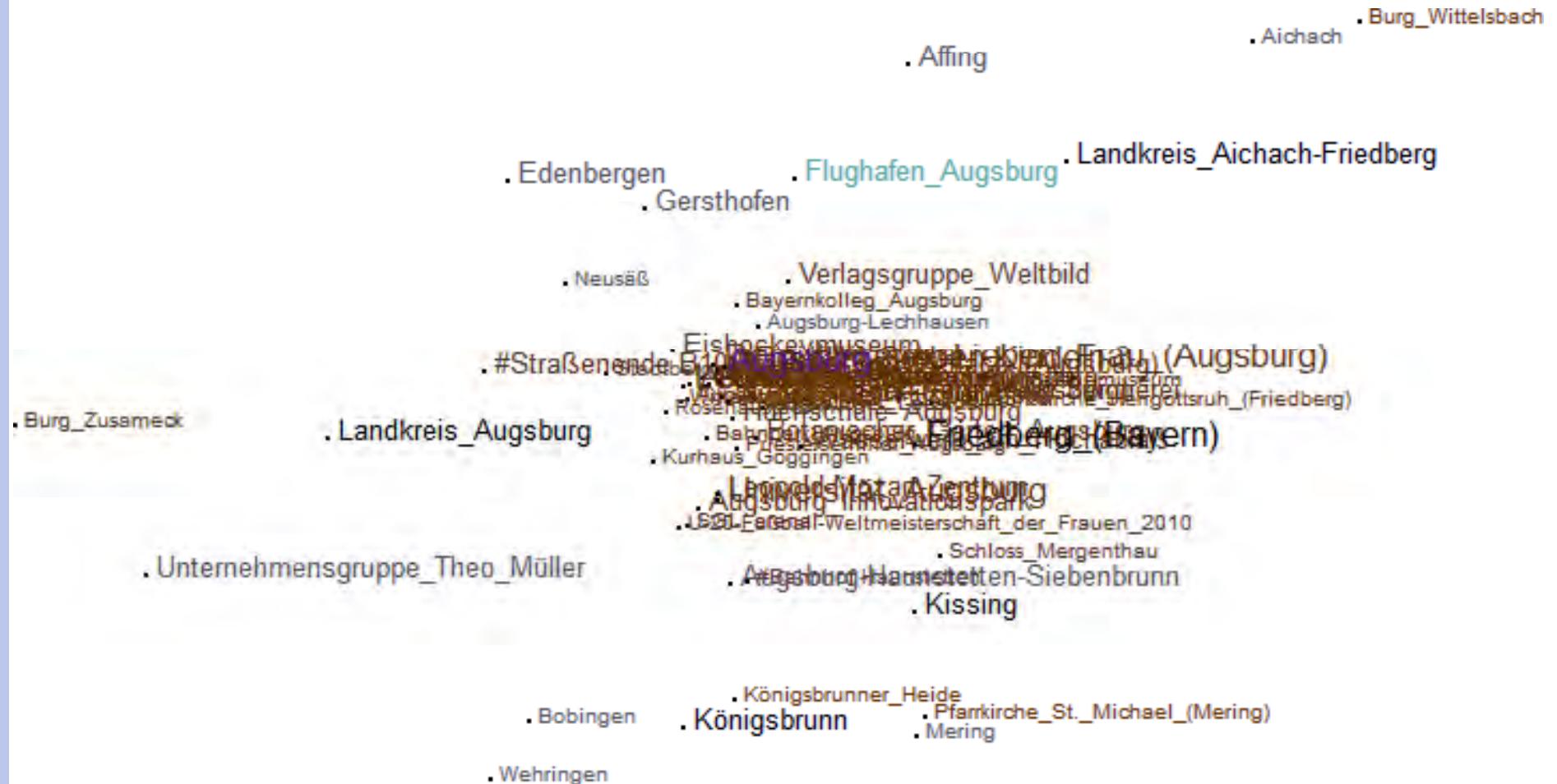


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Reuss (Fluss)

Die Reuss ist ein Fluss in der [Schweiz](#). Sie ist 164 Kilometer lang und hat ein Einzugsgebiet von 3425 Quadratkilometern. Damit ist sie nach [Rhein](#), [Aare](#) und [Rhône](#) der viertgrösste Fluss der Schweiz.

Die Reuss entspringt im [Gotthardmassiv](#), am [Gotthardpass](#) und am [Furkapass](#) auf 2431 m ü. M. [Gotthardreuss](#) und [Furkareuss](#) vereinigen sich im [Urserental](#) und fliessen nach Osten. Einer der Quellflüsse der Furkareuss ist die [Witenwasserenreuss](#).

Bei [Andermatt](#) biegt der Fluss nach Norden ab und durchquert die [Schöllenenenschlucht](#). Die unwegsame Schöllenenenschlucht mit ihren steilen, hunderte Meter hohen Granitwänden war im Mittelalter das Hindernis zur Erschliessung des Gotthardpasses, das nur durch schwierige Kunstbauten wie das [Urnerloch](#) und die Teufelsbrücke überwunden werden konnte. In der Schöllenen befindet sich auch das [Suworow-Denkmal](#), das dem russischen General [Suworow](#) gewidmet wurde und an die [Schlacht von 1799](#) erinnert.

Bei [Göschenen](#) verlassen Bahn und Autobahn die [Gotthardtunnel-Röhren](#). Bis [Erstfeld](#) folgen weitere Schluchten, dann geht es durch die breite Ebene des [Urner Reusstals](#), bis die Reuss bei [Flüelen](#) in den [Vierwaldstättersee](#) mündet.

In [Luzern](#) verlässt sie den See wieder und fliesst als breiter Fluss mit vielen Schlaufen und Windungen in zuerst östlicher, dann nördlicher Richtung durch das Reusstal vorbei an alten Städten wie [Bremgarten](#) und [Mellingen](#), bis sie unterhalb von [Windisch](#) beim [Wasserschloss](#) in die [Aare](#) mündet.

Von geschichtlicher Bedeutung ist die Reuss insofern, als sie im Mittelalter seit dem 10. Jahrhundert während ca. 200 Jahren Grenzfluss auf Schweizer Gebiet zwischen dem Königreich [Burgund](#) und dem deutschen Kaiserreich respektive zeitweilig den übrigen Teilen des Kaiserreiches war.

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Reuss



Die Reuss in Luzern

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Idea: Hecht and Raubal (2008)

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Schweiz

Der Titel dieses Artikels ist mehrdeutig. Für die Landschaftsbezeichnung [Schweiz](#) siehe [Schweiz \(Landschaftsbezeichnung\)](#).

Die Schweiz, amtlich [Schweizerische Eidgenossenschaft](#), ist ein [Binnenstaat](#) und [Alpenland](#) in [Mitteleuropa](#) mit 7,7 Millionen Einwohnern auf 41'285 km². Das Land grenzt im Norden an [Deutschland](#), im Osten an [Österreich](#) und das [Fürstentum Liechtenstein](#), im Süden an [Italien](#) und im Westen an [Frankreich](#). [De jure](#) hat die Schweiz keine Hauptstadt; [de facto](#) ist es die [Bundesstadt Bern](#) (siehe auch [Hauptstadtfrage der Schweiz](#)). Die Einwohner sind sprachlich und [konfessionell](#) heterogen. Deutsch, Französisch, Italienisch und Rätoromanisch sind die vier offiziellen Landessprachen; 41 Prozent der Schweizer Bürger sind [römisch-katholisch](#) und 40 Prozent [evangelisch-reformiert](#). Die Schweiz wird darum auch als «[Willensnation](#)» bezeichnet.

Die Schweiz ist mit einem [Bruttoinlandsprodukt](#) von 58'000 Schweizer Franken (36'000 Euro) pro Einwohner und Jahr eines der wirtschaftsstarksten Länder der Welt. Drei Viertel der Erwerbstätigen sind im Dienstleistungssektor tätig, die Städte [Zürich](#) und [Genf](#) stehen zuoberst auf der Rangliste der Städte mit der höchsten Lebensqualität. [7]

Die Eidgenossenschaft existiert als loser [Staatenbund](#) seit dem 13. Jahrhundert. Dem [Nationalmythos](#) zufolge wurde sie Anfang August 1291 auf der [Rütliwiese](#) zur Gründung beschworen. Die Schweiz in ihrer heutigen Form als [föderalistischer](#) Bundesstaat wurde mit der Bundesverfassung von 1848 geschaffen. Sie gliedert sich in 26 [Kantone](#) (Gliedstaaten), wobei der [Kanton Jura](#) erst 1979 gebildet wurde. Die aussenpolitische [Neutralität](#) der Schweiz ist seit dem [Wiener Kongress](#) 1815 völkerrechtlich anerkannt. Heute ist das Land Mitglied der [Europäischen Freihandelszone](#), des [Europarats](#), der [Welthandelsorganisation](#) (seit 1995; seit 1959 Mitglied der Vorläuferorganisation [Allgemeines Zoll- und Handelsabkommen](#)), der [Vereinten Nationen](#) (seit 2002), des [Schengener Abkommens](#), nicht aber der [Europäischen Union](#).

Der Name [Schweiz](#) stammt vom Namen des Gründungskantons [Schwyz](#), der auf die gesamte Eidgenossenschaft verallgemeinert wurde. Um keine der vier Amtssprachen zu bevorzugen, lautet das [Landeskennzeichen](#) der Schweiz «CH», für [Confederatio Helvetica](#), die lateinische Bezeichnung für Schweizerische Eidgenossenschaft. In den anderen Landessprachen ist der Name der Schweiz [Suisse](#) (franz.), [Svizzera](#) (ital.) und [Sviza](#) (rätoroman.).

Koordinaten: 47° N, 8° O; CH1903: (660000 / 183511)
[Ausblenden] [Hilf uns mit der Übersetzung!](#)

Schweizerische Eidgenossenschaft
[Confédération suisse](#) (franz.)
[Confederazione Svizzera](#) (ital.)
[Confederaziun svizra](#) (rätorom.)
[Confoederatio Helvetica](#) (CH) (lat.)

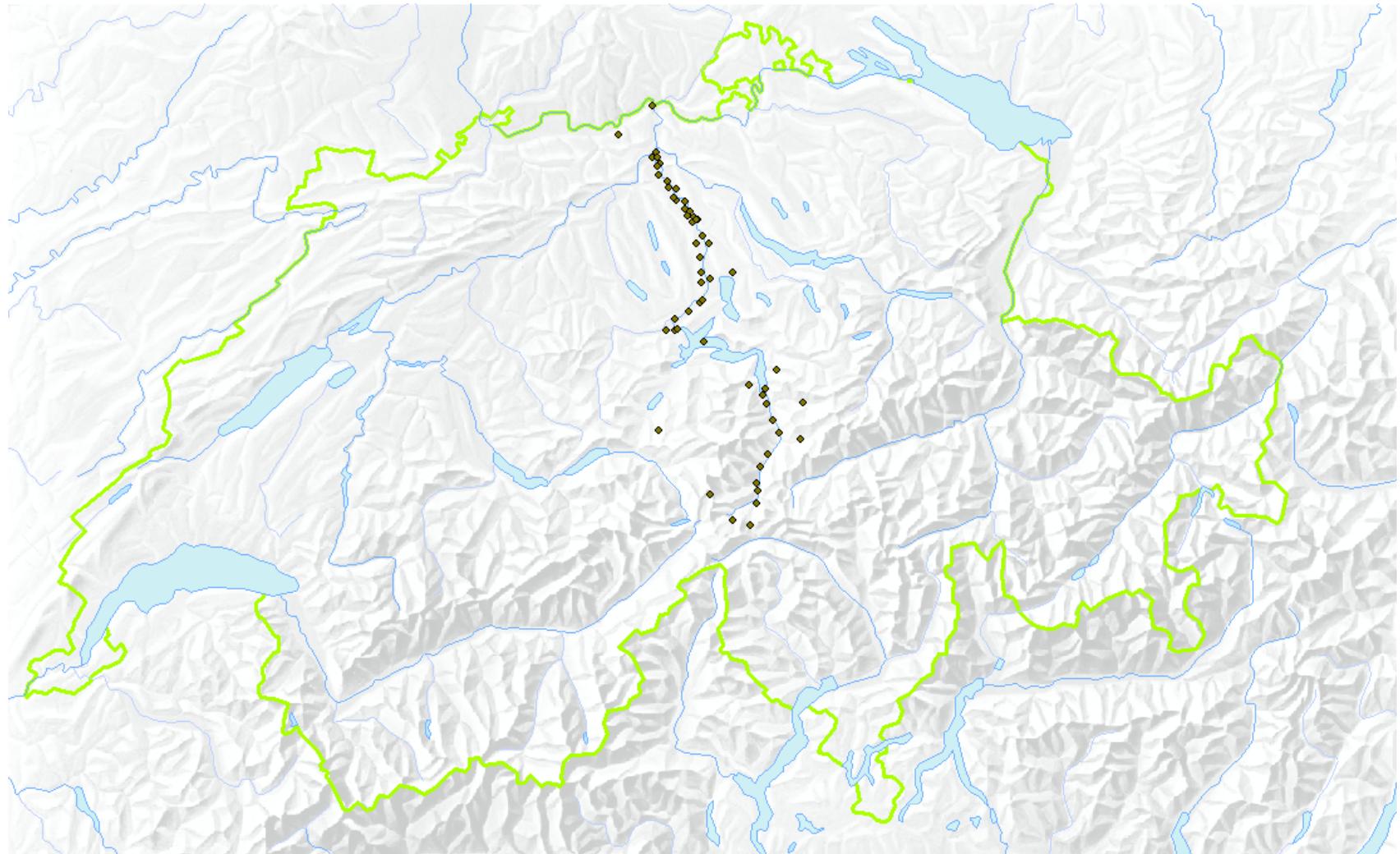
 
Flagge Wappen

Delineation of Vague Places | Kartographie und Forschung

Dahinden | 33



Localisation of Geographic Objects



Localisation of Geographic Objects

► Deister

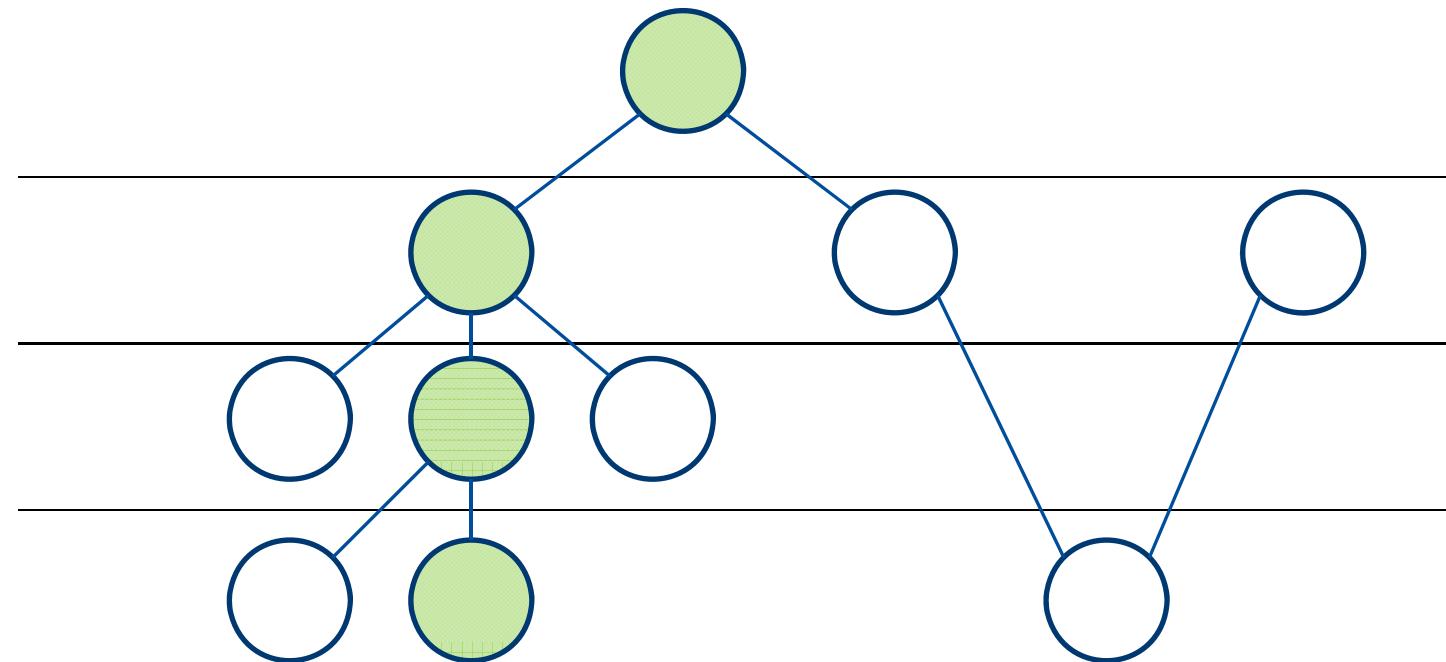


Base Map: BKG (2001)

Definition: Liedkte (2002)

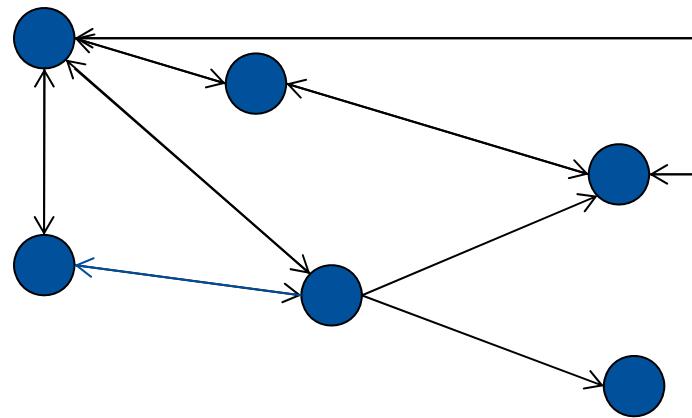
Neighbourhood of Articles

- ▶ Horizontal and vertical neighbourhood
 - classes



Neighbourhood of Articles

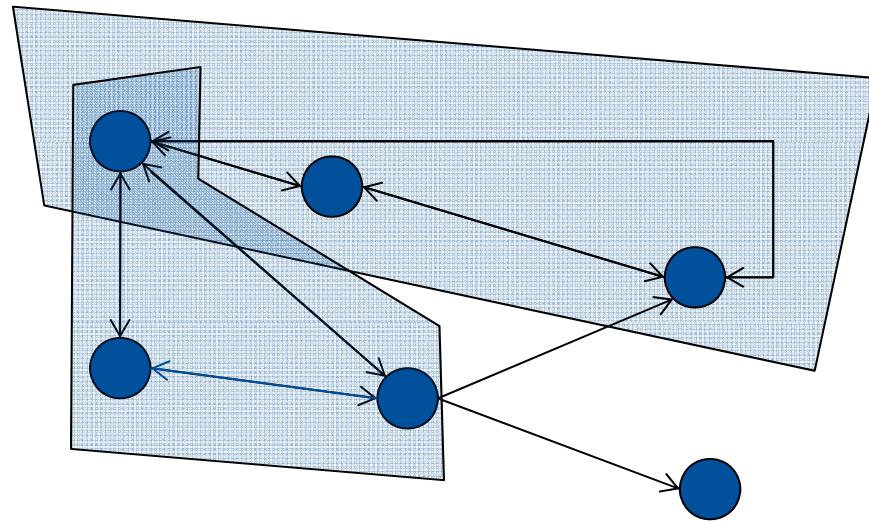
- ▶ Wikipedia has a graph structure
 - Articles = Nodes Links = Edges



- ▶ Semantic Relation of Articles:
 - Hecht and Raubal (2008)

Neighbourhood of Articles

► Neighbourhood Cliques



Split Cliques According to Topic and Size

► Topic



- Compare Templates
 - Infoboxes
 - Data About Individuals
- Coordinate's Type

► Size



- Length of the Article
- Distribution of the Footprint of the Linked Articles

Example

► Deister



Base Map: Landschaften (2001)





Range Estimation

Range Estimation

- ▶ “Home Range Estimation”:
 - For animals: 95 % Range (Worton, 1987)
- ▶ Point-set Based Regions

Range Estimation

▶ Polygon

- Minimum Convex Polygon with Restrictions
- Alpha-Shape (Aramatzis et al., 2006)
 - Recoloring, Potential Adaptations

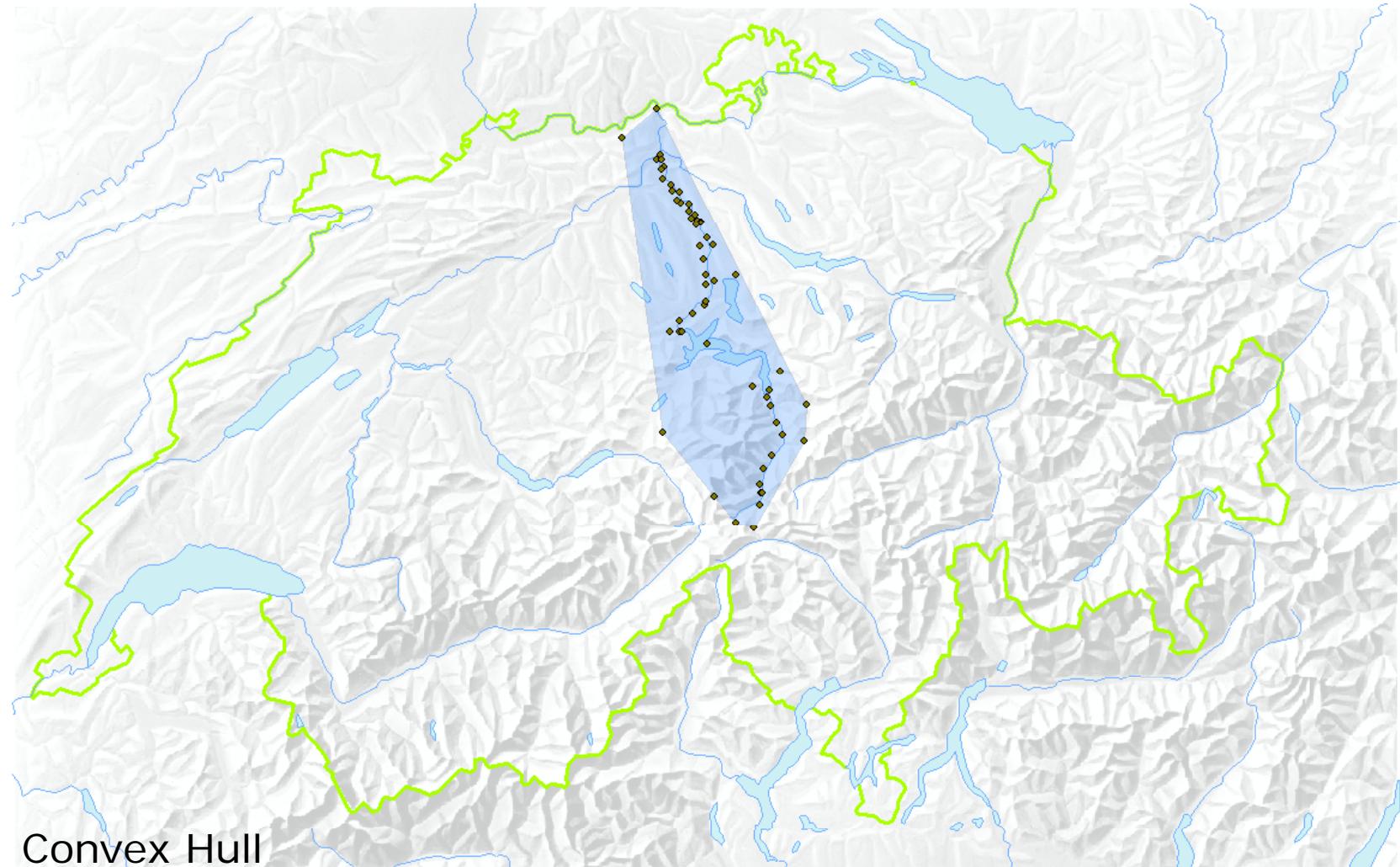
▶ Centre of Activity

- Circular distributions

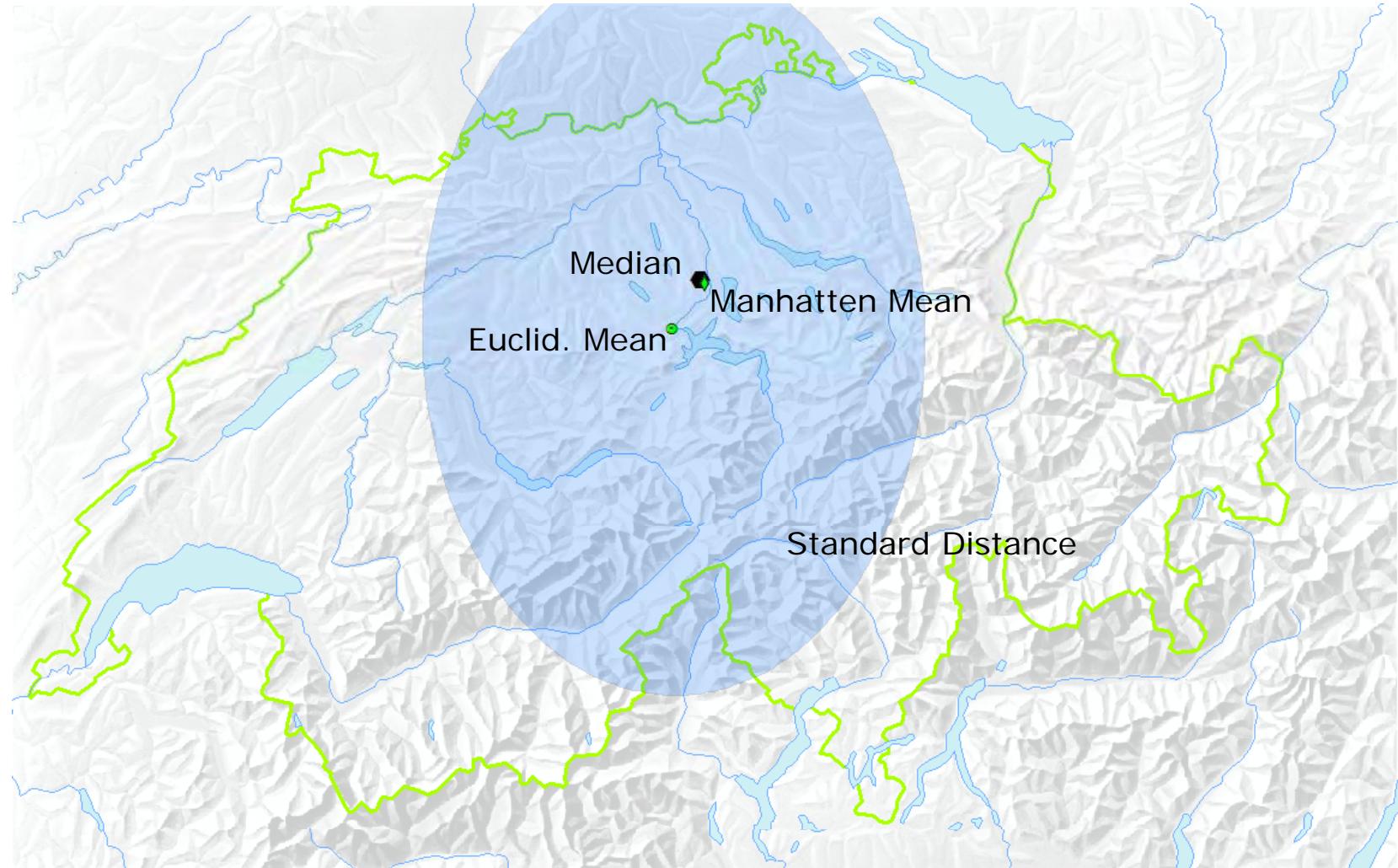
▶ Non-parametric

- Fourier Analysis
- Harmonic Mean
- SVN
- Kernel Density Estimation

Range Estimation

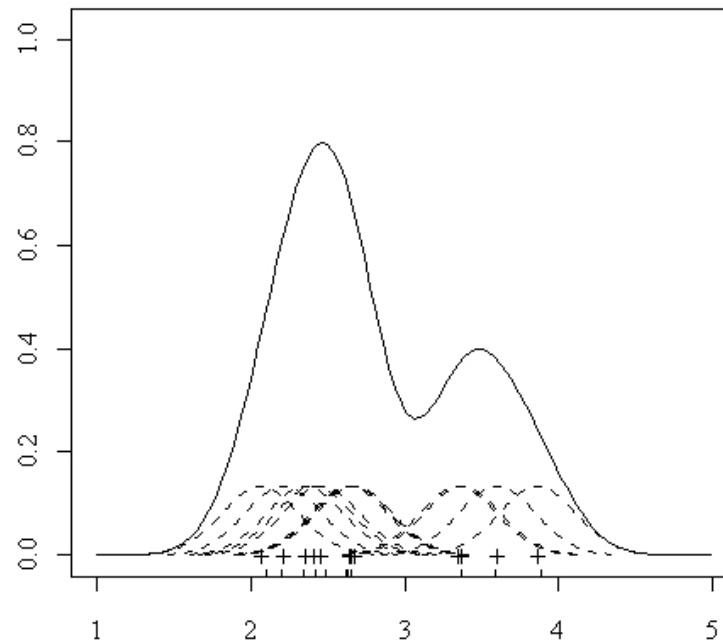


Range Estimation



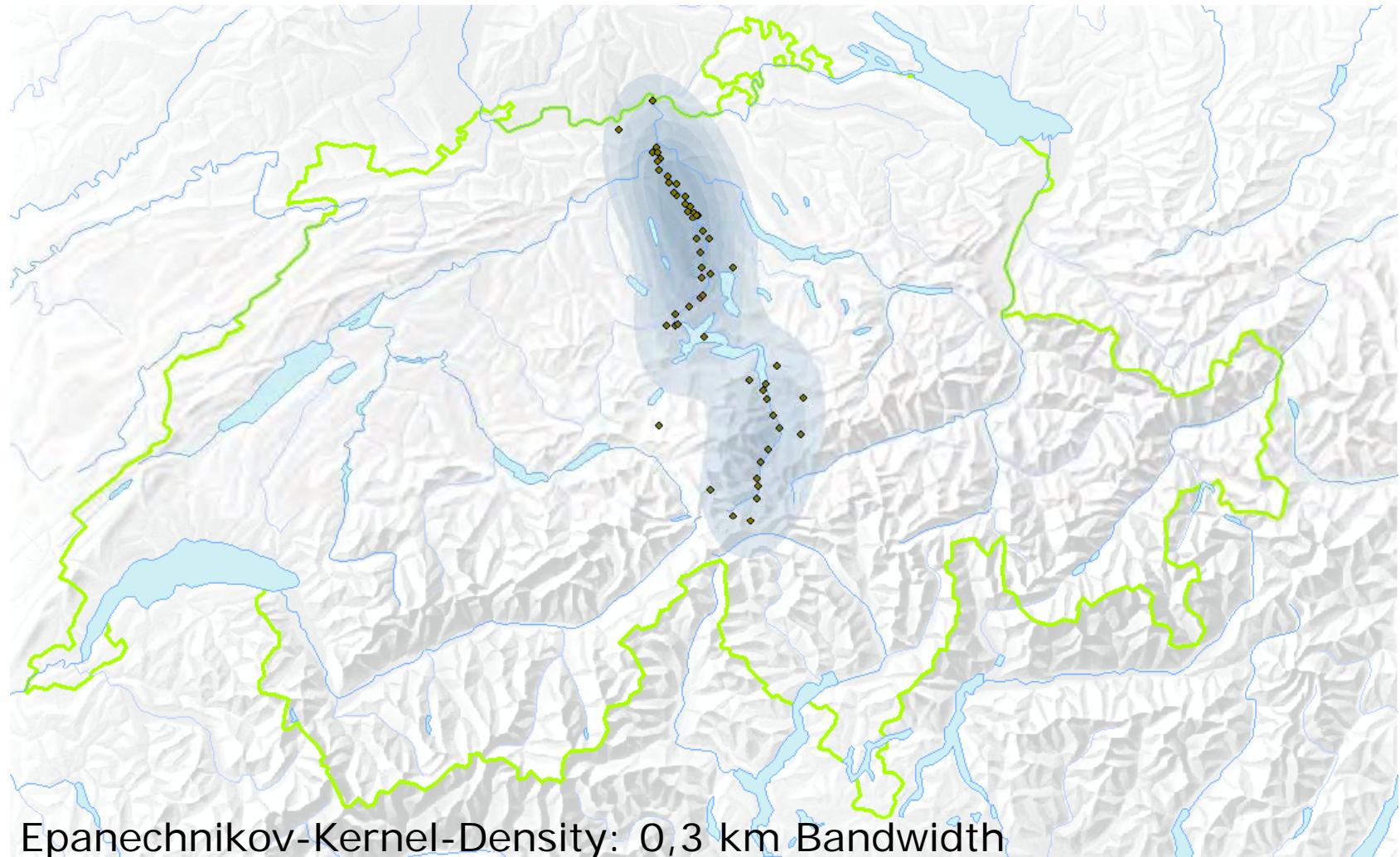
Range Estimation

► Kernel Density Estimation

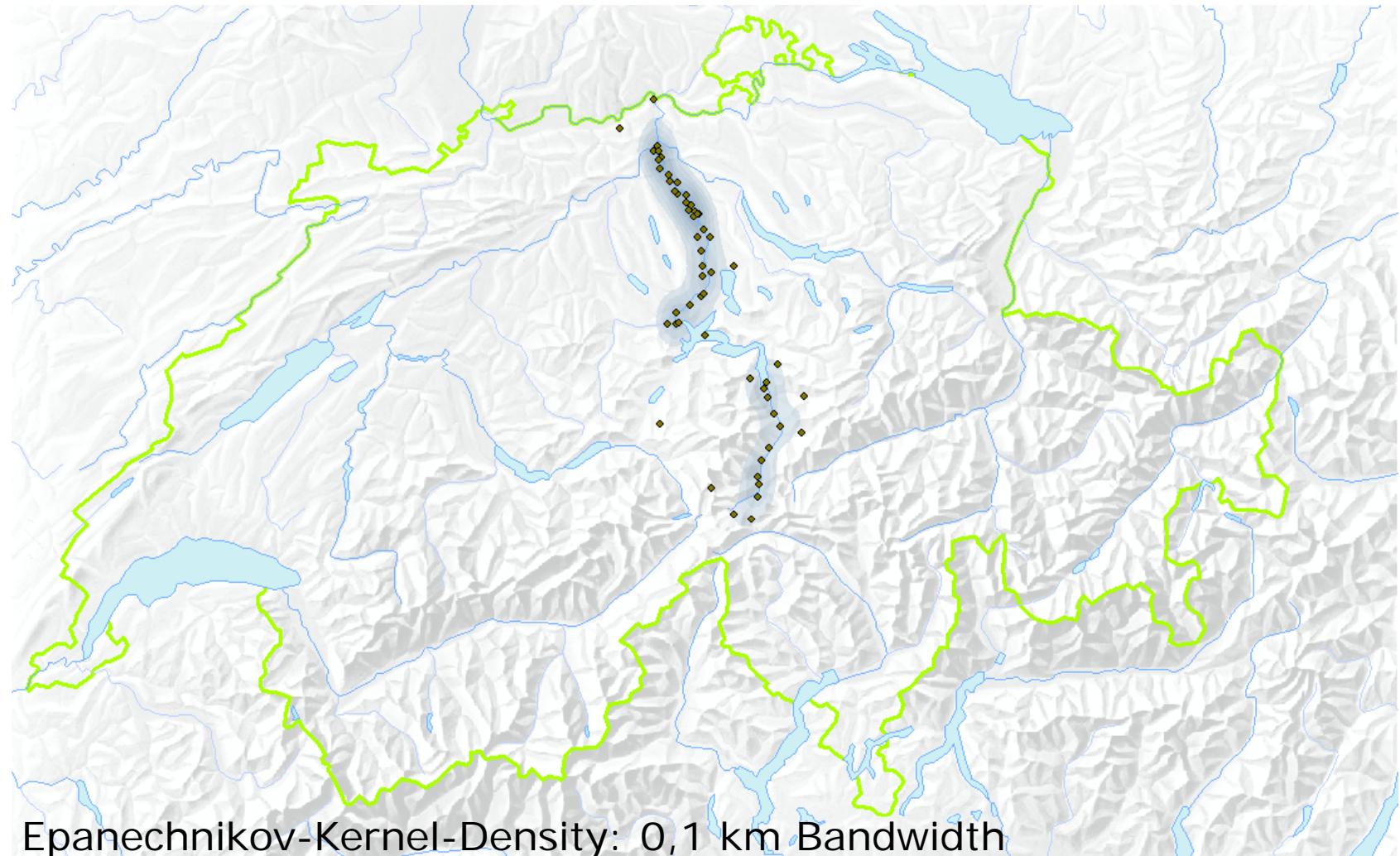


(Silverman, 1986)

Range Estimation



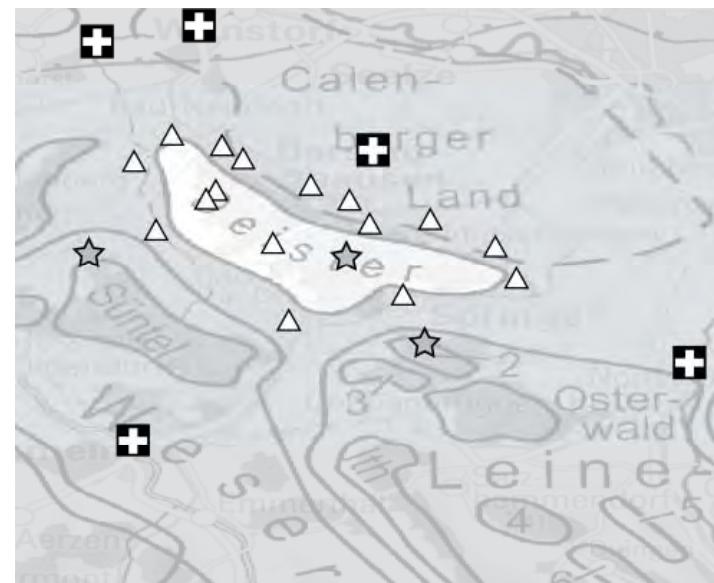
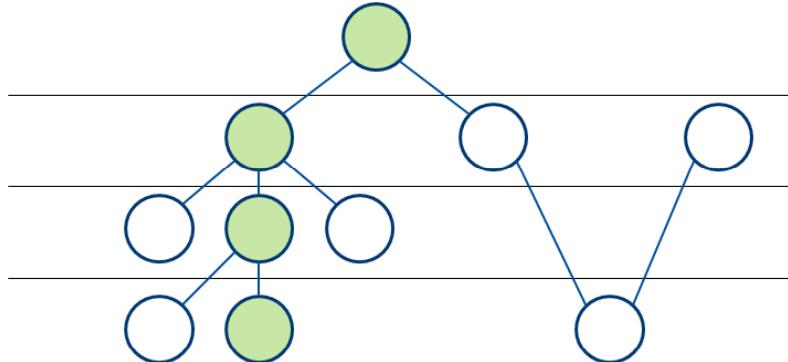
Range Estimation



Relationship Between Point Sets

Relationship Between Point Sets

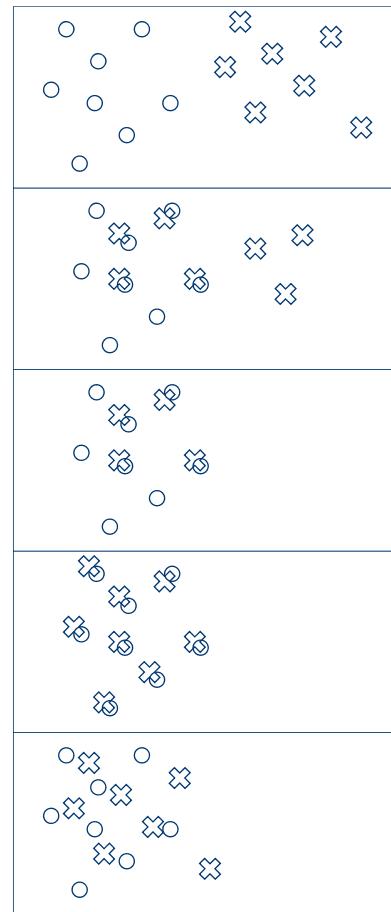
- ▶ Selected Points vs. All Other Points
- ▶ Children of Siblings



Relationship between Point-set-based Regions

► Topological Relationship

- Disjoint
- Overlap
- Inside
- Contain
- Deduced Overlap



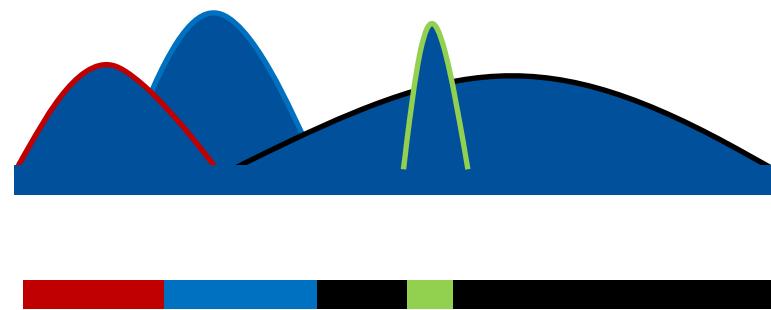
Relationship between Point-set-based Regions

- ▶ Directional Relationship
 - Cardinal Direction
- ▶ Metric Relationship
 - Distance Between Centroids
 - Average Distance
 - Hausdorff Distance

Relationship between Point-set-based Regions

▶ Maximum Density

- Normalization
- Bandwidth

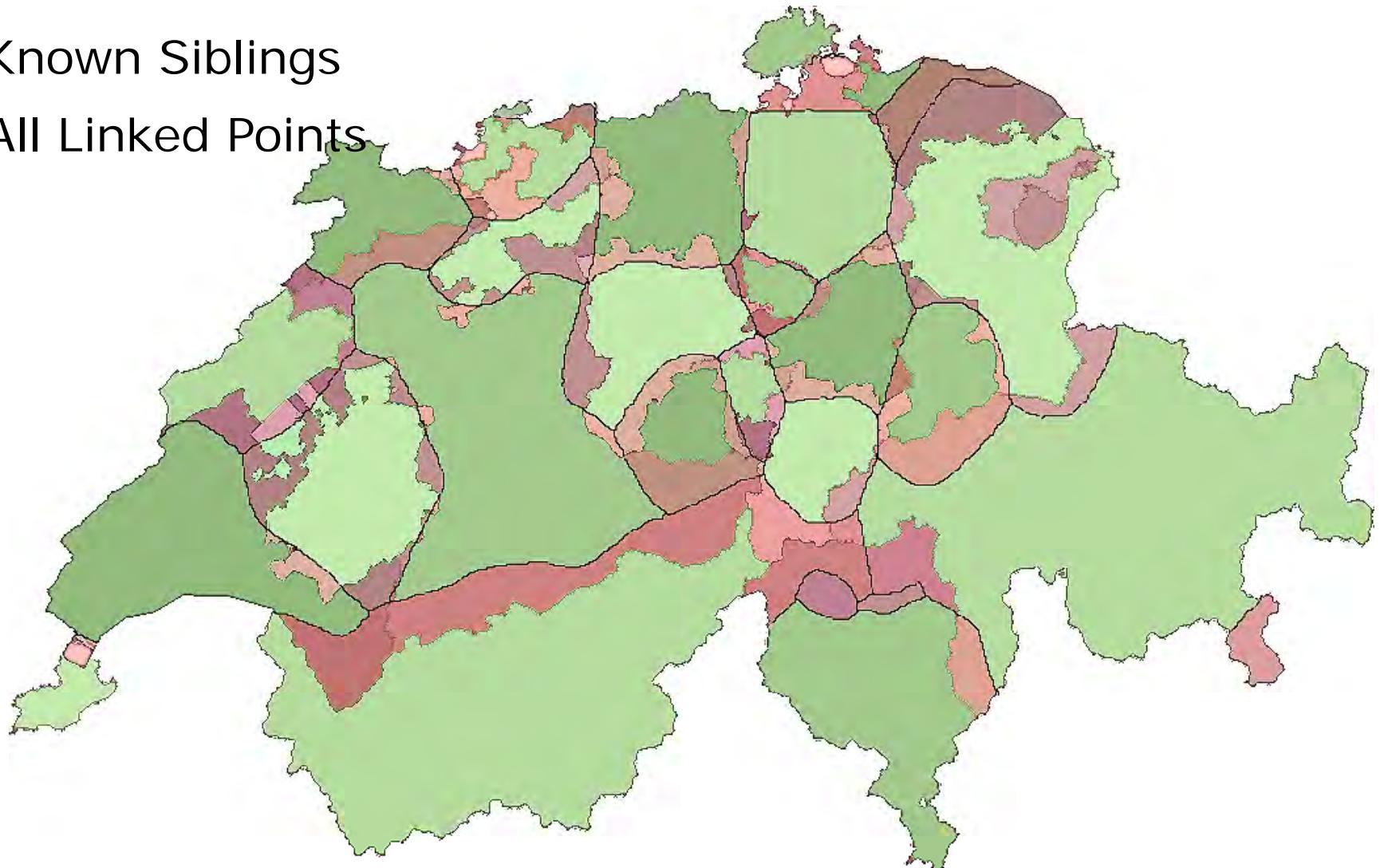


▶ Thiessen Polygons

- Disjoint Point-Sets

Evaluation

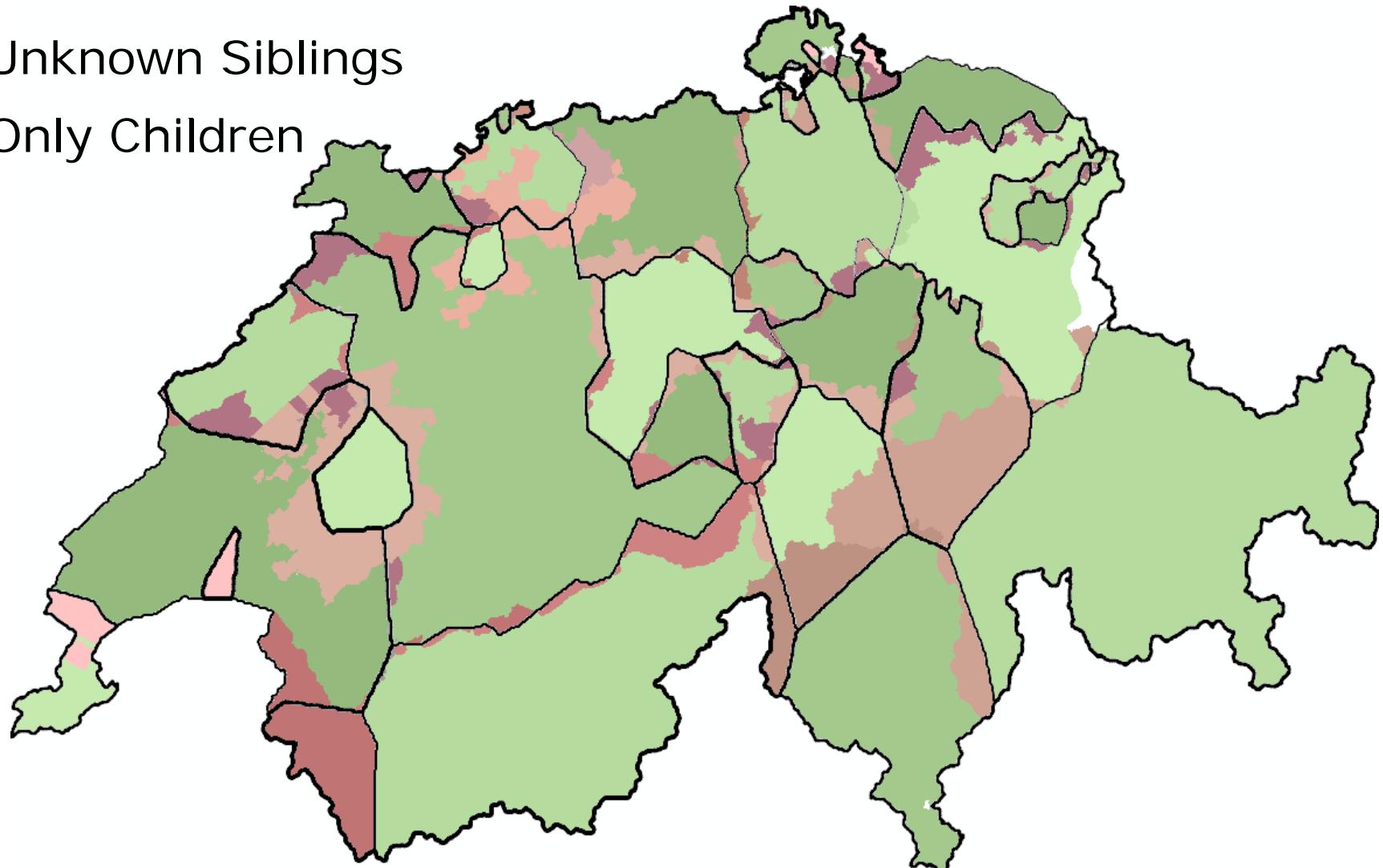
- ▶ Known Siblings
- ▶ All Linked Points



Bandwidth: 0,25 km

Evaluation

- ▶ Unknown Siblings
- ▶ Only Children



Thiessen-Polygon

Résumé

- ▶ Wikipedia is a Useful Source for Geographic Information
- ▶ Graph-Analysis
 - Improves Point Classification
 - Enables Concurrent Delineation
- ▶ Issues
 - Relationship Between Point-Sets
 - Topology

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