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Information technology for web application in surveying

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7th FIG Regional Conference, Spatial Data Serving People, Hanoi, Vietnam, 19-22 October 2009

Paper contents:

- short **description of general principles** and advantages of applied technologies of web services and XML applications
- **Two examples** of web applications for surveyors:
 - **description of XML web application to geodynamic analysis of deformations** with examples of using
 - **web application for survey sketch processing**
- this way the paper reflects **a decline of understanding web as a medium offering information to be the tool providing services and applications**

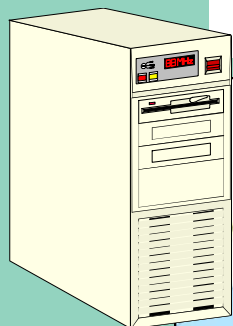
Basis of Applied technologies - XML:

- As basis is the **XML** (eXtensible Markup Language) **interface to services and applications**
- XML is a markup language, similar to the HTML
 - **Self-describing, platform independent, text format**
 - Possible simple validation and data correctness
 - Possible transfer of binary data, too
 - **Expandable and possible to define own signs and structure**
- => XML is very suitable format to data storing and exchange

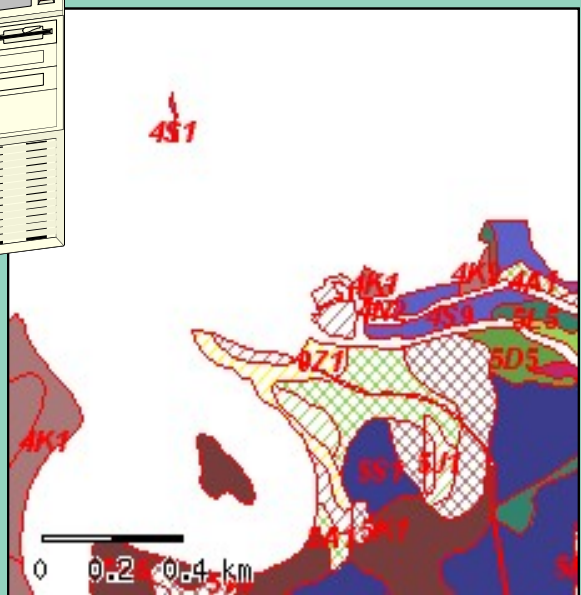
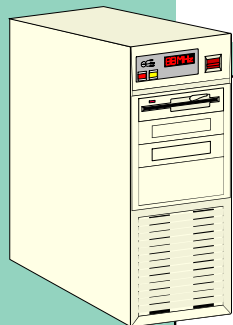
Principles - web **services and applications**:

- Web **application** enables interaction between man and machine, web **service** enables interaction machine - machine
- Web services represent basic building blocks to web applications and distributed data and information processing
- Using of standardized interface (XML) to services and applications allows creation of new platform independent applications, which utilizes such services
- Such services and applications may be multiplied => **a development towards using distributed services and data from more servers simultaneously**
- **In GIS area WMS, WFS,..., WPS** (Web Map Service, ...) are used in accordance to Open Geospatial Consortium (OGC - <http://www.opengeospatial.org/>)
- => GIS data must not be on own PC

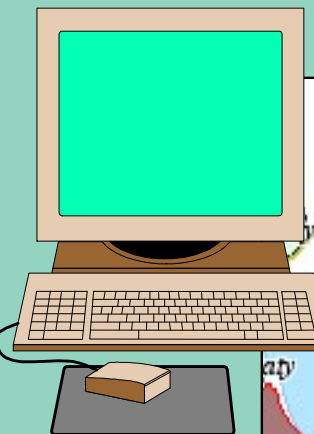
Server1 – topographic base

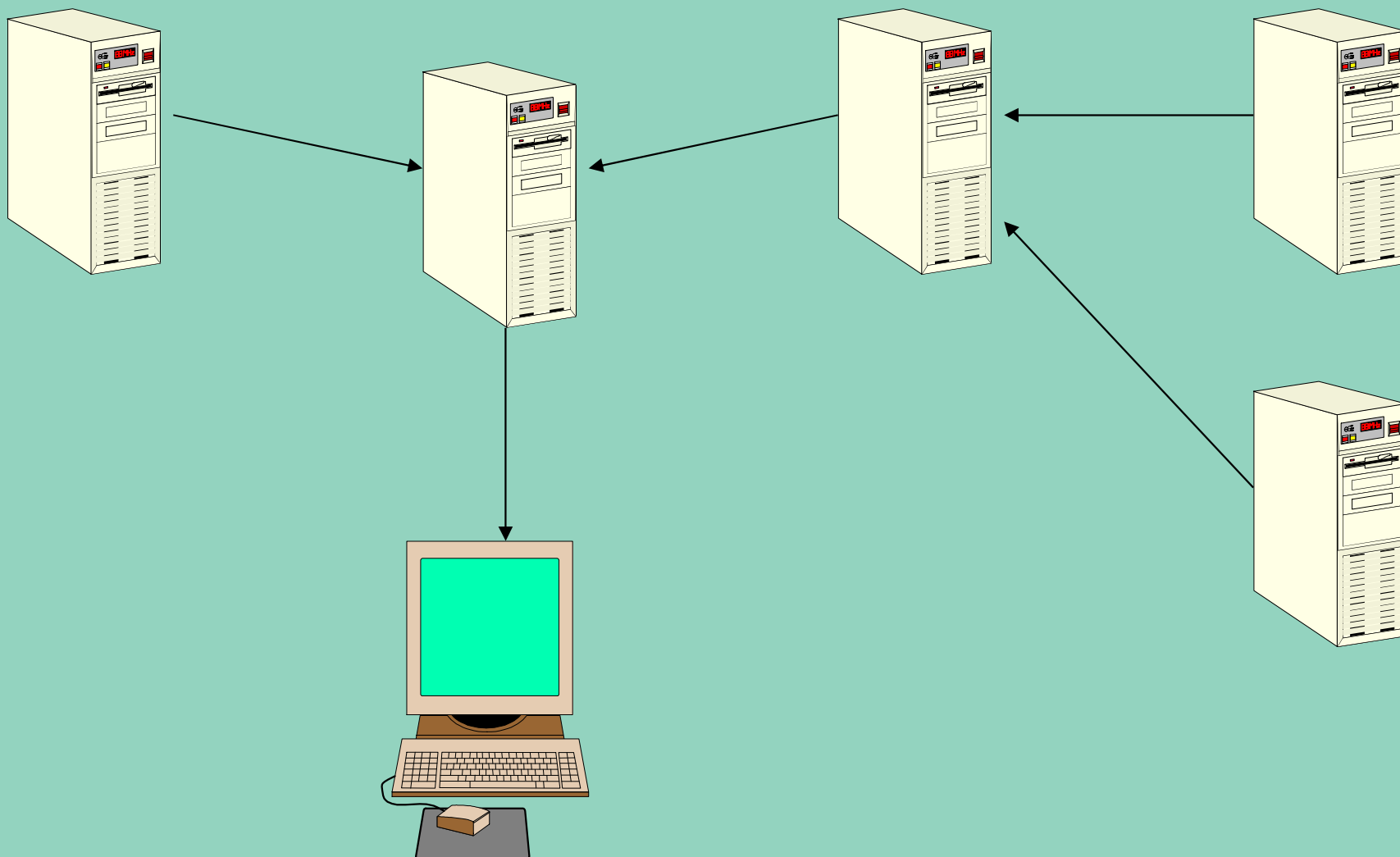


Server2 – thematic base



Client





Main advantages of XML web applications:

- **User does not need his own software** to less frequent or complicated calculations
- User must not care about **software updating** evoked by technology advancement or changes of calculation (technological) procedures and regulations
- On-line made calculations guarantee **securing uniform calculations and procedures** of given applications (regulations), results from different input data may be compared
- It is possible to **document** calculation steps made and methods on server as well as input and output values
- It is possible to **charge** e.g., by **microfees** in commercial cases and applications and services may be used
- Interconnection of applications from different producers is possible including their cascading a simultaneous using of different XML web services => **whole infrastructure may be built and complicated problems solved by distribution**

1st example: XML web application to geodynamic analysis of deformations:

- Application to **geodynamic analysis of deformations** made on-line and utilizing simultaneously WMS web services (www.vugtk.cz/~deformace)
- Application goes from the desktop version which we used 23 years ago and **is based on continuum mechanics**
- **As input** to the application: coordinates of given points, their displacements and numbers stored at client and some other information as required
- **As output:**
 - Values of interpolated displacements in quadratic network
 - Deformation field values in the same quadratic network (strain tensors)
 - Graphic representation of displacement field and map deformation
 - Possible insertion of topographic base to map by WMS (SMO 5, UHUL, NASA – Landsat a MODIS, DEMIS)
 - Export to the KML format for GoogleEarth
- Input and output values are in the XML format (GML, SVG, KML)

Deformation Analysis - Microsoft Internet Explorer

Soubor Úpravy Zobrazení Oblíbené Nástroje nápověda

Zpět Hledat Oblíbené

Adresa http://www.vugtk.cz/~deformace/pgm/text.php

česká verze | VÚGTK | HELP SERVICE | MAPSERVER | deformace@www.vugtk.cz | updated: 1.6.2005



Deformation Analysis

The transformation of the displacement vectors due to the surface movements into the parameters of deformation with graphical output.

ABOUT THE APPLICATION

HORIZONTAL DEFORMATION ANALYSIS	HORIZONTAL DEFORMATION ANALYSIS ON GLOBE
Monitoring geodynamic changes in certain terrains using repeated geodetic measurements. Modelling horizontal movements and computing parameters of deformations from displacement vectors. - Basic 2D program uses following Coordinates Reference Systems: S-JSTK, S-42, UTM. - Graphical output together with topographic layer: TopoHelp ČR, Landsat... - Graphical output formats: BMP, GIF, JPG, SVG, SHP, GML. 	NEW (testing). Modelling horizontal movements and computing parameters of deformations over regular grid on globe. Interpolations are computed by method of inverse distance. No graphical output. 

Input data:

- Coordinates of given points
- Horizontal movements
- ID of given points
- Additional text comments and some parameters for interpolation etc.
- [Coordinate Reference Systems Support \(pdf\)](#)

Output data:

- Field of movements, field of deformations and parameters of deformations
- Graphical demonstration of numeric results in map
- Results can be studied together with topographic layer
- Output XML: GML and SVG, ESRI Shapefile.
- [Examples of graphical output.](#)

Examples:

- Monitoring motions and the surface deformations - [Coal quarry ČSA \(Czechoslovak army\) in Komořany \(NW Bohemia\)](#)
- Monitoring motions and the surface deformations - [area of coal basin Ostrava \(NE Bohemia\)](#)
- Egypt - [Aswan High Dam, The Kalabsha fault](#)

INPUT DATA FORMAT

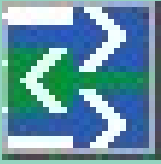
TEXT FILES	XML FILES	TEXT FILES	XML FILES
Input from one file File contains coordinates of given points. First column is point number, coordinates follows in order: X, Y, dx, dy. Input file example Input from two files Two files with values from two measurement periods. Each file contains point id followed by coordinates in order: Y, X. Example	Input data in XML: Description of XML format (.pdf) DTD Empty XML form Example	One file input - Lambda, Fi File with given coordinates. In first column is point number, coordinates follows in order: Lambda, Fi, dLambda, dFi. Example One file input - XYZ File with given coordinates. In first column is point number, coordinates follows in order: X, Y, Z, dx, dy, dz. Example- ETRS S-42: 33-32	<i>In progress.</i>

FORM FOR DATA INPUT



First time [registration](#) needed

Internet



Characteristics of Deformation application:

User interface

www

- Application properties
- Detailed description of inputs and outputs
- Examples of using

Help

- standard Windows Help format .HLP,
- Register
- Searching

Coordinate systems

- UTM
- WGS – fi, lambda, or X,Y,Z
- S-JTSK (Křovák)
- S-42 (Gauss)

XML format

- Corresponding to XML definition and other international recommendations of W3C consortium
- Modular system
- Input possible of one or two sets

Exaples of use in practice:



Deformation Analysis

Examples

1. Monitoring motions and the surface deformations [Coal quarry ČSA \(Czechoslovak army\) in Komořany \(NW Bohemia\)](#)
2. Monitoring motions and the surface deformations [area of coal basin Ostrava \(NE Bohemia\)](#)
3. Egypt - [Asuan Lake, The Kalabsha fault](#)

Monitoring motions and the surface deformations - Coal quarry ČSA (Czechoslovak army) in Komořany (NW Bohemia)

Jezeří area is **limited local monitoring network, close to the coal quarry ČSA in Komořany**. Repeated measurements were performed for repeated debris chute threatening to coal quarry and close castle Jezeří as well.

Data input is from 02/1994 and 05/1994:

jezeri05.txt

```
46 O 800185.26337 982519.11716
72 O 799992.47215 982511.89766
73 O 799959.14953 982474.05883
106 O 800044.10062 982433.74075
80 U 799941.77455 982614.67548
81 O 800182.27314 982621.93475
82 O 800136.54128 982567.79597
83 U 799978.90978 982641.22866
84 U 799968.96487 982699.39723
85 U 799989.05811 982776.96653
79 U 799731.42702 982888.53515
402 O 799978.49980 982554.49218
```

[Input file 1 - txt](#)

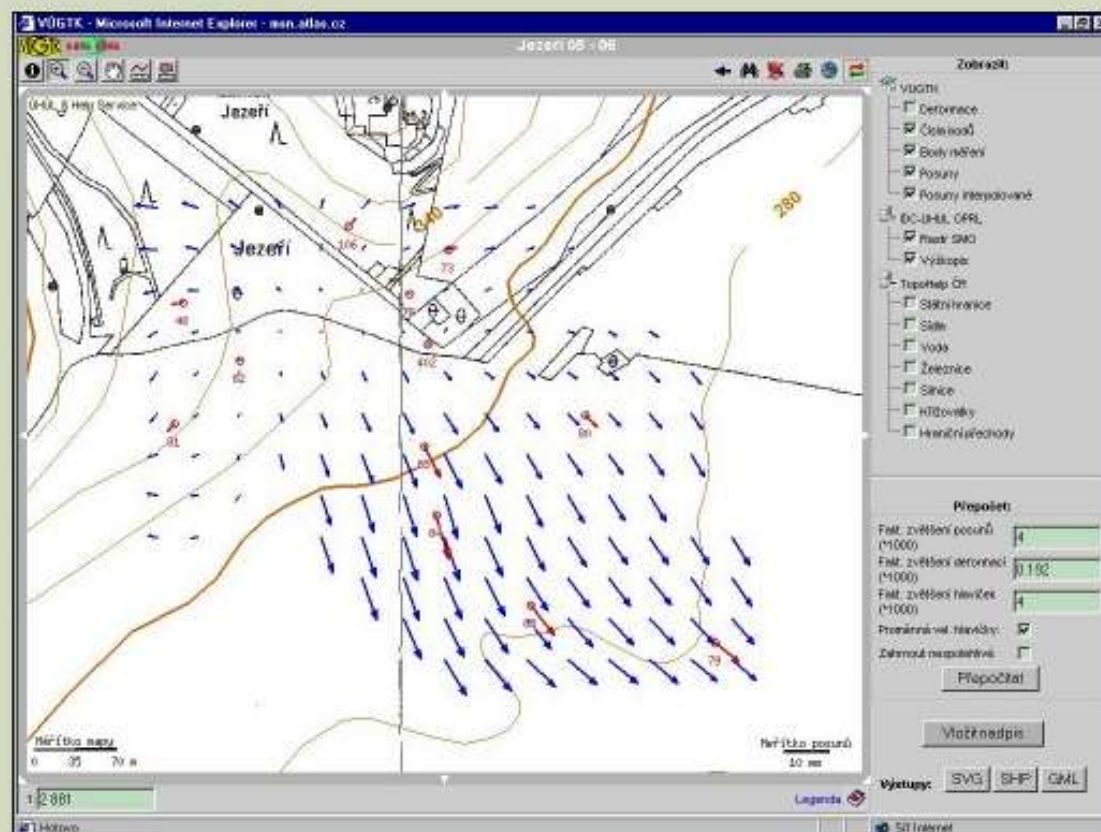
[Input file 1 - xml](#)

jezeri06.txt

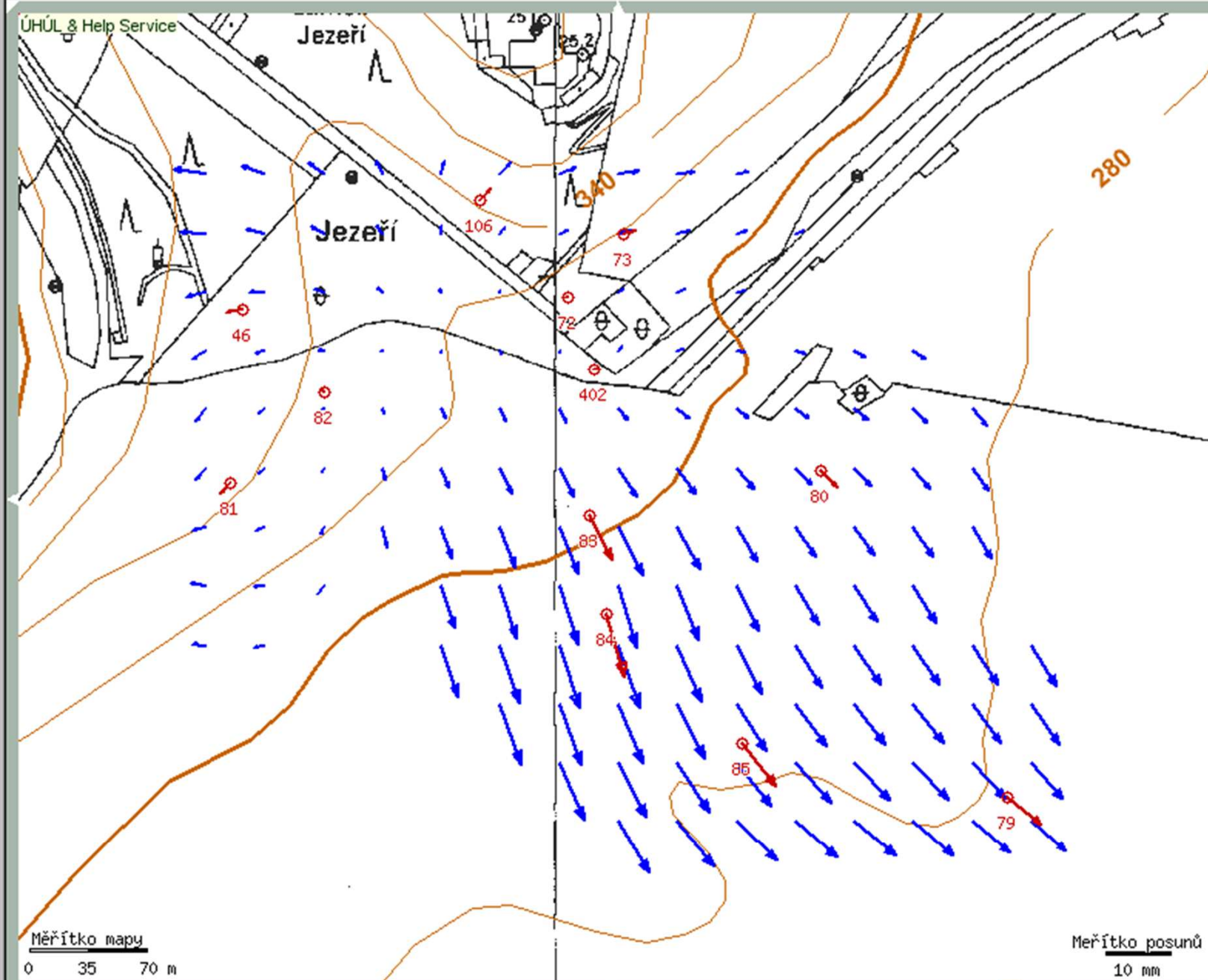
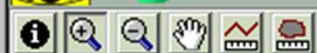
```
85 U 799989.05292 982776.97283
106 O 800044.09909 982453.75916
72 O 799992.47218 982511.89765
73 O 799959.14770 982474.05856
81 O 800192.27654 982621.93640
82 O 800136.54136 982567.79584
402 O 799978.49936 982554.49222
80 U 799941.77214 982614.67754
83 U 799978.90649 982641.23632
84 U 799968.96209 982699.40665
46 O 800185.26356 982519.11755
79 U 799731.42194 982888.53935
```

[Input file 2 - txt](#)

[Input file 2 - xml](#)



Numeric result is text file with values of displacements and values of deformations in grid. Graphical output is interactive. It is possible to change **scales, display of point id** and include **topographic layer like TopoHelp ČR or Landsat etc.** Resulting picture can be saved as **bmp, gif or jpg, GML, SVG a ESRI Shapefile (SHP)**. The field of horizontal displacements on grids and the field on main axes of horizontal deformations on grids within the area is showed. Arrows in deformation field picture indicate the orientation to compression (blue) - to the center of cross, or extension (green) - outside the center of cross.



Zobrazit:

- VÚGTK
 - ☐ Deformace
 - ☒ Číslo bodů
 - ☒ Body měření
 - ☒ Posuny
 - ☒ Posuny interpolované
- IDC-UHUL OPRL
 - ☒ Rastr SMO
 - ☒ Výškopis
- TopoHelp ČR
 - ☐ Státní hranice
 - ☐ Sídla
 - ☐ Voda
 - ☐ Železnice
 - ☐ Silnice
 - ☐ Křižovatky
 - ☐ Hraniční přechody

Přepočít:

Fakt. zvětšení posunů (*1000)
Fakt. zvětšení deformací (*1000)
Fakt. zvětšení hlaviček (*1000)
Proměnná vel. hlavičky: ☒
Zahrnout nespolehlivé: ☐

Přepočítat

Vložit nadpis

Výstupy:

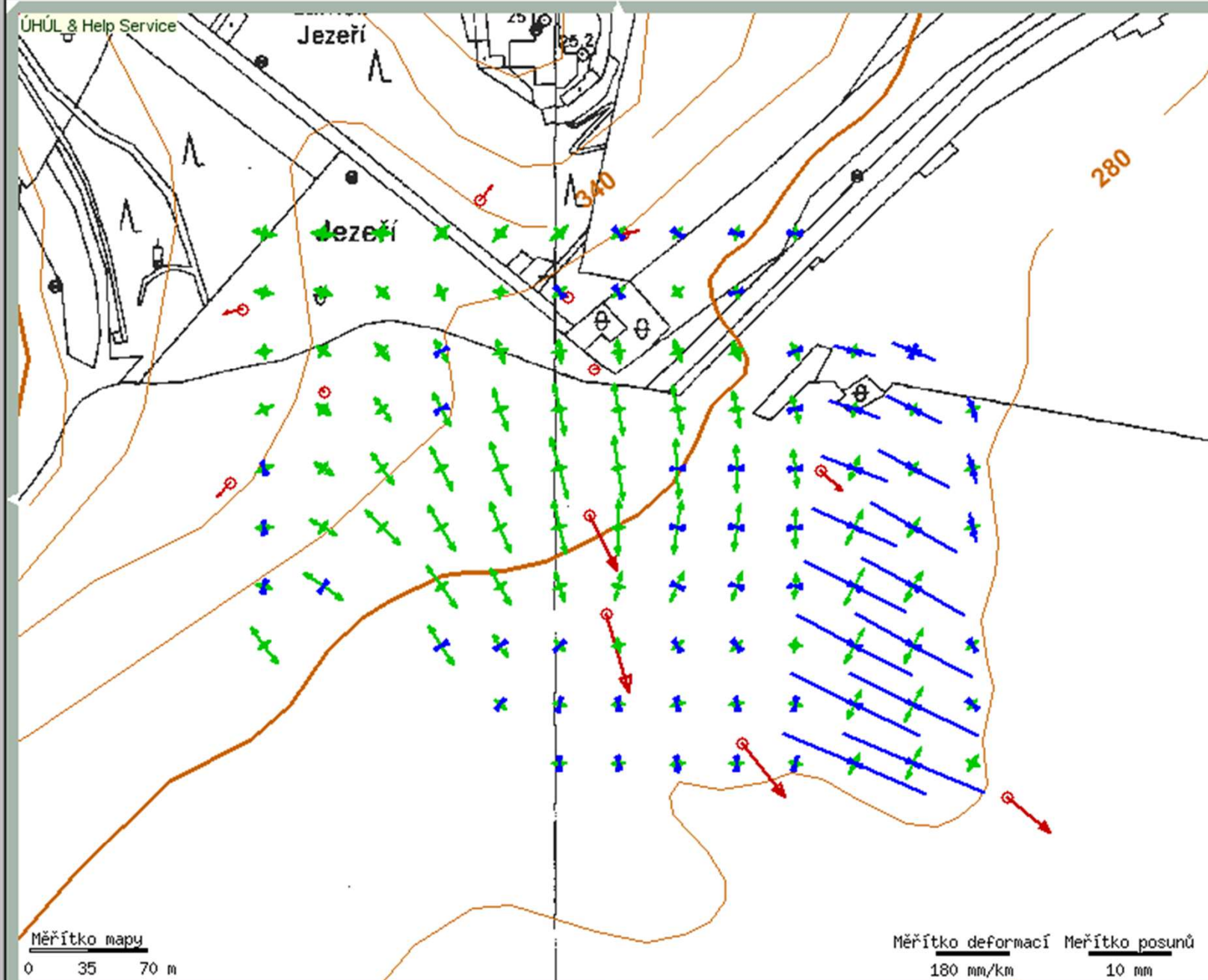
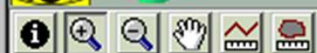
SVG

SHP

GML

Legenda

1: 2 881



Zobrazit:

- VÚGTK
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Fakt. zvětšení deformací (*1000)

Fakt. zvětšení hlaviček (*1000)

Proměnná vel. hlavičky: ☒

Zahrnout nespolehlivé: ☐

Přepočítat

Vložit nadpis

Výstupy:

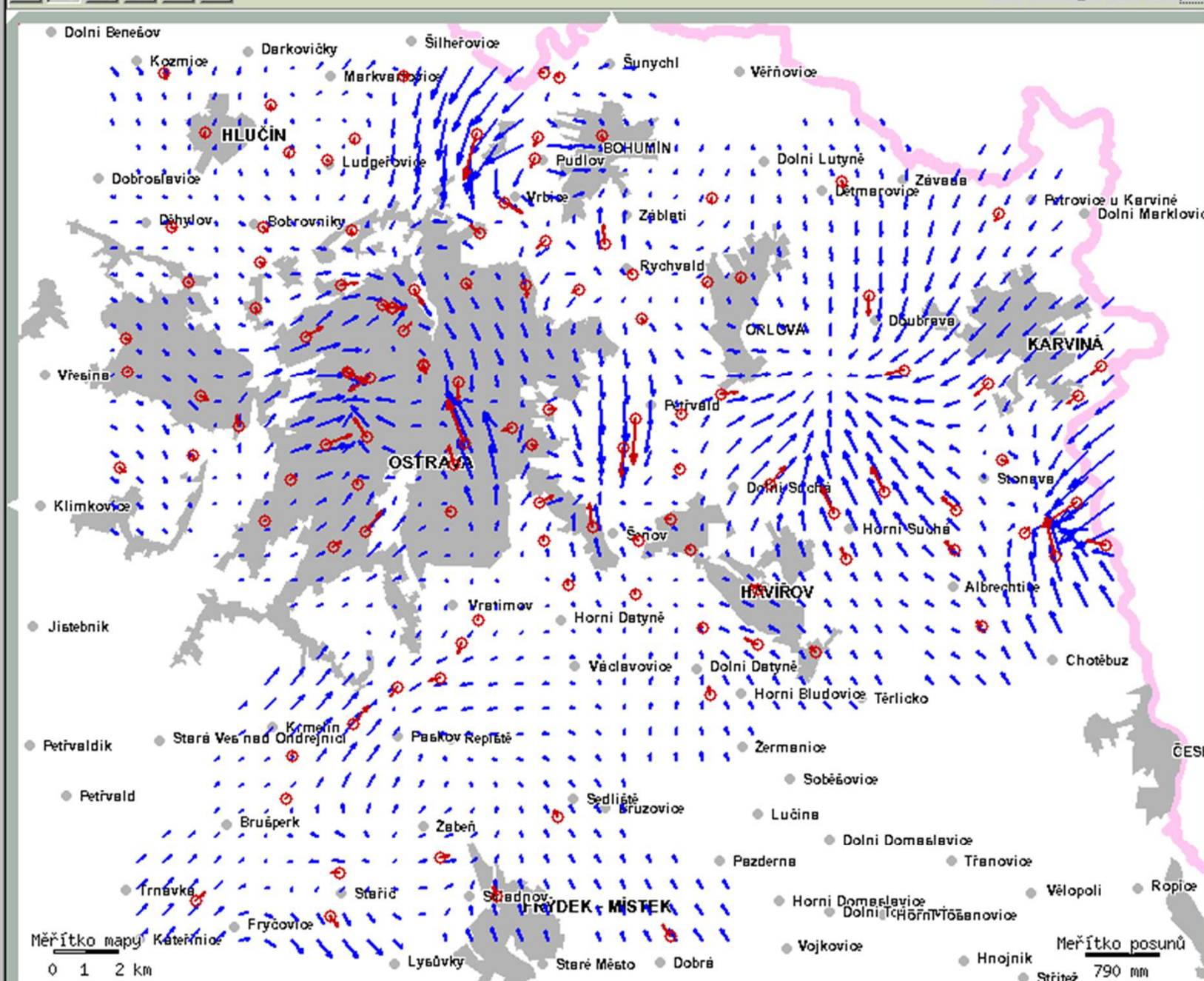
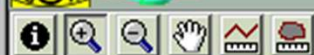
SVG

SHP

GML

Legenda

1: 2 881



Zobrazit:

- ☒ VÚGTK
 - ☐ Deformace
 - ☐ Čísla bodů
 - ☒ Body měření
 - ☒ Posuny
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Přepočít:

Fakt. zvětšení posunů (*1000)

Fakt. zvětšení deformací (*1000)

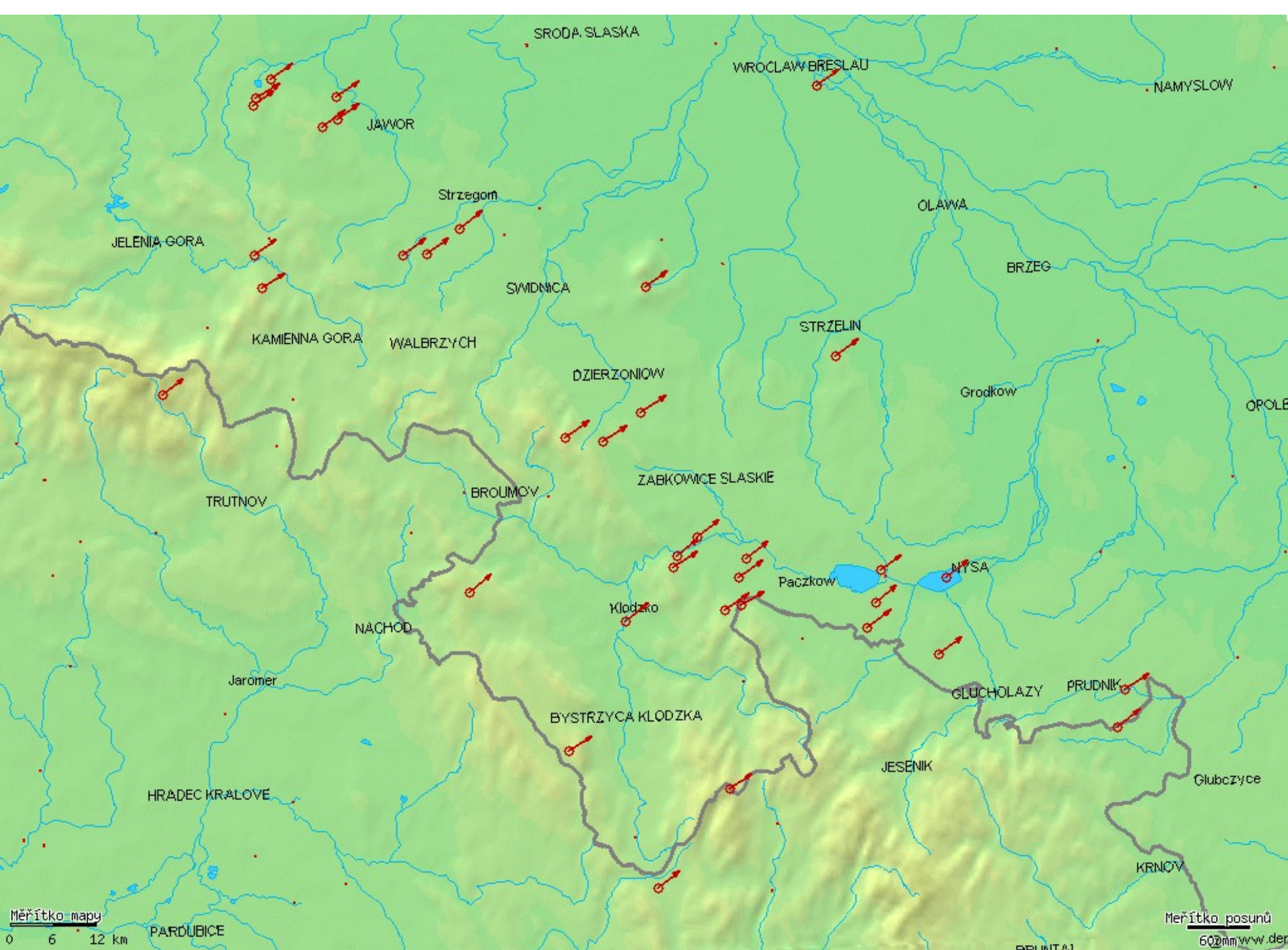
Fakt. zvětšení hlaviček (*1000)

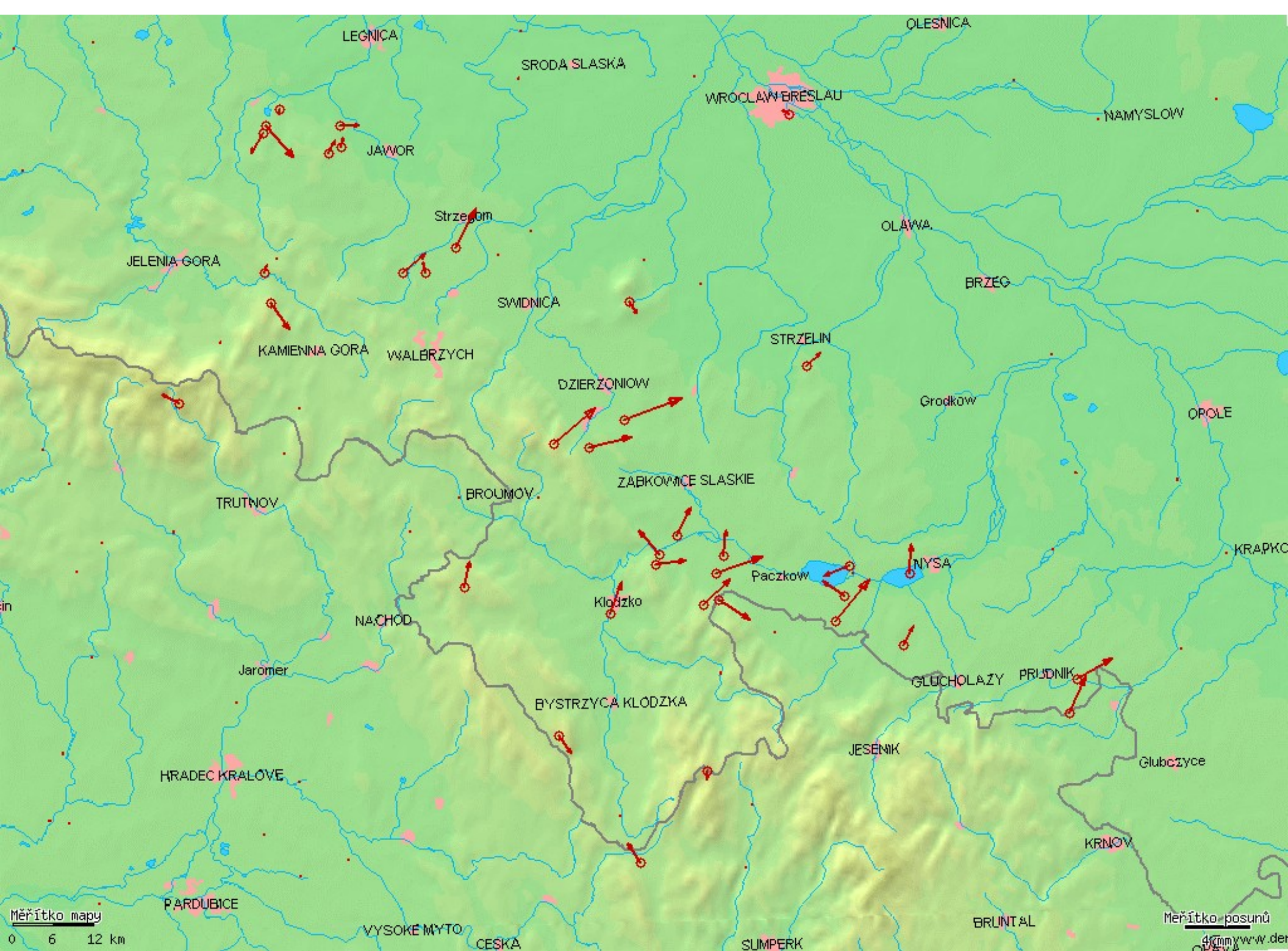
Proměnná vel. hlavičky: ☒

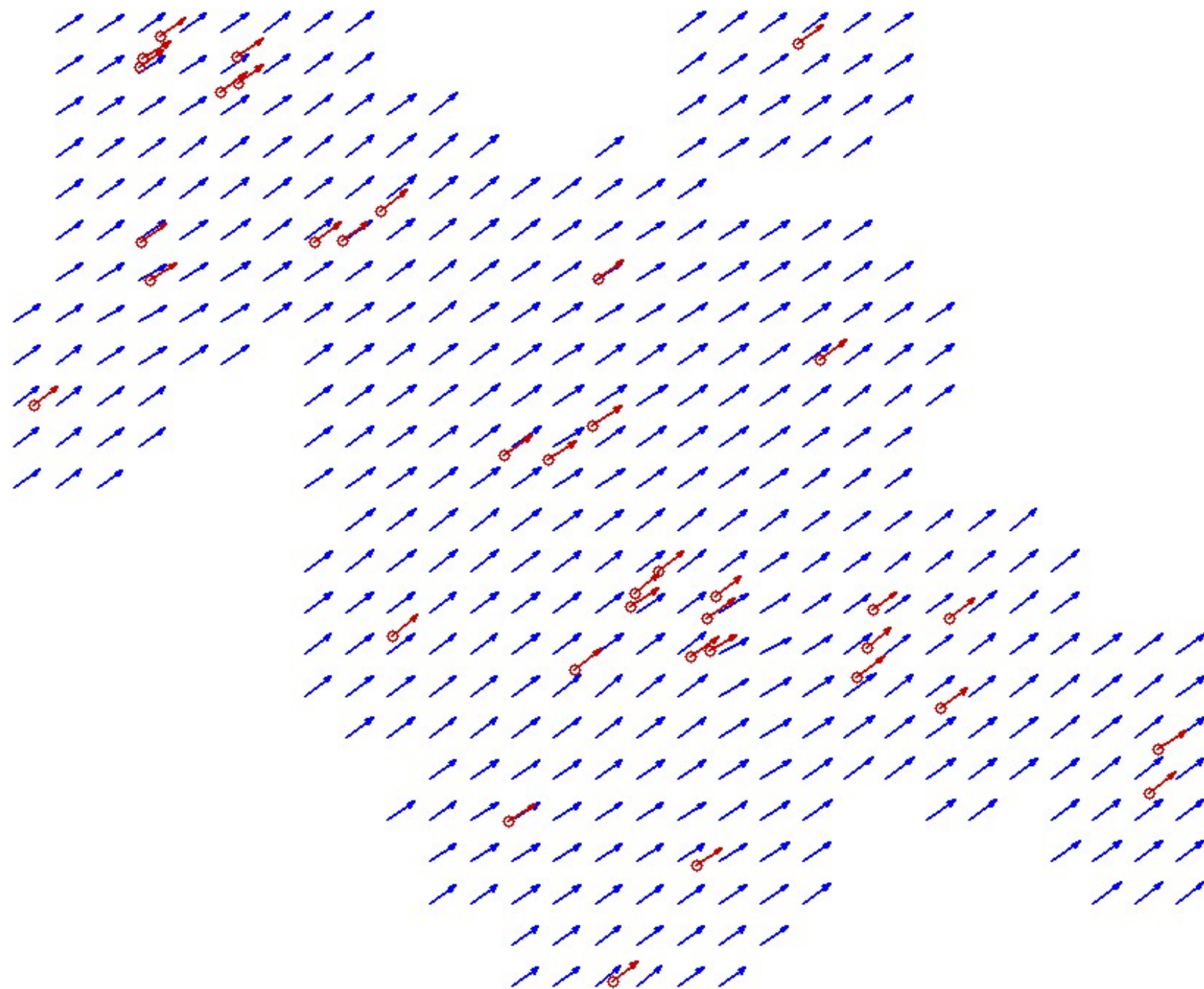
Zahrnout nespolehlivé: ☐

Výstupy:

[Legenda](#)

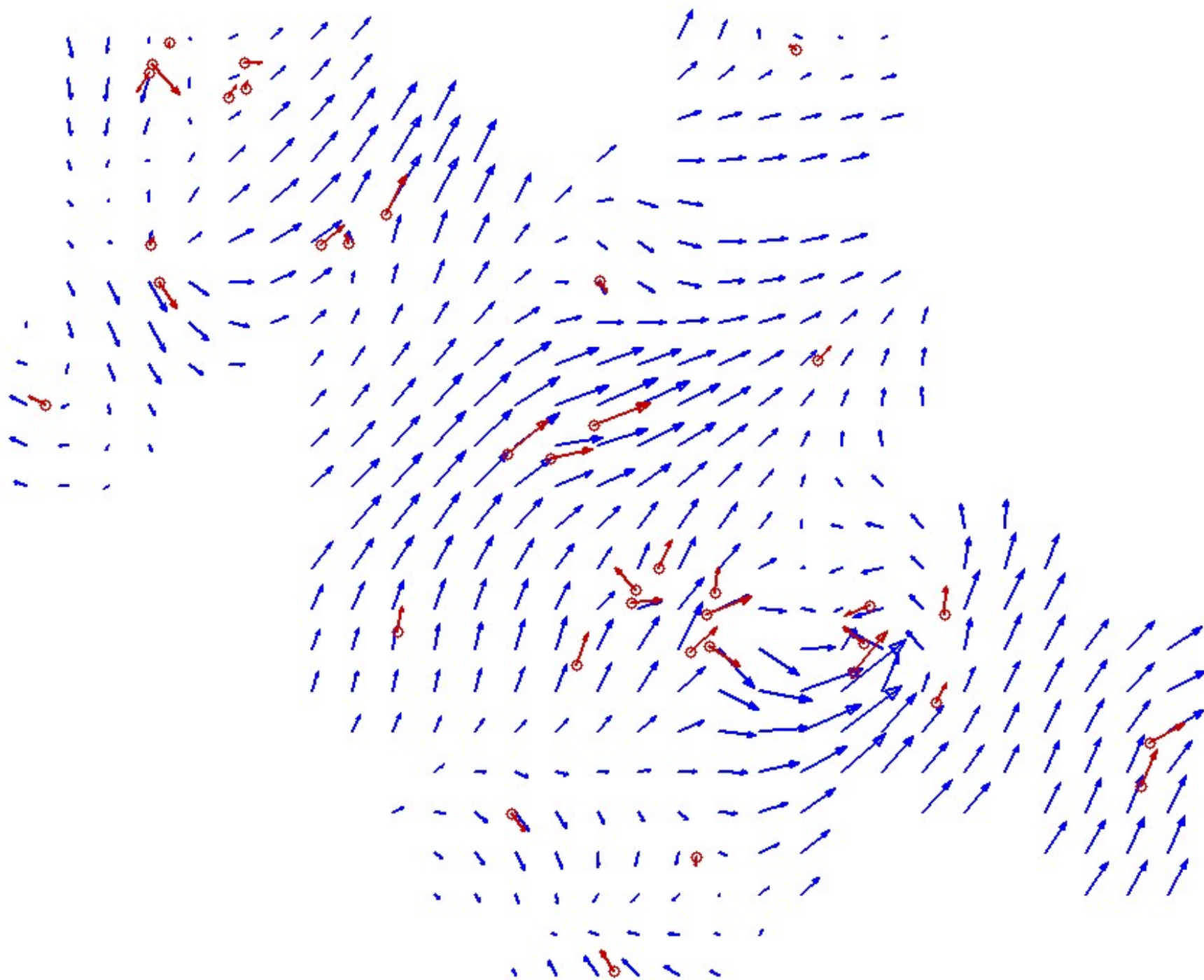






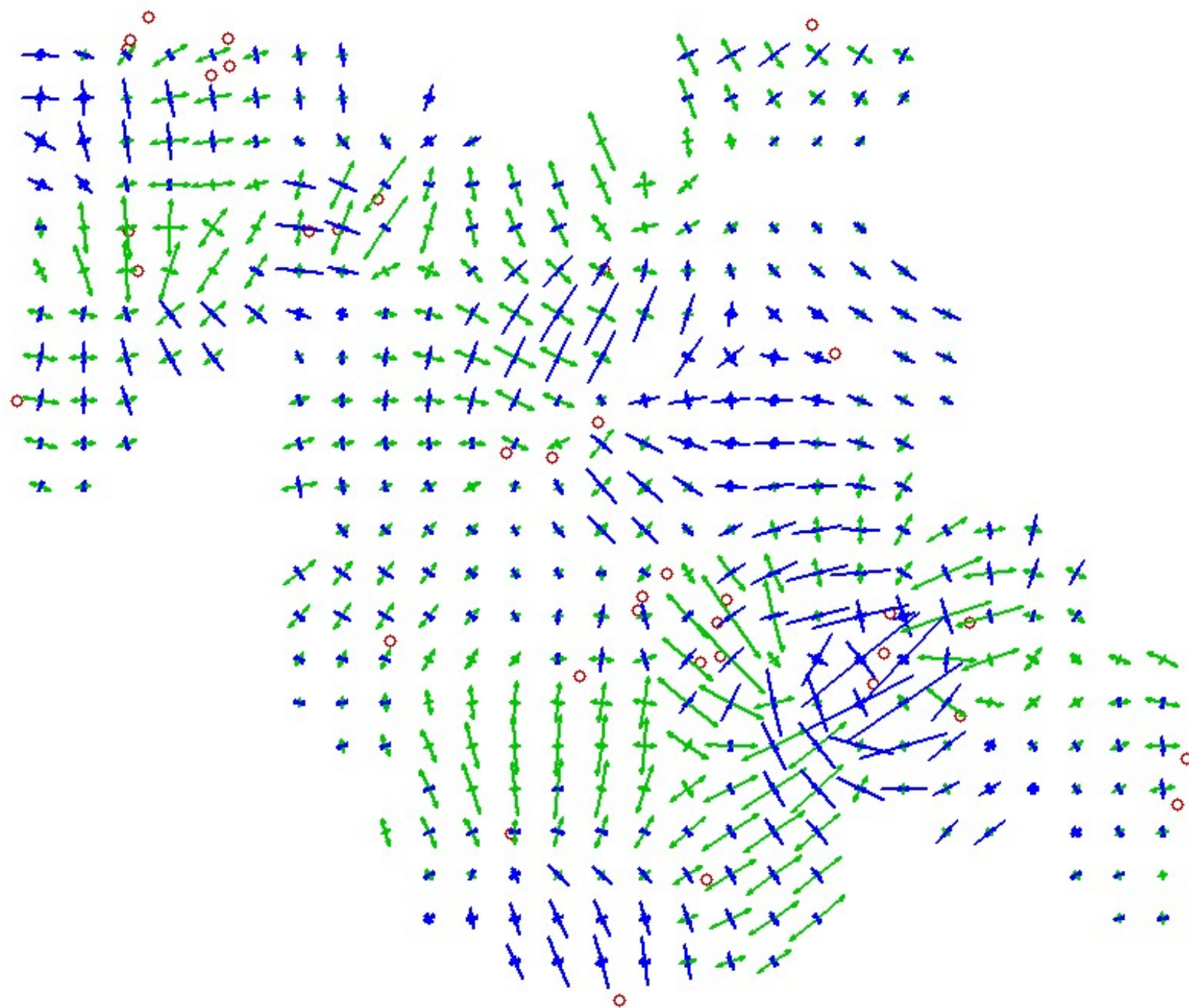
Měřítko mapy
0 6 12 km

Měřítko posunů
60 mm



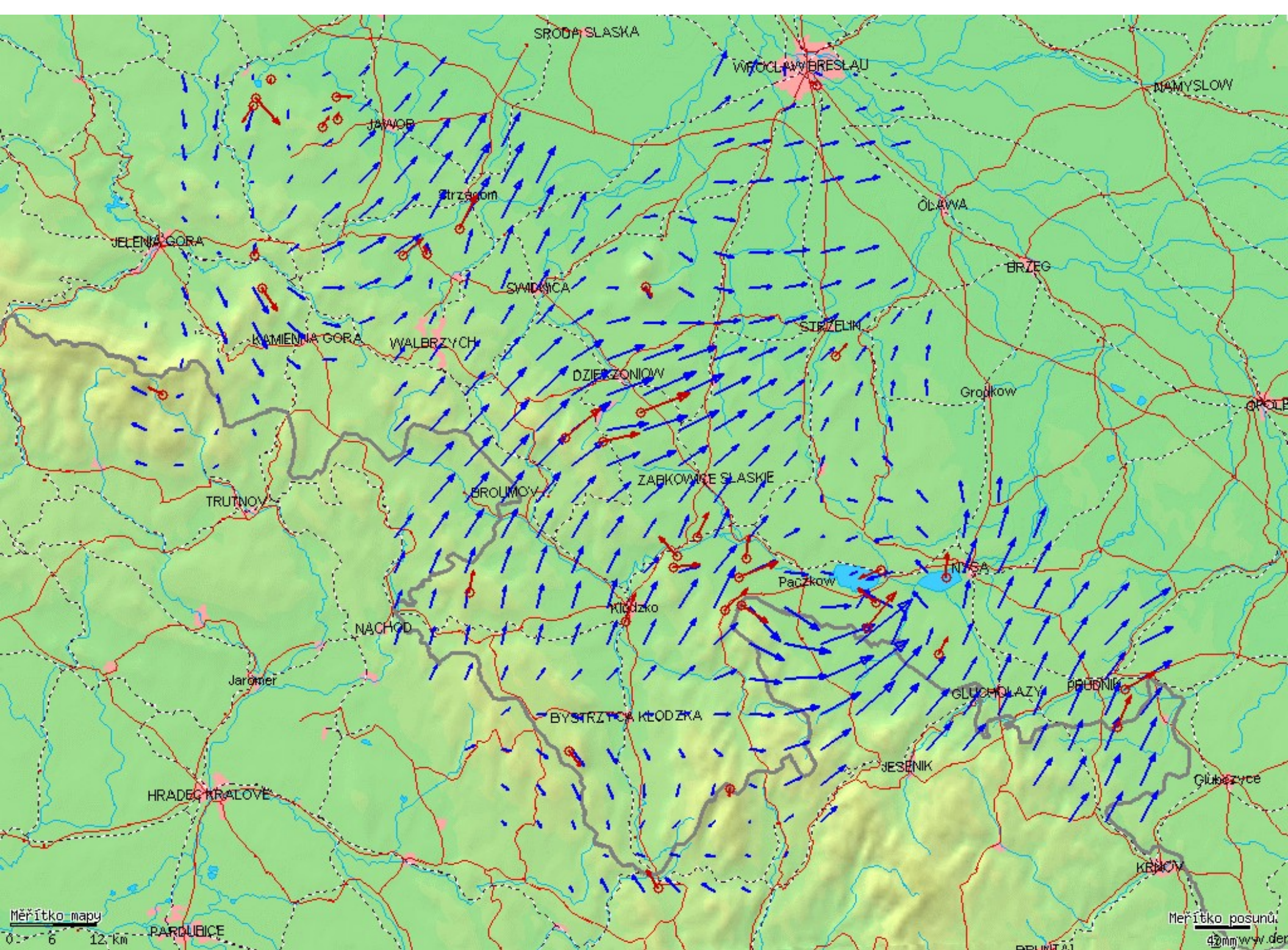
Měřítko mapy
0 6 12 km

Měřítko posunů
4 mm



Měřítko mapy
0 6 12 km

Měřítko deformací
0.442 mm/km

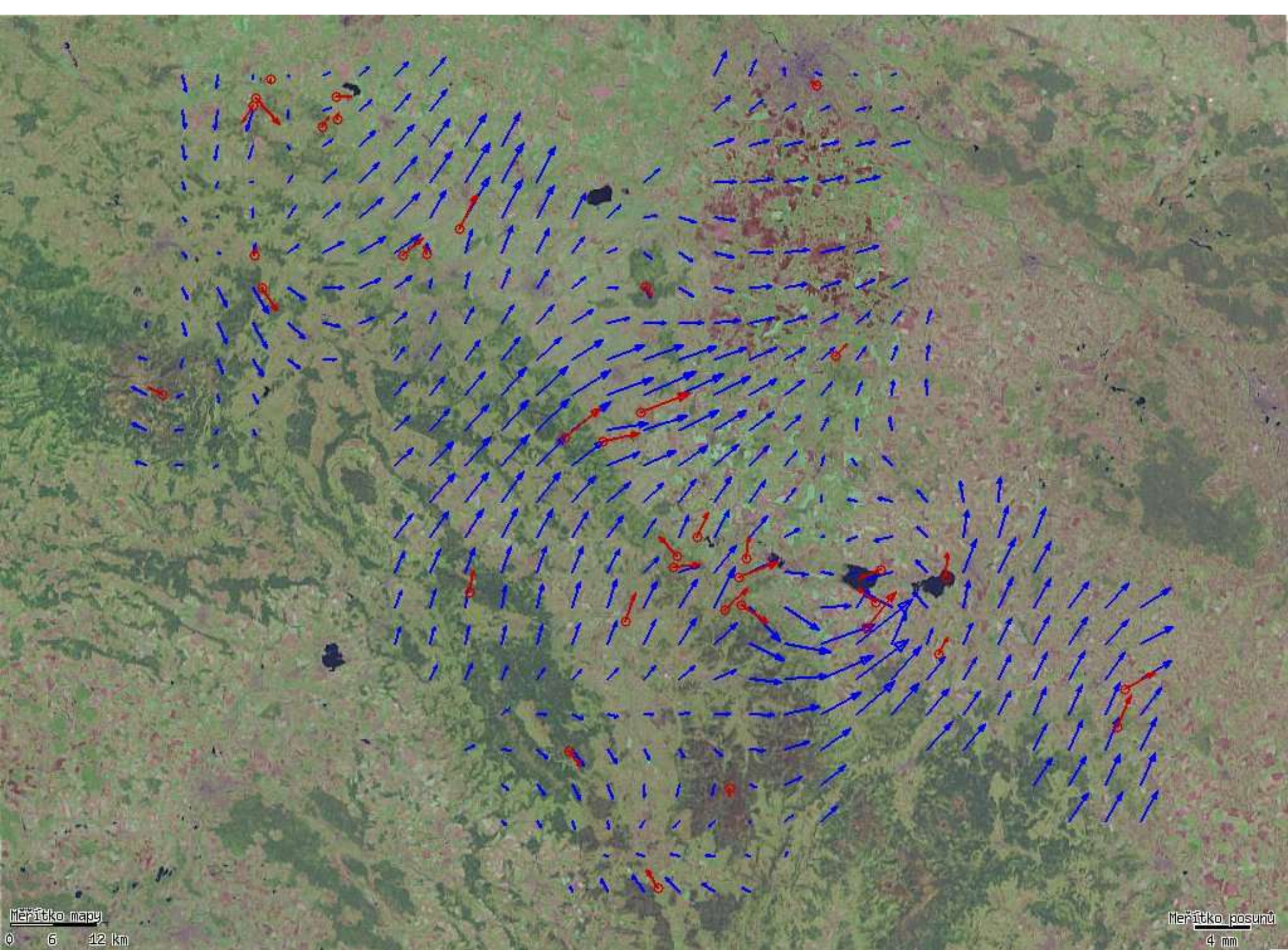


Měřítko mapy

0 6 12 km

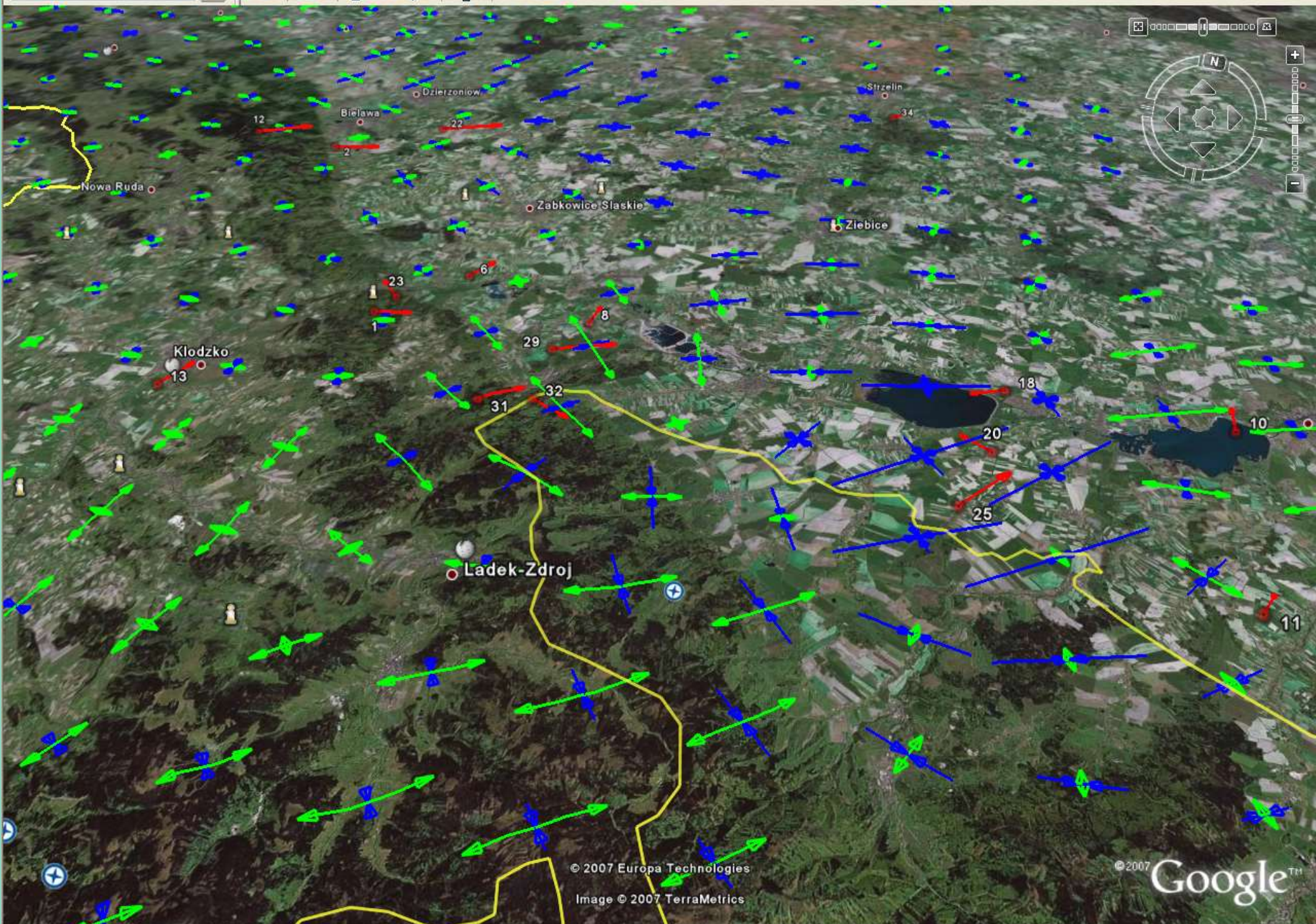
Měřítko posunu

42mm v v. der



Merítko mapy
0 6 12 km

Merítko posunů
4 mm



Conclusions to the 1st example:

- presented application demonstrates **XML technology** and standards to form web computing applications with simultaneous use of XML web map services
- this concrete application enables that any surveyor may perform even more complicated work such as deformation analysis without own special software

2nd example:

Web Application for Survey Sketch Processing

- **interactive web technology with web application and „Javascript“ exploitation on the client side**
- **asynchronous XML based client-server communication**
- **no need to reload and refresh whole web page after each operation (as in static HTML)**
- **full-value GIS application with its own internal logic for survey sketch processing**

Zpracování geometrického plánu

[Home](#)
[Zpracování GP ▶](#)
[Konverze ▶](#)
[Dokumentace ▶](#)
[O aplikaci ▶](#)

Kreslení geometrického plánu na Internetu

Aplikace VUGTK pro zpracování geometrického plánu v novém výměnném formátu.

- Zpracování již hotových geometrických plánů a jejich převod do NVF
- Celá aplikace je k dispozici **zdarma**
- Řešení založené na osvědčené technologii DIKATu
- Aplikace VUGTK reflektující změny ve struktuře NVF



Řešení bylo dosaženo za finanční podpory ze státních prostředků poskytnutých prostřednictvím Akademie věd ČR projektu programu "Informační společnost" s registračním číslem 1ET206030506 a názvem "Systém přenosu dokumentačních dat pro aktualizaci informačního systému státní správy zeměměřictví a katastru".

Přihlášení

Uživatelské jméno:

Heslo:

[Přihlásit](#)

[Registrace](#)

Aktuality

31.1.2007

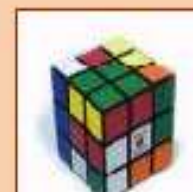
Zprovozněna nová verze pro zpracování geometrického plánu. Stávající řešení umí zpracovat speciální grafický formát, který se vytváří aplikací ["Kreslení GP"](#). Další možností je zadání změnové

Konverze mezi formáty, se kterými pracují geodeti

Řešení navrženo uživateli tak, aby poskytlo převody mezi výměnnými formáty resortu ČÚZK a dalšími relevantními formáty.

Aplikace zajišťuje konverzi v ýměnných formátů katastru a dalších například grafických CAD formátů (DGN). Podporovány tyto formáty:

- VKM

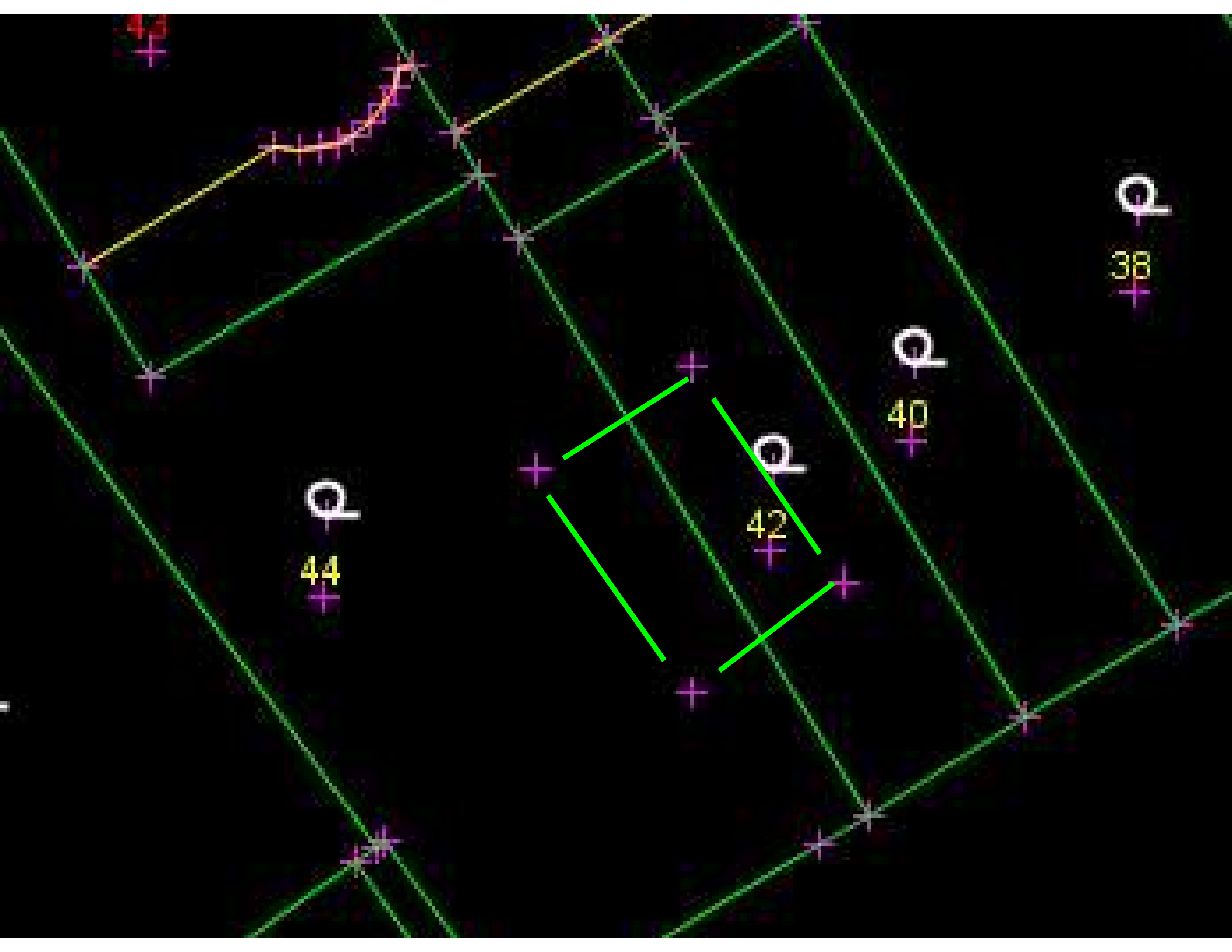


Operation Sequence for the Application

- a) **Project creation** and background import in VFK exchange format from ISKN to the database including TXT file of list of coordinates for measured points for creation of the survey sketch
<http://www.geometrplan.cz>
- b) **Visualisation** of VFK graphic data and list of coordinates of points in the editor that is part of the web application
- c) **Drawing of new (changed) state** in the cadastral map and saving of the change data with web editor into distant database on server. Contains an error protocol for case of error.

Survey Sketch Drawing - Illustration





Conclusions:

- the development leads up to exploitation of distributed services and databases that use such XML interfaces for access
- the future doubtless belongs to web applications (two were mentioned) that use mentioned standards-based services (**WPS**, WMS, WFS,...)



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Thank you for your attention

Milan Talich

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