



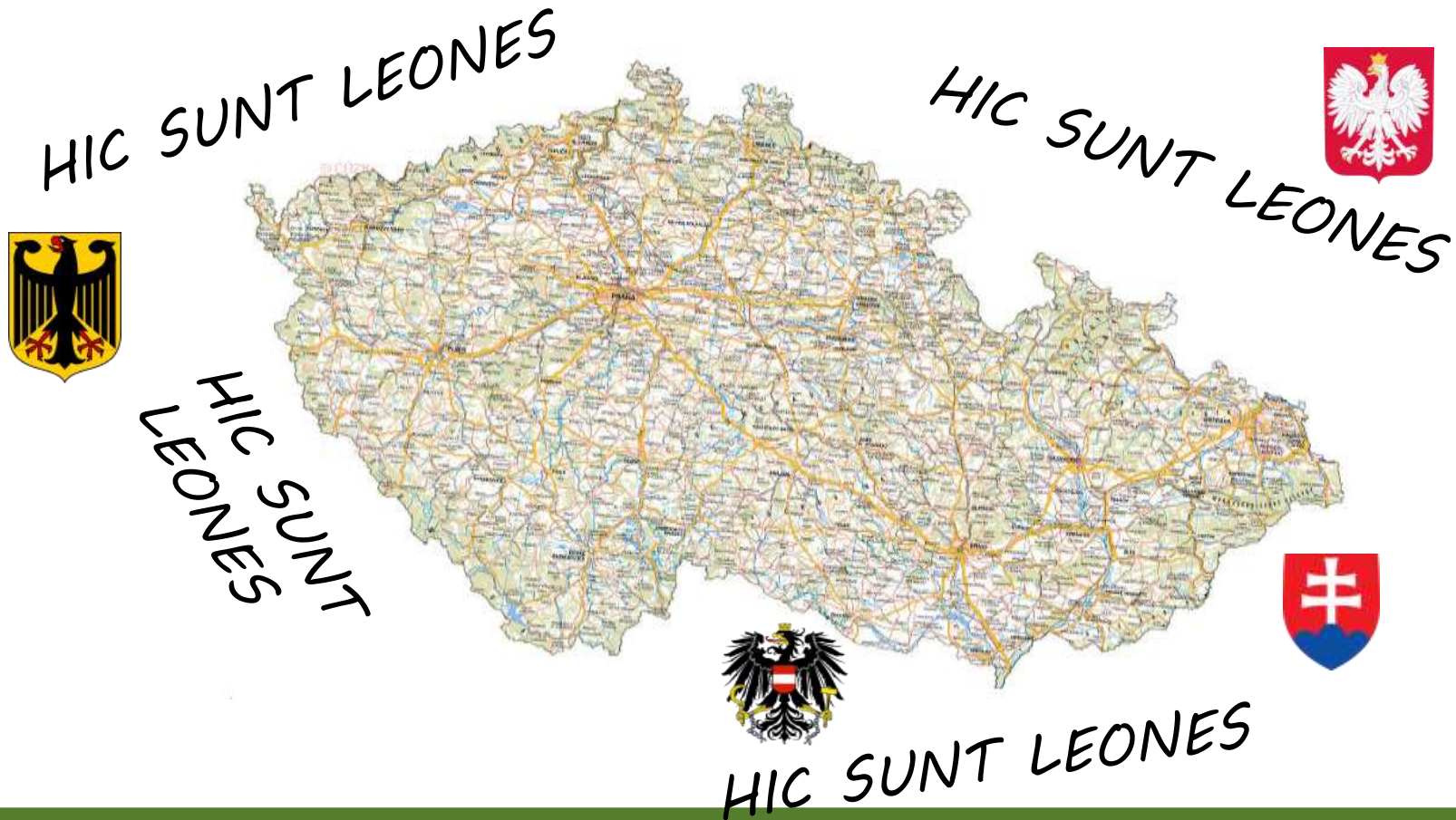
LAND SURVEY OFFICE OF CZECH REPUBLIC

Harmonizing at the borders

Pavel Šidlichovský

IGW/ISPIRE 2015; Lisabon
26.5.2015

State map series: HIC SUNT LEONES (OR AQUILAS ?)



INSPIRE DIRECTIVE and Implementation rules

- **2007/2ES Ch. III; art. 10/2:**

In order to ensure that ...geographical features...which spans the frontier between two or more Member States, are coherent, Member States shall, where appropriate, decide by mutual consent on the depiction and position of such common features.

- **TN data spec.:**

Network connection mechanism to establish the cross-border connectivity (a simple crossreferencing system to establish cross-border connections between the transport networks) ... are compulsory

- **HY data spec.:**

Wherever a watercourse crosses a border, the **dataset holders must agree upon a common node** so that the network connects across the border. Border nodes are identified by the HydroNodeCategory type 'boundary' and should have the same unique identification attribution in the datasets that connect. Whenever the watercourse forms the border, it must be included by both member states with the same unique identification attribution in order to ensure integrity of the model.

Practical requirements

- Emergency services need to share capabilities alongside borders: useful to know which road actually crosses borders
- Water management and monitoring authorities need united hydrography network for both teoretical and practical purposes: floods and contamination spreads



Project: Cil 3/Ziel 3

Project: Cross-border homogenisation of spatial base data between the Free State of Saxony and the Czech Republic 2009-2011

- Funded by the EU from the European Regional Development Fund
- Ziel 3/Cil 3 programme (2007-2013)
to support the cross-border co-operation between
the Free State of Saxony and the Czech Republic
- Lead partner Leibnitz –Institute,
partners GeoSN, Land Survey Office
- <http://geodat.ioer.info>



Europäischer Fonds für regionale Entwicklung:
Wir investieren in Ihre Zukunft/Evropský fond pro
regionální rozvoj: Investice do vaší budoucnosti



Grenzüberschreitende
Geodatenhomogenisierung
Homogenizace
geodat na hranicích



Leibniz-Institut
für ökologische
Raumentwicklung

Cil3 results



BilingualerKatalog

ID	ObjectType	Attribute 1	A1_ name	A1_ value	A1_ value_name	Attribute 2	A2_ name	A2_ value	A2_ value_name
A_52003_001	AX_Schleuse	KON	konstruktionsmerkmalBauart			ZUS	zustand		
A_52003_002	AX_Schleuse	KON	konstruktionsmerkmalBauart	1010	Schiffshebewerk	ZUS	zustand		

171 connecting points

263 interlaying „fixed“ points

Common boundary based on newly measured or old paper HD

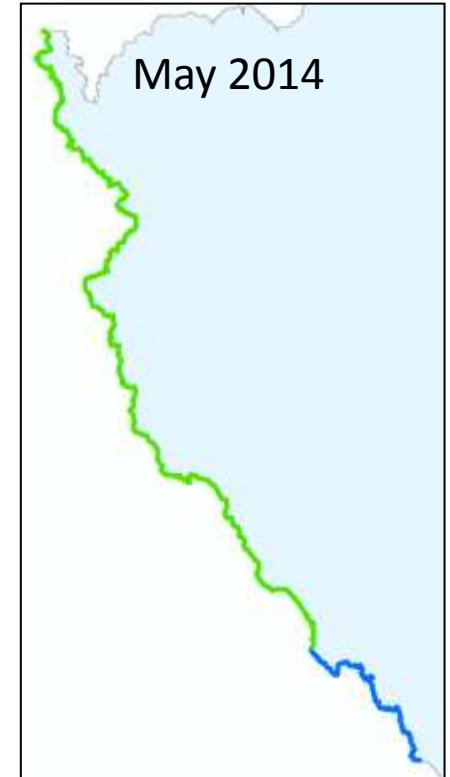
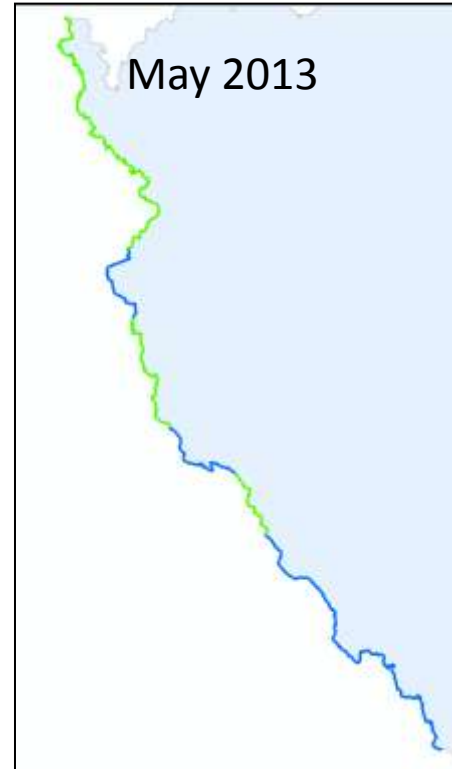
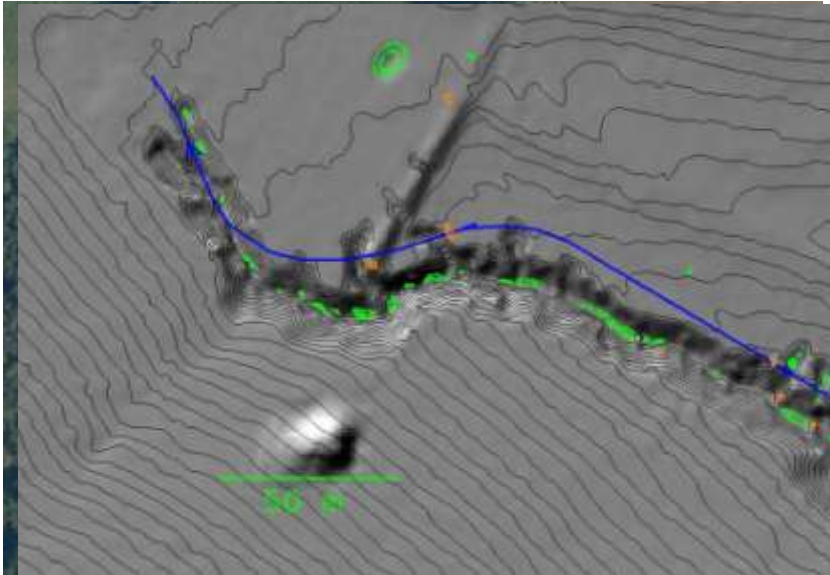
LEGENDA :



- Objektbr
- Gebäude
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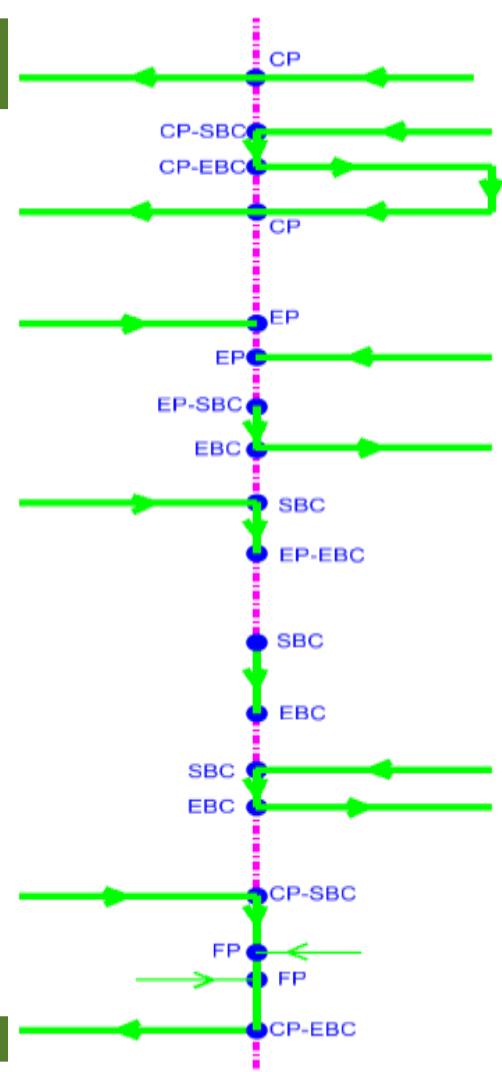
Experience transfer to Bavarian border (2012-2014)

- adopted boarder sections from new measurement only
- 586 connecting points – availability off LLS



Connecting points

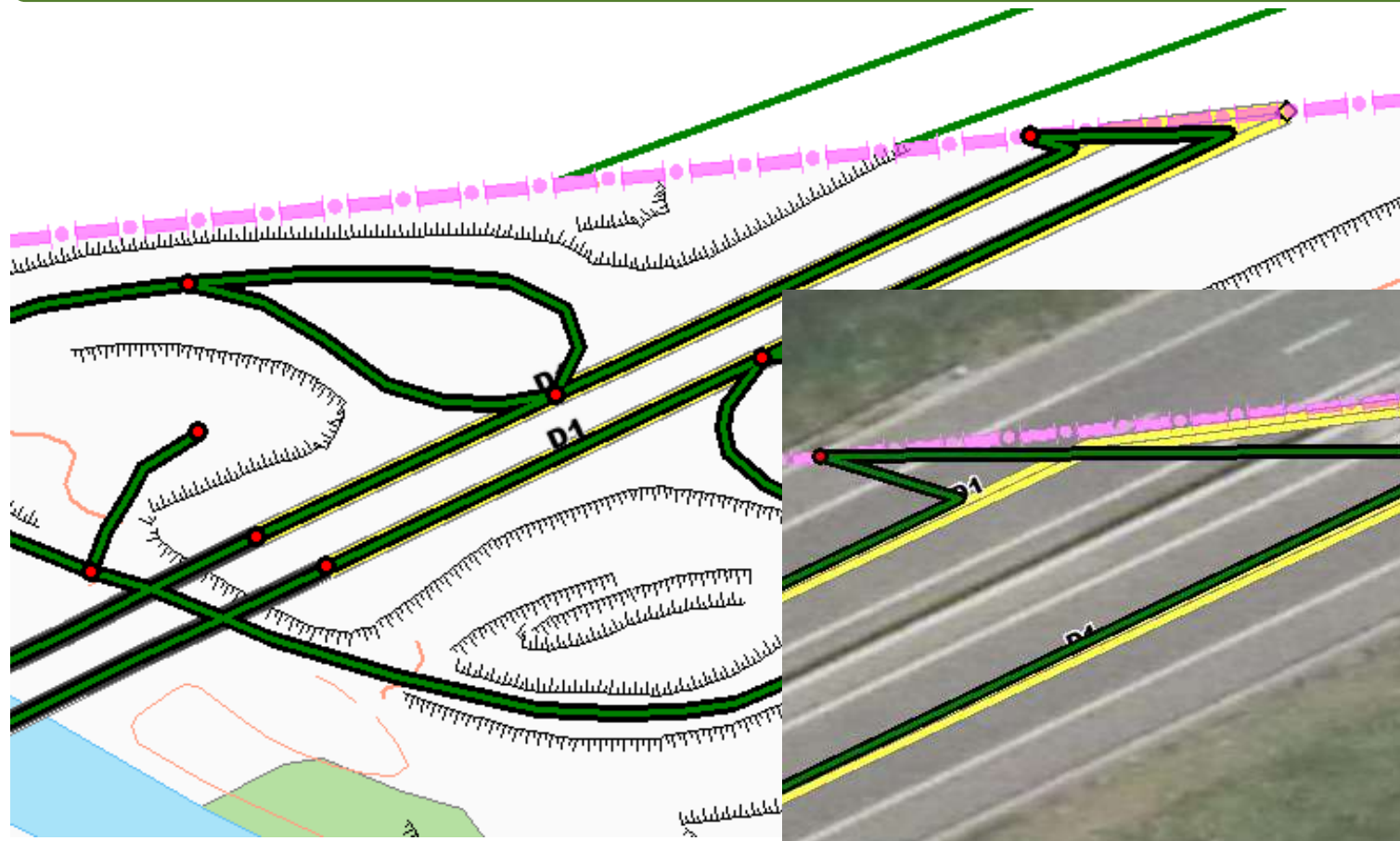
- Since February 2014 as a new feature type in ZABAGED[®]
- Attribute:
 - FID (unique database key in ZABAGED[®])
 - ID e.g. BY02175
(composed from state-bordersection-number)
 - FT_CODE (connecting feature type in ZBG)
 - TYPE (typology =>
 - SIGN (road number, watercourse name, ... etc.)



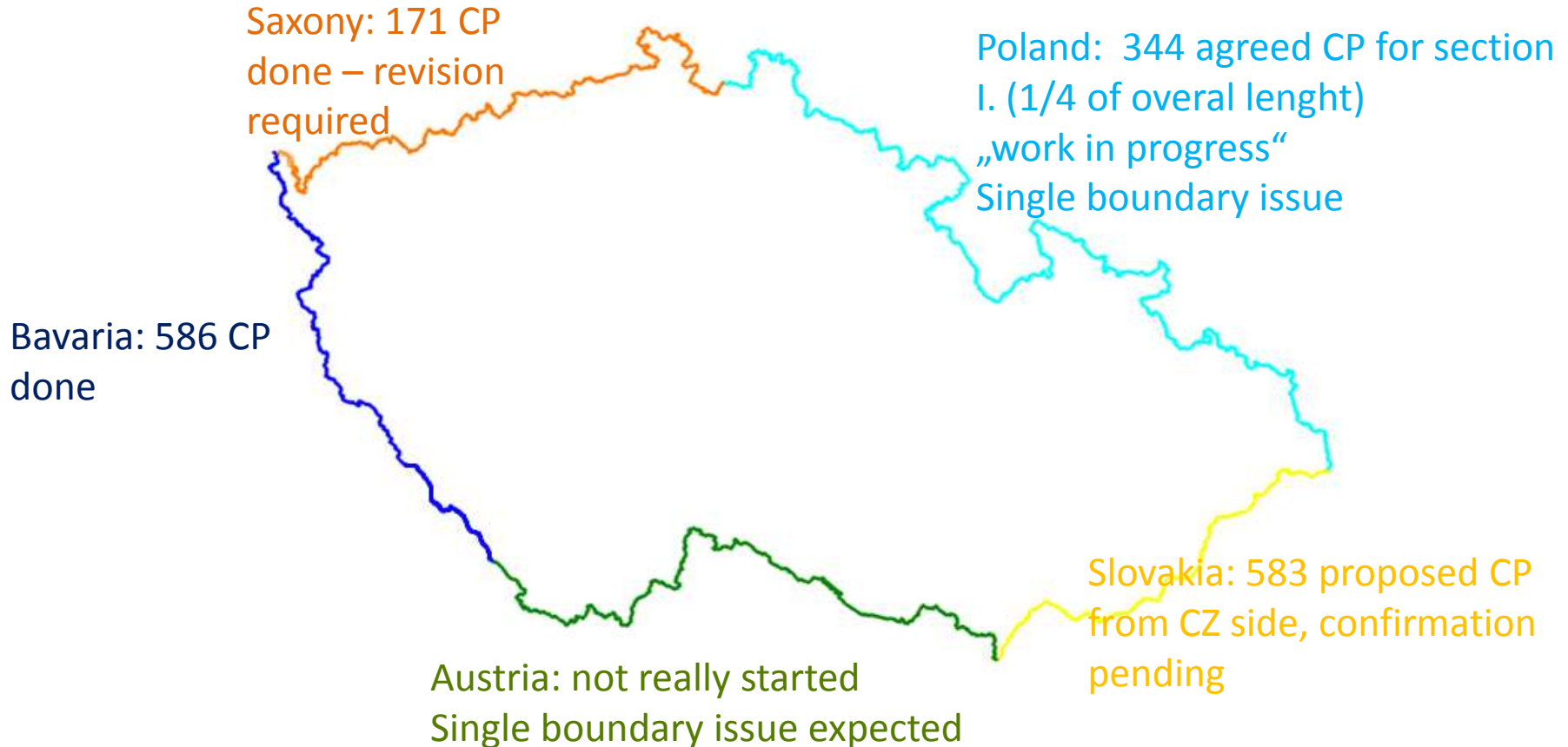
Waterstreams refuse to respect int. boundary



Many things went wrong at once



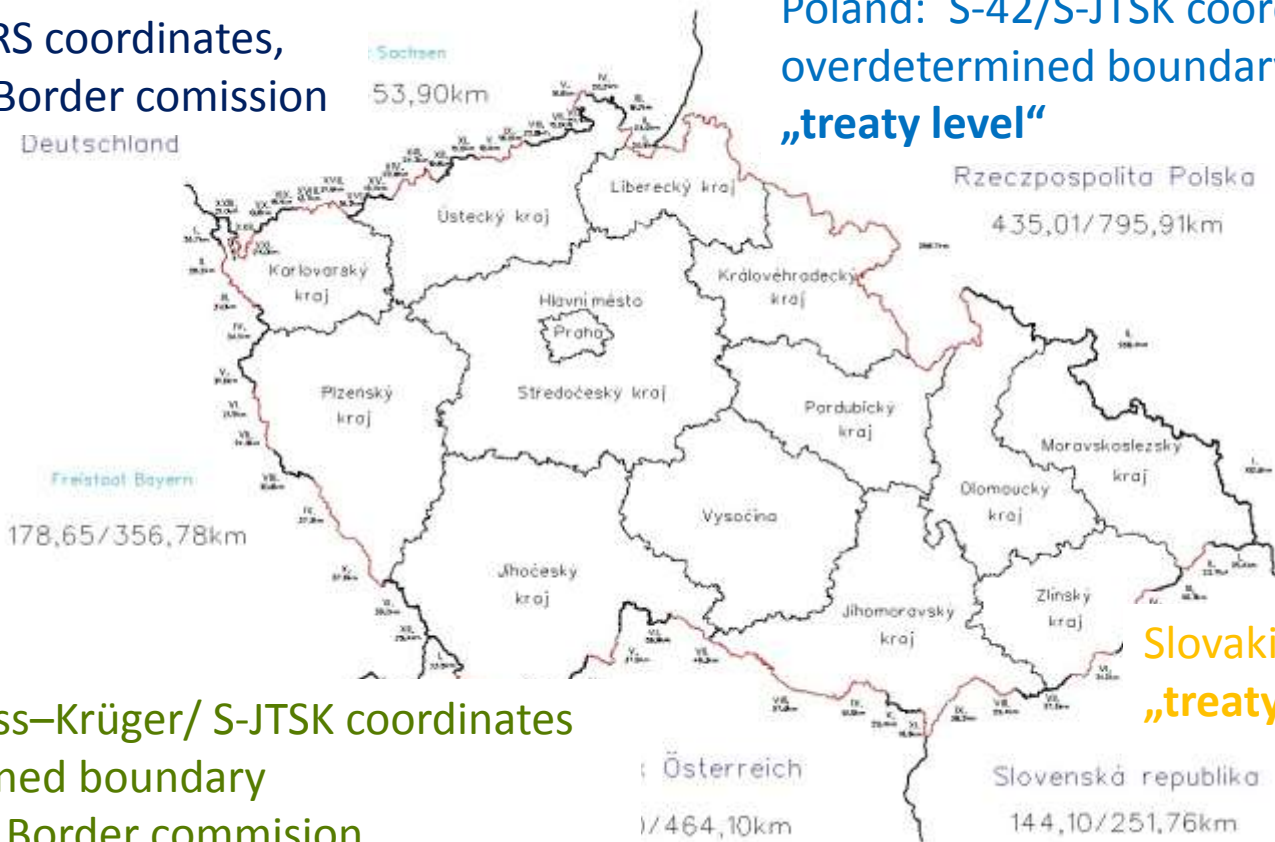
Overview – current stage



International boundary measurement

Germany: ETRS coordinates,
approved by Border commission

Poland: S-42/S-JTSK coordinates =>
overdetermined boundary
„treaty level“



Slovakia: ETRS/S-JTSK
„treaty level“

Austria: Gauss–Krüger/ S-JTSK coordinates
overdetermined boundary
approved by Border commission

More on transformations in poster session

If you want to discuss, disagree or you think we must be just crazy, visit the poster section as well:

State Borders in ETRS89 Coordinates – Reality or Fiction

State Borders in ETRS89 Coordinates – Reality or Fiction

Jiří Podskopý – Director of the Section of Geodetic Control Database Czech Office for Surveying, Mapping and Cadastre, e-mail: jiri.podskopy@czka.cz, www.czka.cz

Common unique ETRS89 coordinates of the state borders are crucial for cross-border data harmonization. Data must be edge-matched to an adjusted common border.

Particular difficulties:

Geodetic points should fit the state border from both sides – the border is derived as an envelope of parcels (also in areas in cadastre maps).

If the state border is measured and administered in the national coordinate system, the accuracy of the transformation into the ETRS89 is influenced by discrepancies of the local trigonometric network, which results in two slightly different sets of state boundaries.

Case study from the Czech and Polish borders in the frame of EUF project cluster:



Conclusion:

- Common unique ETRS89 coordinates of the state boundaries are crucial for cross-border data harmonization.
- Field solution for Europe – when national border on the state borders based on the ETRS89 coordinates – is necessary, but it will take years (additional measurements and processing).
- In the meantime an adjusted common boundary for edge matching of other datasets (UTM, ...) has to be used.
- A special coordinate transformation to the ETRS89 based on dynamic grid for the Czech Republic is being prepared to be an alternative (Navaš 2010, 2011) precisely to the state boundaries.

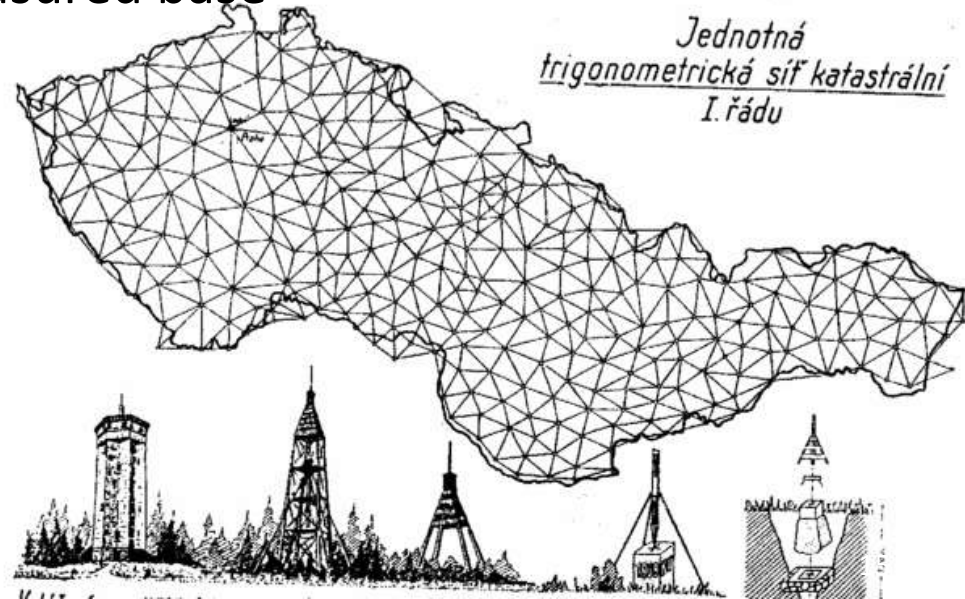
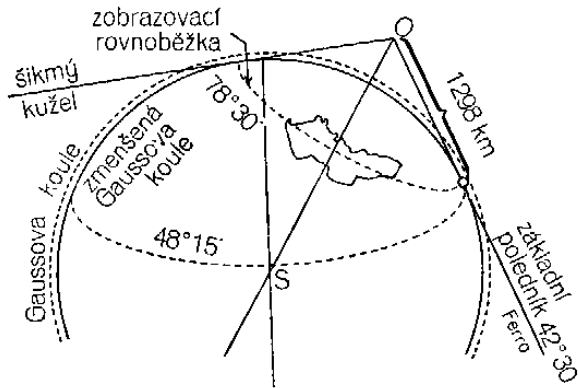
State of art on the Czech borders:



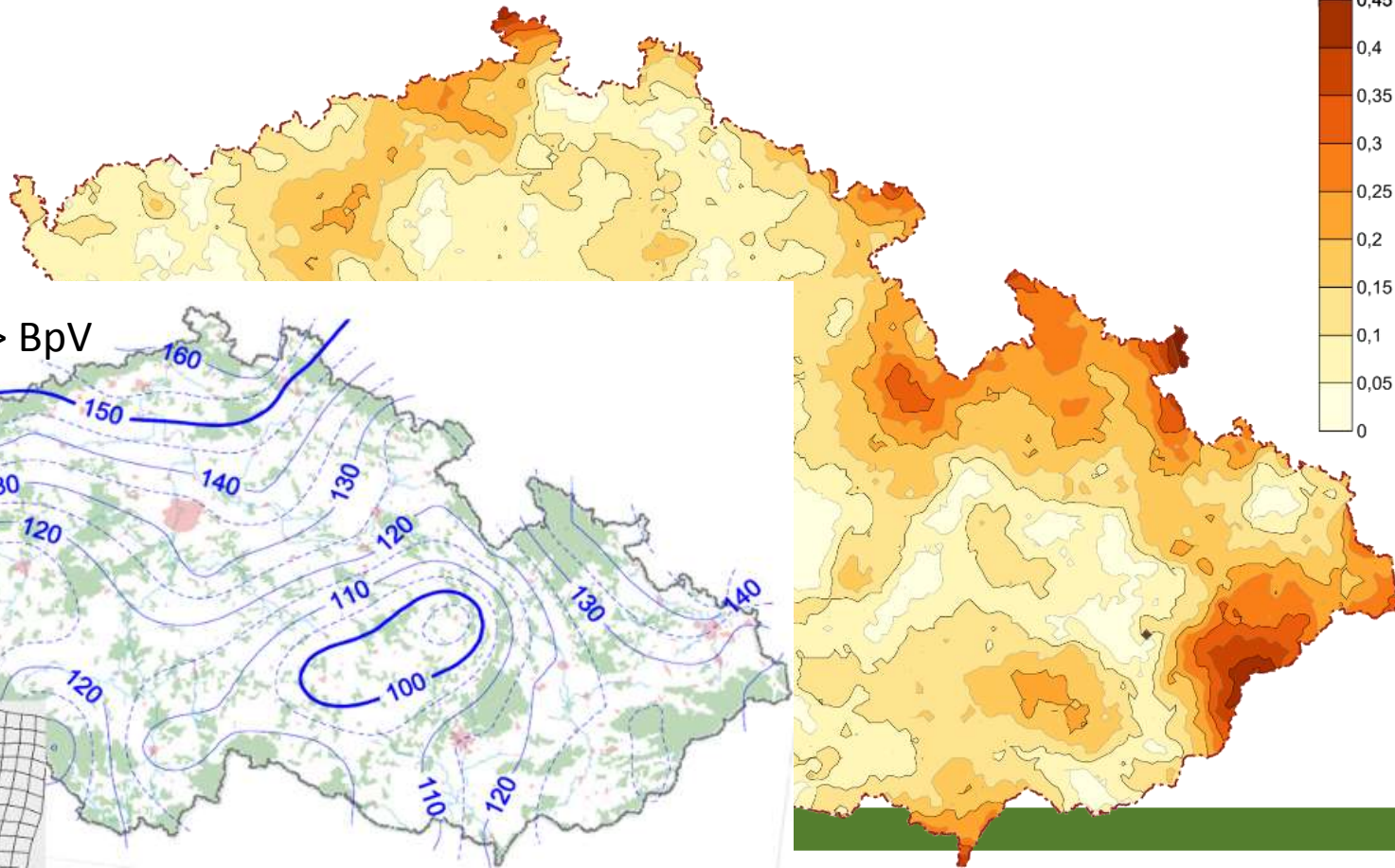
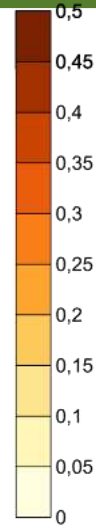
S-JTSK National system, origin

- Best fit cartographic projection for former Czechoslovakia area
- Underlying trigonometric network built between 1920-1935
- Relays on Austro-Hungarian 19th century measurement
- Scale derived from single measured base

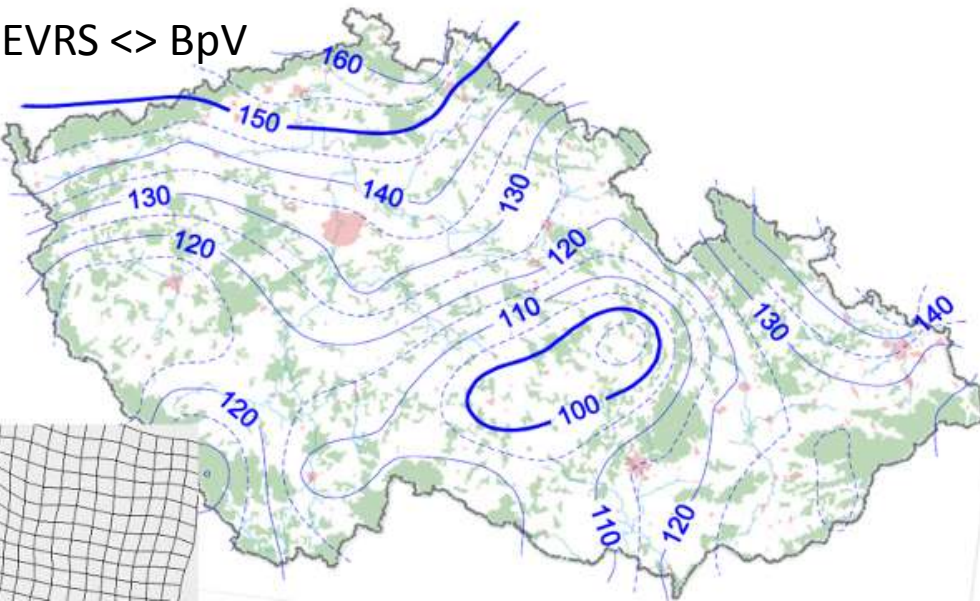
-> variable scale



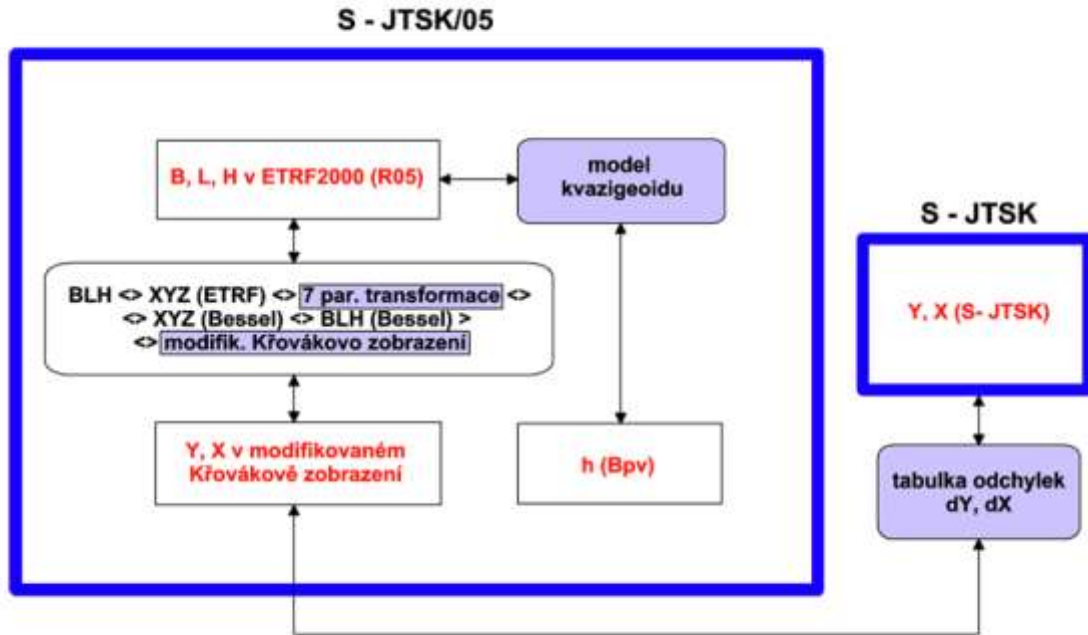
S-JTSK „variable scale“



EVRS <> BpV



S-JTSK > ETRS transformation



S-JTSK/05 > ETRS is mathematically defined relation

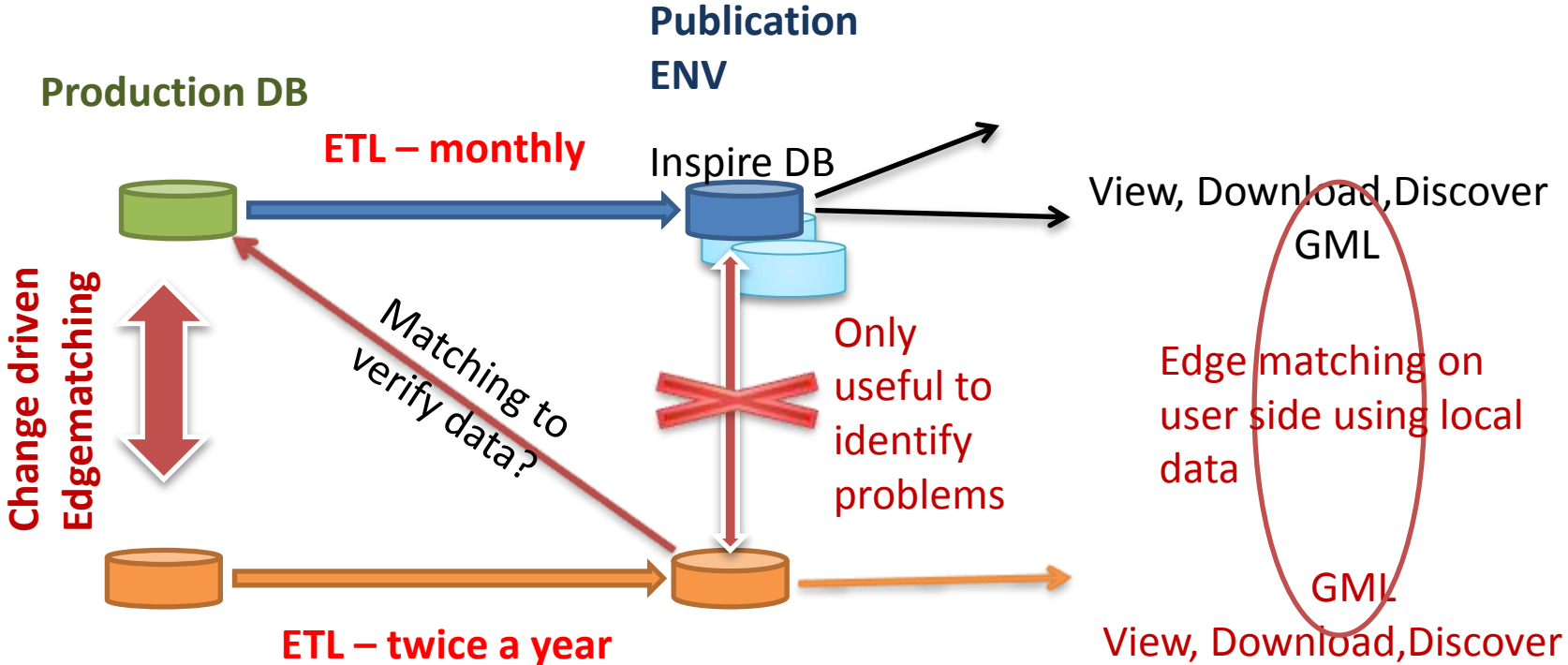
S-JTSK/05 is „virtual“ system

Commercial GIS SW transformation solutions often stop at Helmert 7 par. transformation
Only geodetical SW for use in cadastre has to have its transformations certified
Opportunity for great number of „approximate“ transformations.

Transformation service

- Official transformation algorithms are published, including standalone transformation software ETJTZU2013 (or 2007, 2017).
- Versions are different only by correction grid definition
- Official transformation is included in published transformation service WCTS (Web Coordinate Transformation Service) which is compliant to OGC 0.4.0. and INSPIRE v. 2.1. definitions
- $m_{xy} = 0.025$ m ($m_p = 0.035$ m) - but transformations on boundary are often extrapolations, not interpolations, so the parameters do not apply.
- <http://geoportal.cuzk.cz/WCTService/WCTService.svc/get?>

Production workflow: where edgematching belongs?



Conclusions: Prerequisites to sustainable seamless data

- ETRS coordinates should be primary definition of international borders
- Stable coordinate transformation **S** with sufficient accuracy is necessary.

Alternative would be to maintain the source data in ETRS coordinate system, or one mathematically transformable (JTSK/05).

- Frequency of data publication should be „matched“

Thank you for your attention



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