WE MAPS
INTERNATIONAL MAP YEAR 2015–2016

ROLE ICA
VE VÝZVÁCH SOUČASNÉ KARTOGRAFIE

Vít Voženílek

ICA ACI
International Cartographic Association
Association Cartographique Internationale

KATEDRA GEOINFORMATIKY
Univerzita Palackého v Olomouci

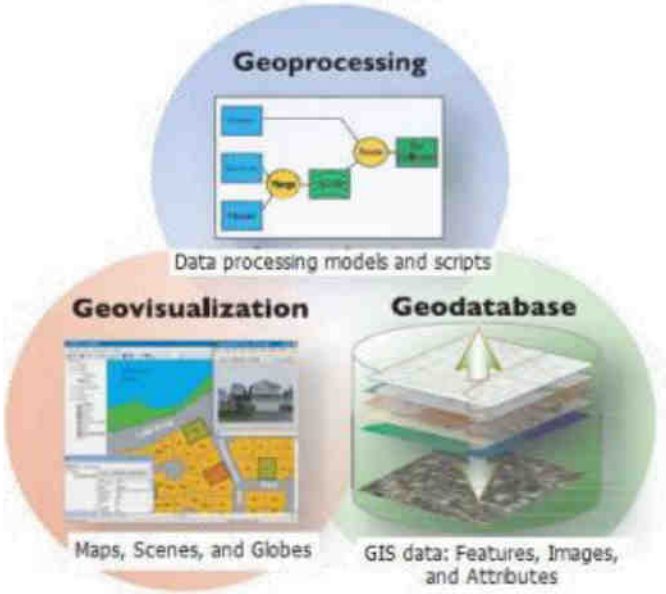
Is Cartography still around?”

- there is quite some confusion about the status, relevance and importance of Cartography
- while the term “map” is most popular and sees its arrival in big business debates amongst major software companies, in mass market applications related to new technologies such as mobile devices or in the mass media
- who are involved in making maps nowadays call themselves not a cartographer but rather something else
- to make growing amount of geodata and geoinformation accessible to human users means to package it in a way that it can be perceived, “digested” and used, thus simply communicated – this was and is exactly the aim and contribution of **cartography**

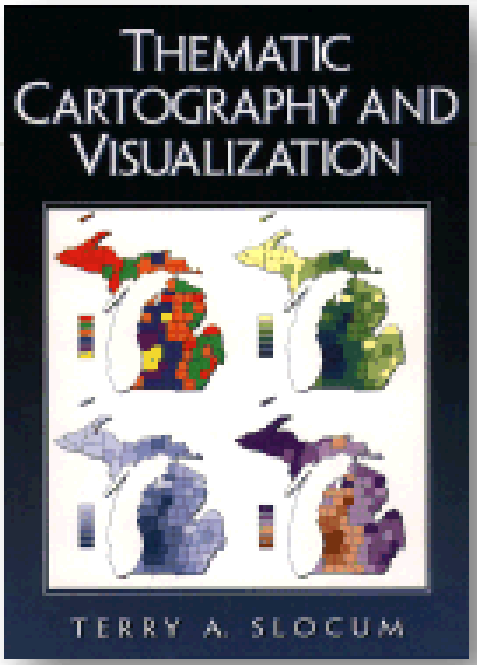
Geovisualization (short for Geographic Visualization)

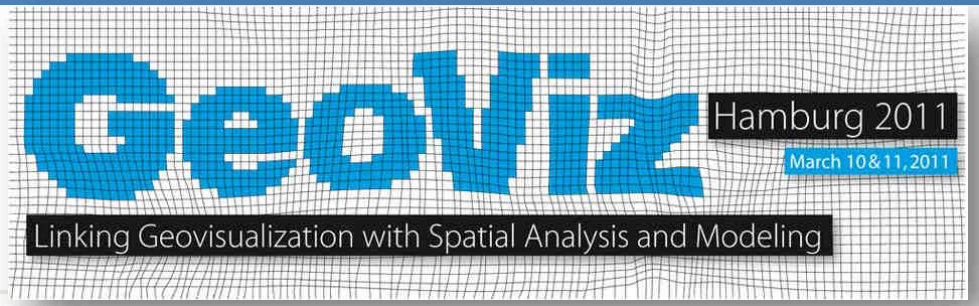
… is visualization of spatial data

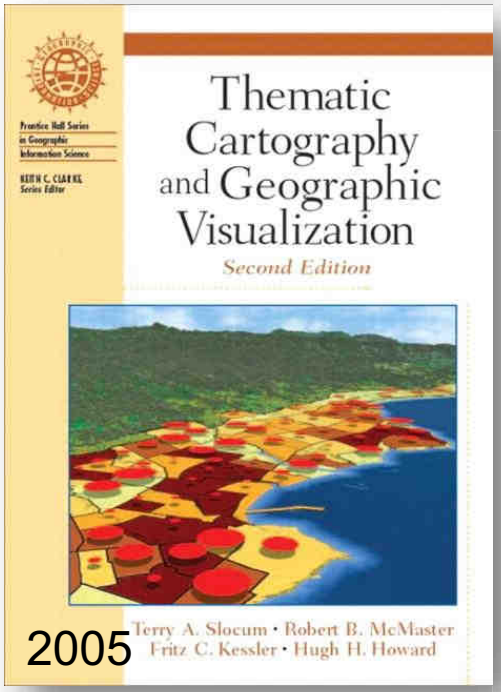
… refers to a set of tools and techniques supporting geospatial data analysis through the use of interactive visualization



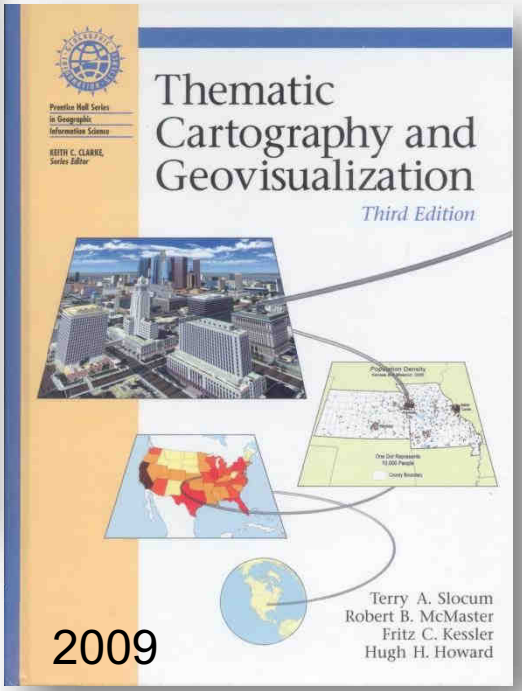
1999







2005

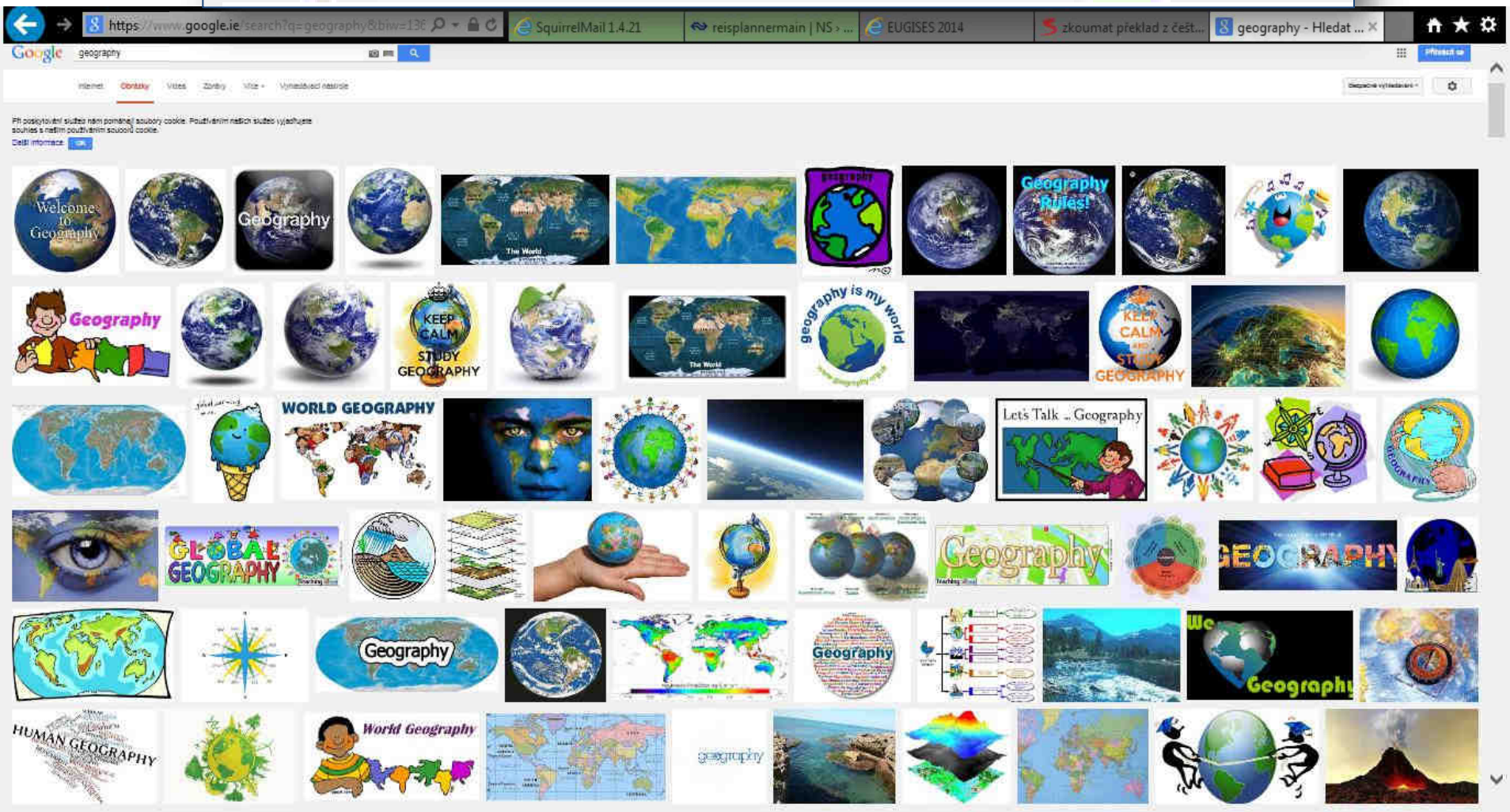


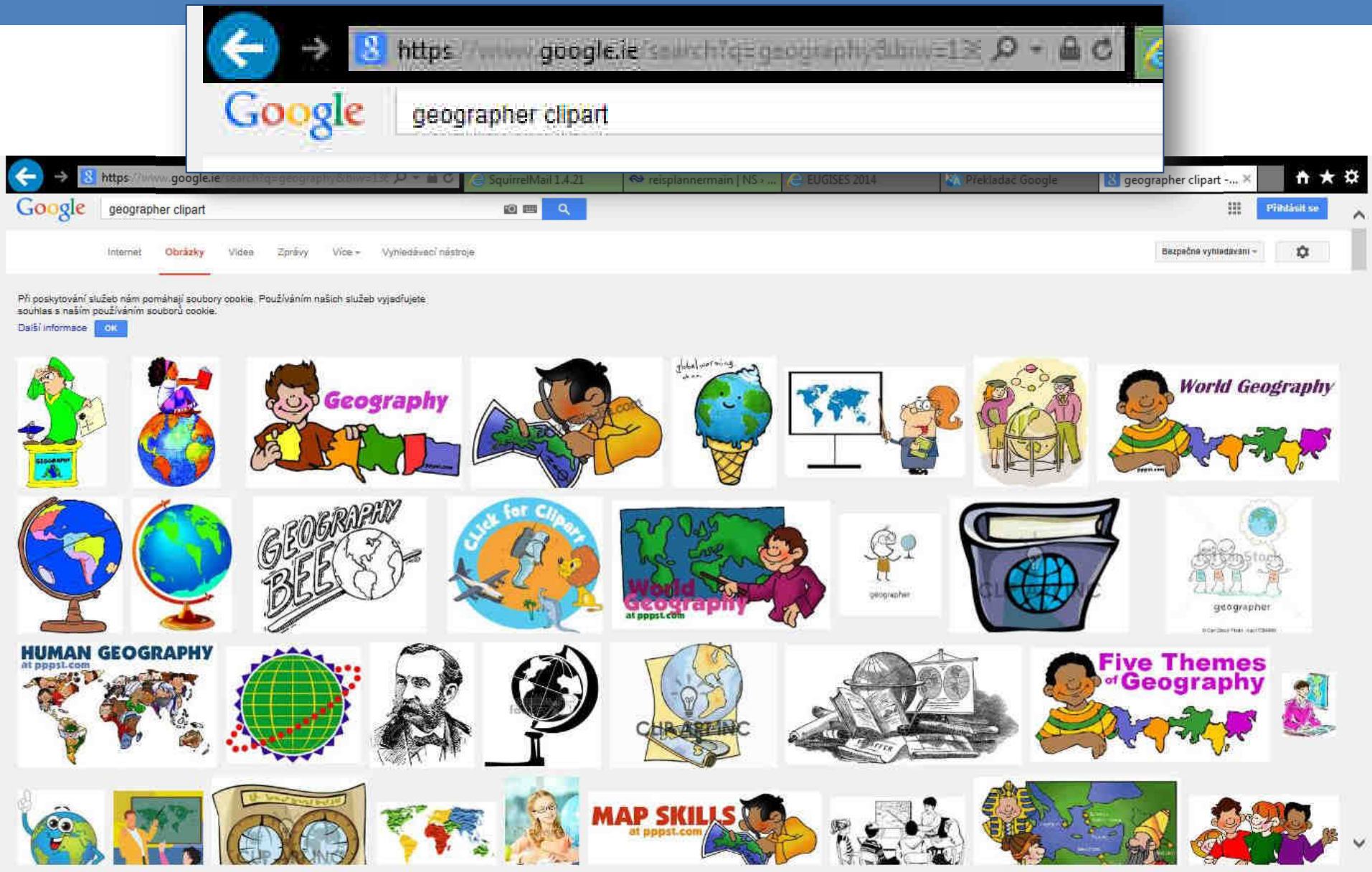
2009

Jack Dangermond:
Geography is more important than ever

Where it is cartography in geography?


https
google.ie
Google
geography

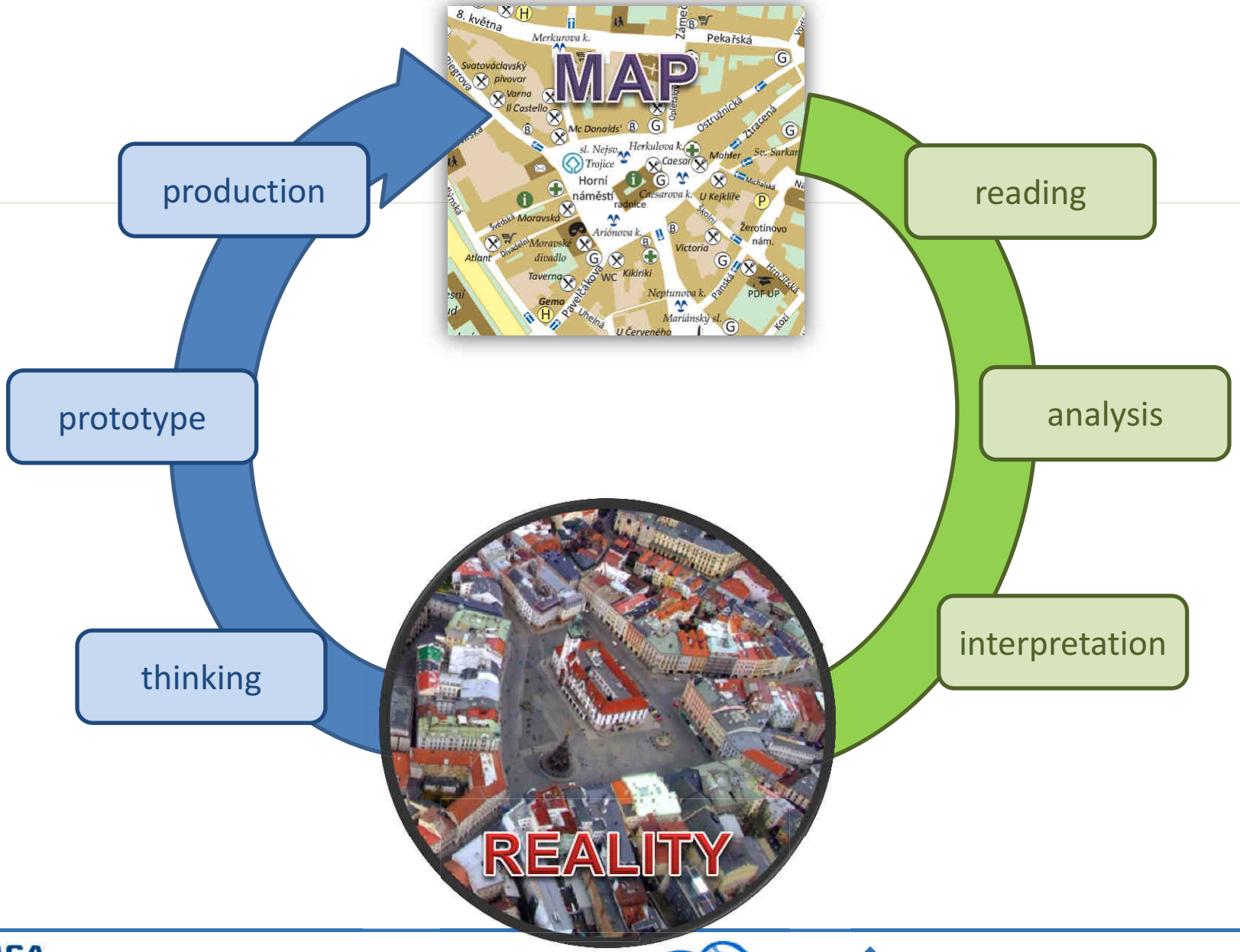

https://www.google.ie/search?q=geography&biw=136
SquirrelMail 1.4.21
reisplannermain | NS › ...
EUGISES 2014
zkoumat překlad z češt...
geography - Hledat ...
Google
geography
Welcome to Geography
Geography
Geography Rules!
KEEP CALM STUDY GEOGRAPHY
geography is my world
KEEP CALM AND STUDY GEOGRAPHY
WORLD GEOGRAPHY
Let's Talk .. Geography
GLOBAL GEOGRAPHY
Geography
GEOGRAPHY
Geography
Geography
HUMAN GEOGRAPHY
World Geography
geography


https google.ie
Google
geographer clipart
https google.ie
SquirrelMail 1.4.21
reisplannermain | NS › ...
EUGISES 2014
Překladač Google
geographer clipart -...
Google
geographer clipart
Přihlásit se
Internet
Obrázky
Videa
Zprávy
Více
Vyhledávací nástroje
Bezpečné vyhledávání
Při poskytování služeb nám pomáhají soubory cookie. Používáním našich služeb vyjadřujete souhlas s naším používáním souborů cookie.
Další informace
OK
Geography
World Geography
GEOGRAPHY BEE
Click for Clipart
World Geography
at pppst.com
geographer
HUMAN GEOGRAPHY
at pppst.com
Five Themes of Geography
MAP SKILLS
at pppst.com

Where is cartography in geography?

- ….everywhere
  - in **map making** – as fundament methods and media for coding geographic facts

  - in **map use** – as voluminous source of spatial information


MAP
production
reading
prototype
analysis
thinking
interpretation
REALITY

Georg Gartner

It's OK to be a Cartographer!

- *Cartography is relevant*
- *Cartography is attractive*
- *Cartography is most contemporary*

ICA survey on definitions:

Q1. How should we call our domain?

Q2. What characterises our domain?

Q3. How would you define our domain?

Q4. What keywords should be used in a definition of a map?

Q5. Your own definition: *A map is…*

Q1. How should we call our domain?

- One keyword was requested
  - the term ***cartography*** dominates (148 responses)

Q2. What characterises our domain?

- Three keywords were allowed
  - The word ***map(s)*** dominates as the first keyword.
  - Adding a second and a third keyword creates some nuance, but one could almost make out the short definition of cartography given above!

Word cloud based on

the first keyword

first two keywords

all three keywords

Q3. How would you define our domain?

- Responses correspond well with the third *(right)* word cloud from the Q2.

Q4. What keywords should be used in a definition of a map?

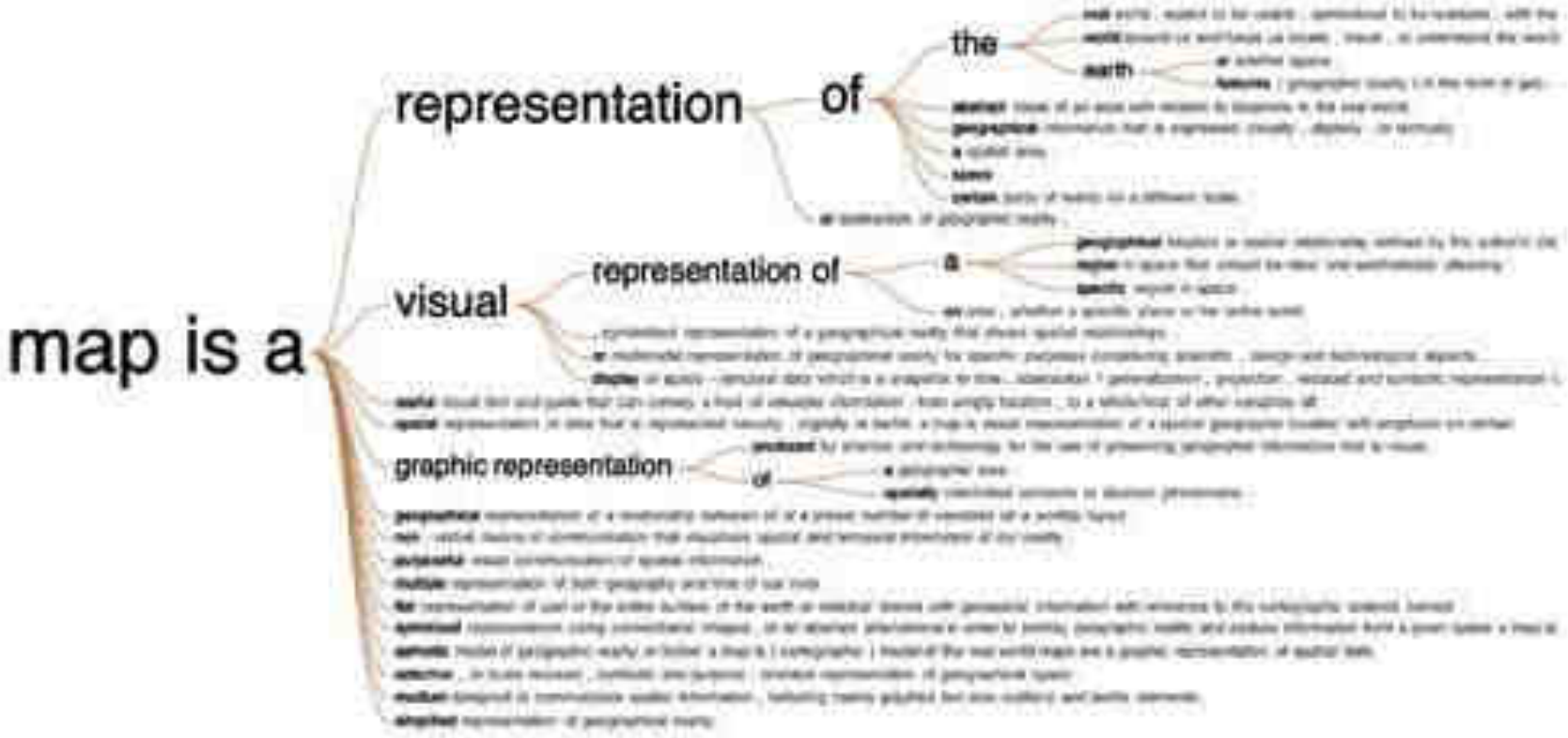
- Five keywords were allowed
  - two word clouds were created

Word cloud based on the first keyword

Word cloud based on all five keywords

Q5. Your own definition: *A map is…*

- 120 definitions provided



„Fields“ of Cartography

1. Science (including technology) – the development of the scientific and technological basis of Cartography, GI science and geoinformatics

2. Education – the development and promotion, through education at all levels

3. Professional Practice – the provision of support for professionals:

a) those who describe themselves as professionally active – as their main occupation - in a specific area of Cartography and GI science

b) those who use systems or procedures from Cartography and GI science as part of their professional activity, e.g. environmental managers, utility managers, planners

4. Society (social and organisational) – the promoting applications of Cartography and GIScience in any area that can be beneficial to Society in general

5. Arts – the aspects of design and aesthetics in cartographic artefacts

Advancing the disciplines of

cartography and GIScience

in an international context

ICA

WE MAPS

INTERNATIONAL MAP YEAR 2015–2016

ICSU

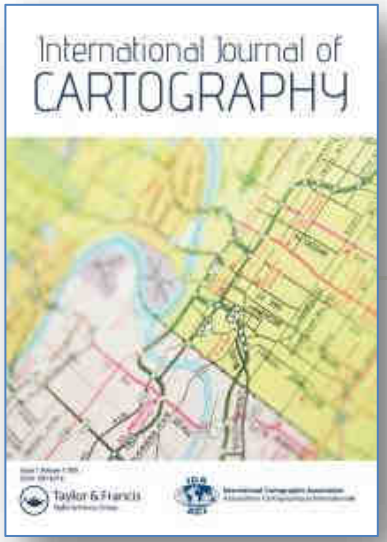
International Council for Science

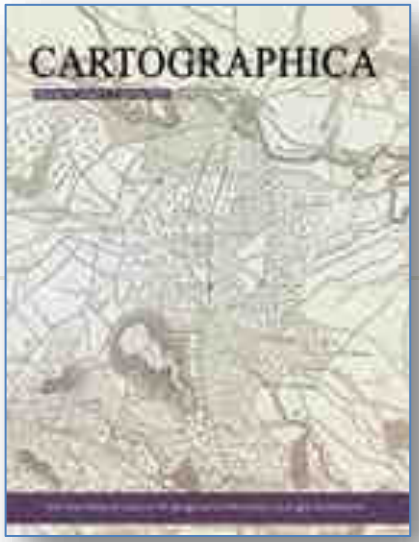
ICC2017 WASHINGTON

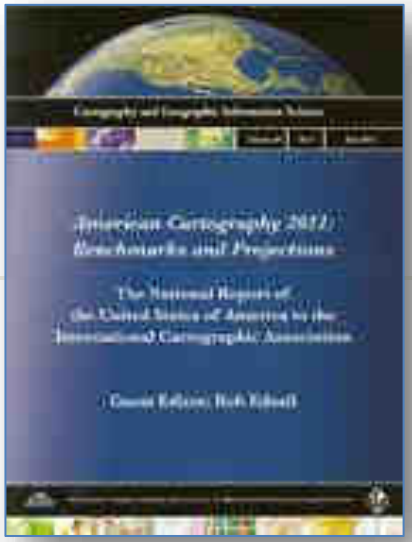
Proceedings

Proceedings of International Cartographic Conferences organizing committees for ICA and are available online

- **27th ICC**, Rio de Janeiro 2015 (external link)
- **26th ICC**, Dresden 2013 (external link)
- **25th ICC**, Paris 2011 (external link)
- **24th ICC**, Santiago 2009 (external link)
- **23rd ICC**, Moscow 2007 (external link)
- **22nd ICC**, A Coruña 2005 (external link)
- **21st ICC**, Durban 2003 (external link)
  (only works when opened within the browser)
- **20th ICC**, Beijing 2001 (external link)
- **19th ICC**, Ottawa 1999 (external link)
  (only works when opened within the browser)
- **18th ICC**, Stockholm 1997 (external link)
- **17th ICC**, Barcelona 1995 (external link)
- **16th ICC**, Cologne 1993 (external link)







The Springer ICA series is a subseries of the Lecture Notes in Geoinformation and Cartography.

Springer

- **Burghardt, D., Duchene, C. & Mackaness, W.** (2014), Abstracting Geographic Information in a Data Rich World (external link)
- **Moore, A. & Drecki, I.** (2013), Geospatial Visualization (external link)
- **Zentai, L. & Reyes Nunez, J.** (2012), Maps for the Future (external link)
- **Liebenberg, E. & Demhardt, I.** (2012), History of Cartography (external link)
- **Ruas, A.** (2011), Advances in Cartography and GIScience. Volume 1

BUTTERWORTH HEINEMANN

- **Anson, R. and F. J. Ormeling** (1994), Basic Cartography, volume 1, ed. 2 (copies available at Amazon.com (external link))
- **Anson, R. and F. J. Ormeling** (2002), Basic Cartography, volume 2, ed. 2
- **Anson, R. and F. J. Ormeling** (1996), Basic Cartography, volume 3

ELSEVIER

- **Peterson, M. P.** (2003), Maps and the Internet, volume 1 (external link)
- **Moellering, H.** (2005), World Spatial Metadata Standards (external link)
- **Dykes, J., A. M. MacEachren and M. J. Kraak** (2005), Exploring Geovisualization (external link)
- **Mackaness, W. A. A. Ruas and L. T. Sarjakoski** (2007), Generalisation of Geographic Information (external link)

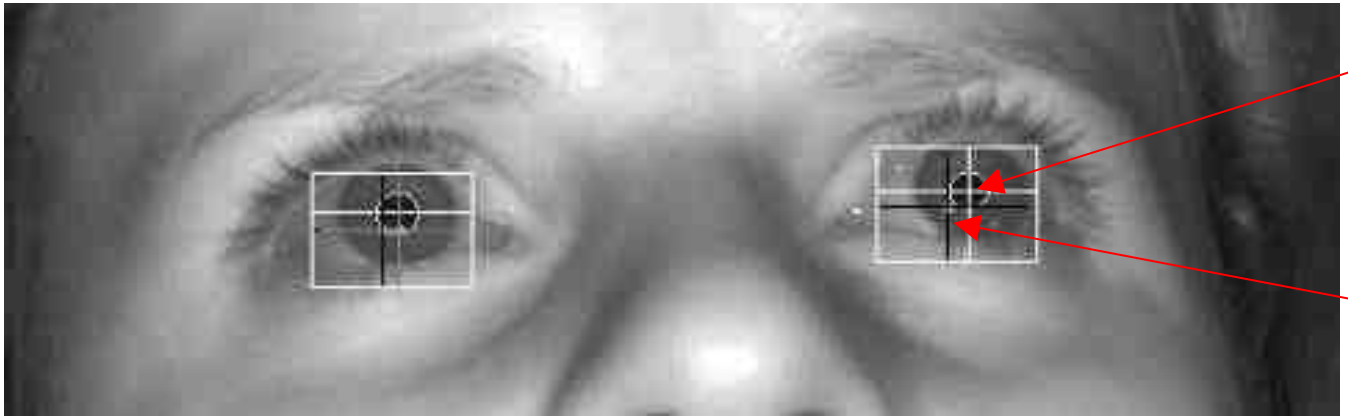
ICA commissions

- Art and Cartography
- Atlases
- Cartographic Heritage into the Digital
- Cartography and Children
- Cartography in Early Warning and Crisis Management
- Cognitive Visualization
- Education and Training
- Generalisation and Multiple Representations
- Geospatial Analysis and Modeling
- GI for Sustainability
- History of Cartography
- Location Based Services
- Map Design
- Map Production
- Map Projections
- Maps and Graphics for Blind
- Maps and the Internet
- Mountain Cartography
- Open Source GeoSpatial Technologies
- Planetary Cartography
- SDI and Standards
- Sensor-driven Mapping
- Topographic Mapping
- Toponymy
- Ubiquitous Mapping
- Use, User and Usability Issues
- Visual Analytics

EYE TRACKING

Eye-tracking je…

- technologie umožňující sledování pohybu očí
- jedna z (relativně) objektivních metod „Usability studies“ – studie použitelnosti



*bezkontaktní metoda **Pupil and Corneal reflexion** = zaznamenává se vzájemná pozice středu zornice a odrazu infračerveného světla od vnějšího povrchu rohovky (korneální odraz) - automatické zpracování snímaného obrazu očí v infračerveném spektru*

Využití eye-trackingu

- Studie použitelnosti
- Human – Computer – Interaction (HCI)
- Marketing
- Design – obaly různých produktů
- Psychologické studie
- Medicína
- Biometrika
- Lingvistika – dyslexie, dysgrafie
- Zoologie – testování makaků jestli si pamatují tváře

… a spousta dalších oblastí (včetně GIS a kartografie)

Visual Attention Level

iPhone

iPad

Web

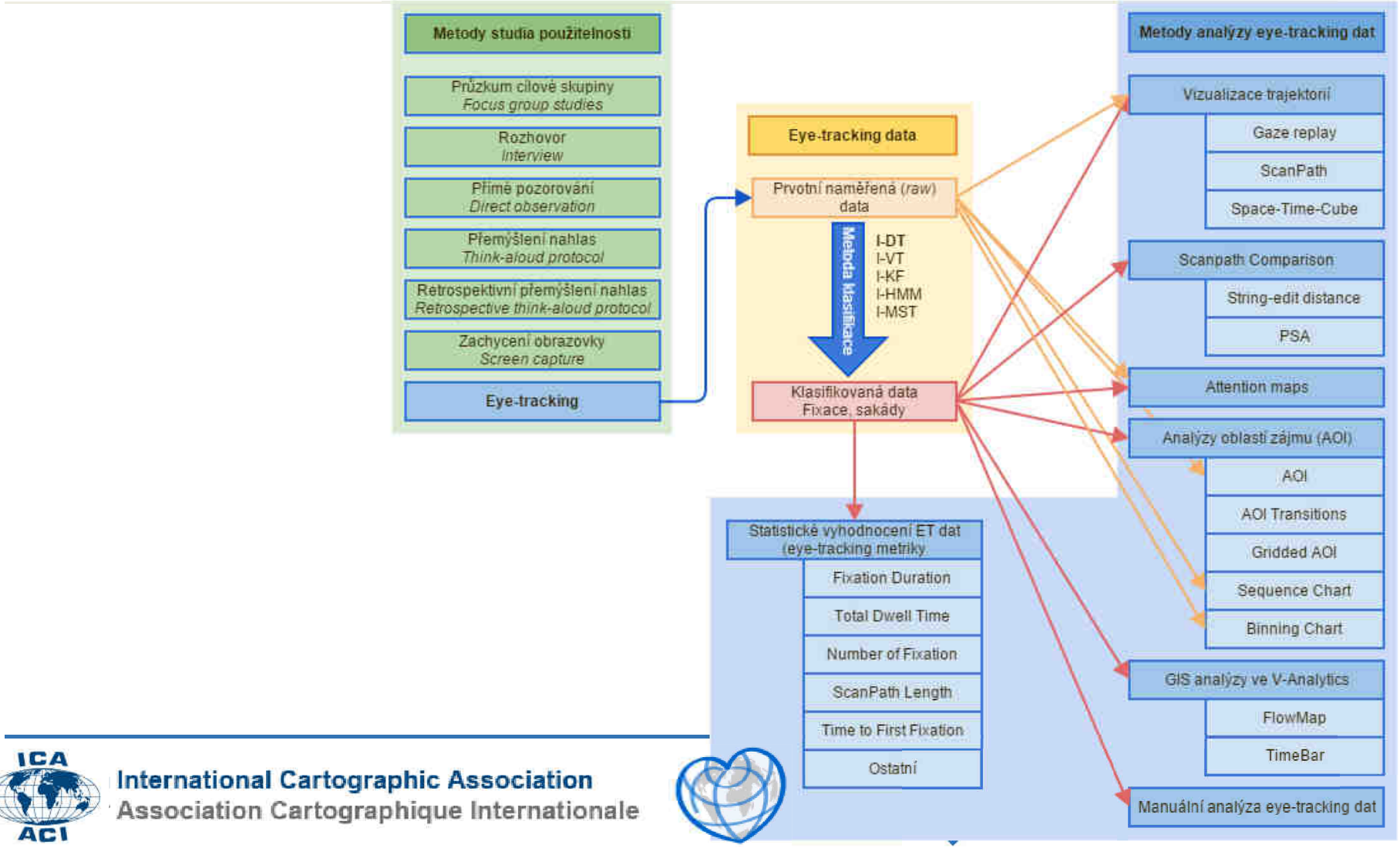
More attention — Less attention

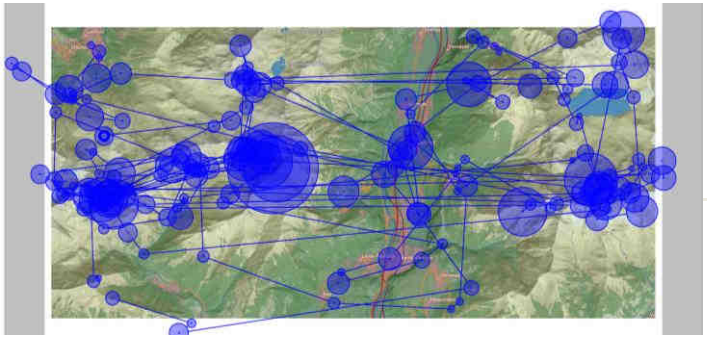

IMPACT OF TEXTING
STUDYING THE SCIENCE OF DISTRACTED DRIVING

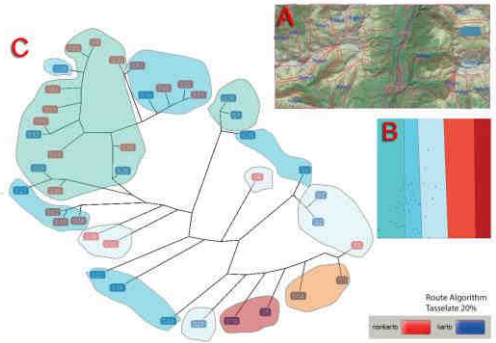
Eye-tracking laboratoř na KGI UP

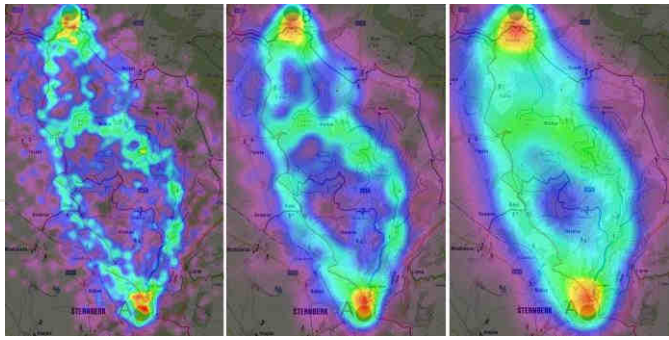
- SMI RED 250
  - Stacionární nízkofrekvenční eye-tracker
  - vzorkovací frekvence 60, 120 nebo 250 Hz
  - přesnost 0.4°
- EyeTribe Tracker
  - Stacionární nízkofrekvenční low-cost eye-tracker
  - vzorkovací frekvence 30 nebo 60 Hz
- EEG Emotiv EPOC
  - 16 kanálový elektroencefalogram
- Webová kamera Logitech - video a audio záznam

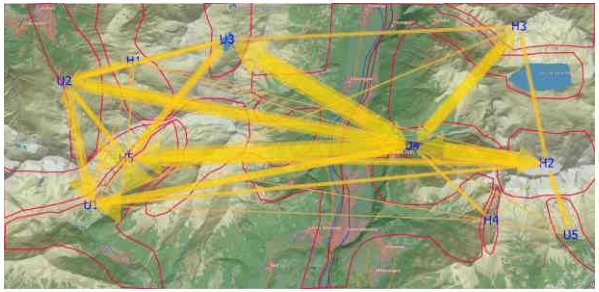
Metody analýzy eye-tracking dat











Otázka 5 - Obec

16a - "Řestoky"

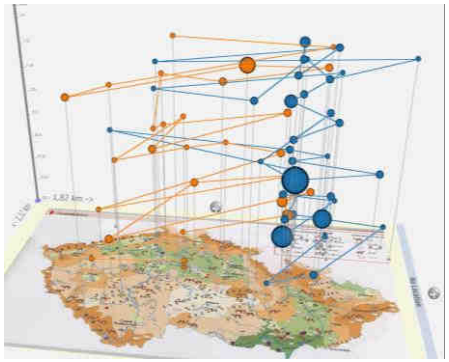
30	37	29	42	71	42	43	18	4	21
22	4	24	68	22	6	27	40	5	26
28	69	67	76	100	50	7	41	36	28
5	odpověď	122	20	66	3	0	16	12	32
33	16	10	63	17	0	29	51	30	19

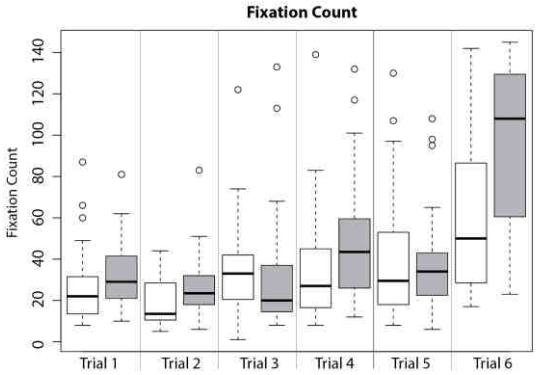
16b - "Jenišovice"

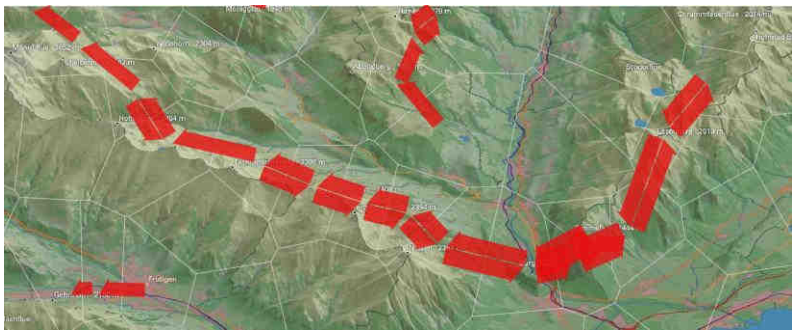
20	30	30	46	75	52	56	29	3	17
24	5	8	60	15	8	44	36	8	8
33	45	50	59	70	67	18	108	odpověď	16
6	34	6	13	61	6	0	29	32	21
29	11	5	41	9	0	21	42	24	13

Rozdíl Se stínováním - Bez stínováním

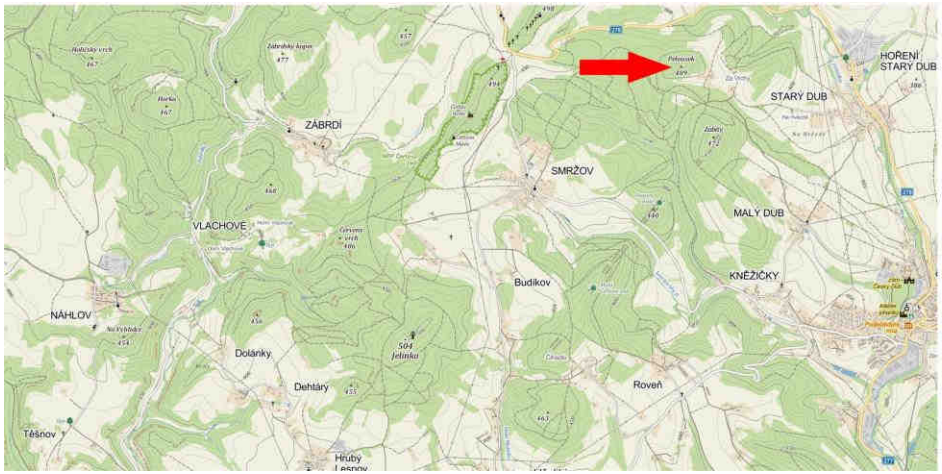
-10	-7	1	4	4	10	13	11	-1	-4
2	1	-16	-8	-7	2	17	-4	3	-18
5	-24	-17	-17	-30	17	11	67	odpověď	-12
1	odpověď	-116	-7	-5	3	0	13	20	-11
-4	-5	-5	-22	-8	0	-8	-9	-6	-6

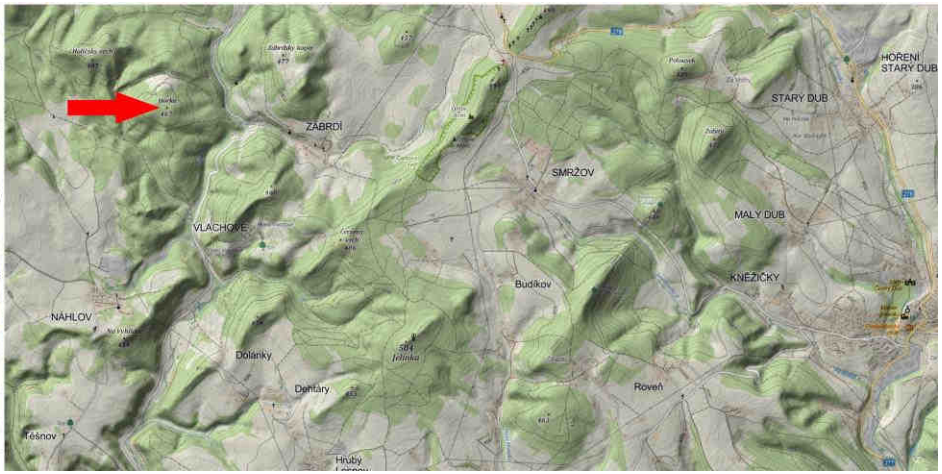






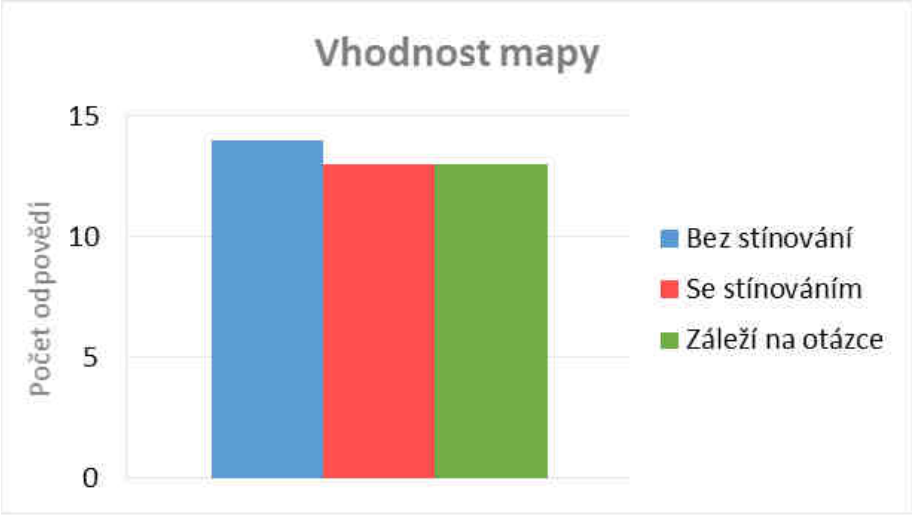
Experiment Shading-Mapy.cz

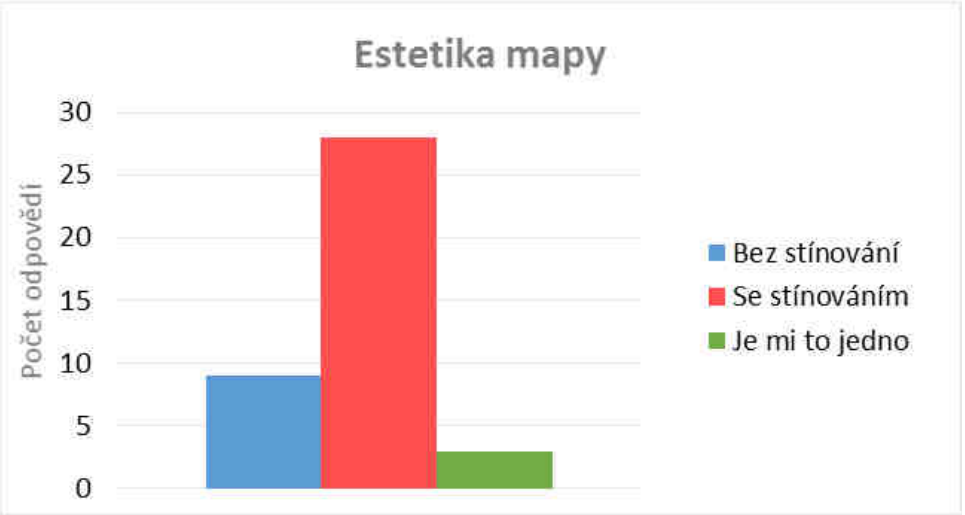




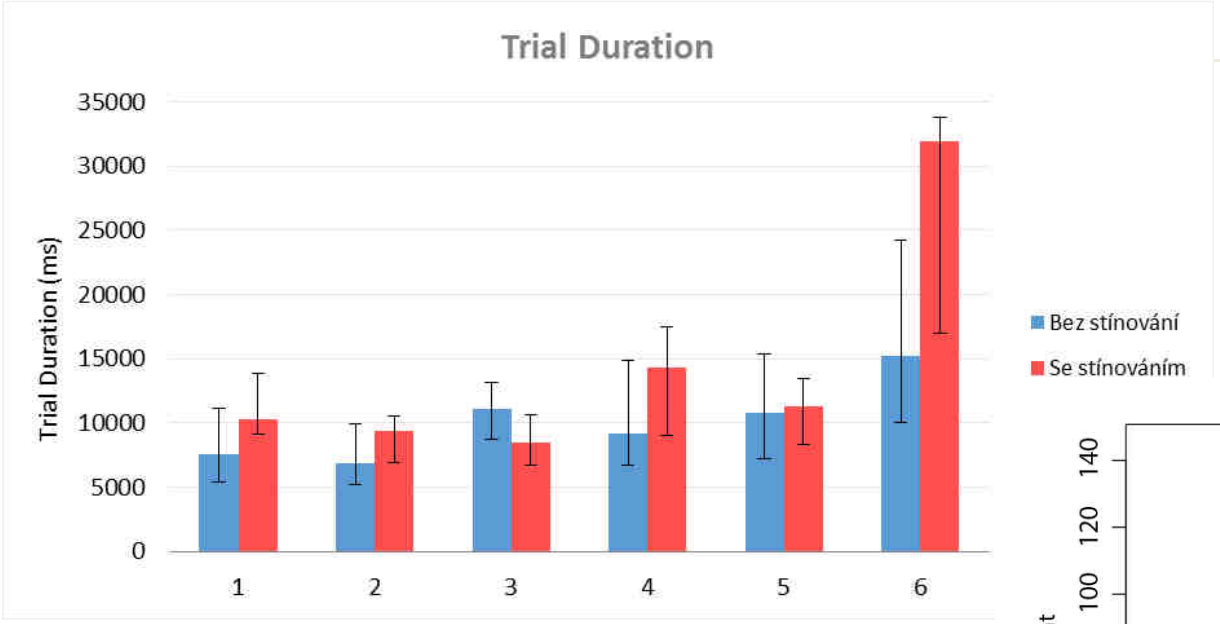
- H2: Z hlediska vhodnosti budou respondenti v dotazníku preferovat nestínovanou (2D) mapu
- H3: Z hlediska estetiky budou respondenti v dotazníku preferovat stínovanou (3D) mapu
- H4: Hledání vrcholu bude jednodušší na stínované (3D) variantě mapy
- H5: Hledání obce bude složitější na stínované (3D) variantě mapy

Experiment Shading-Mapy.cz

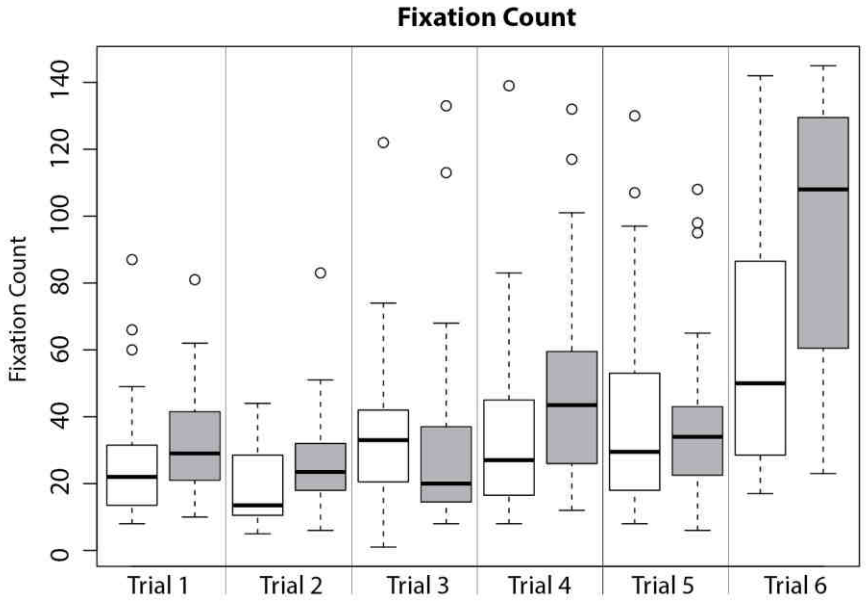




Experiment Shading-Mapy.cz



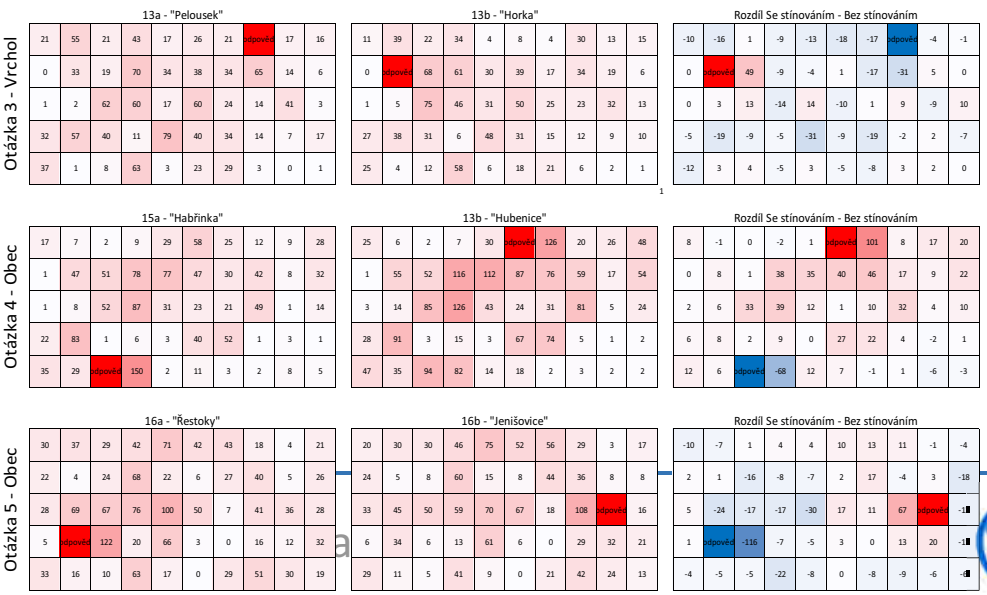
	Trial Duration	Fixation Count	Fixation Duration	Scanpath Length
Trial 1	0,069	0,058	0,650	**0,014**
Trial 2	**0,039**	**0,031**	**0,004**	**0,019**
Trial 3	**0,022**	**0,028**	0,080	**0,019**
Trial 4	**0,029**	**0,037**	0,357	**0,024**
Trial 5	0,879	0,922	0,330	0,837
Trial 6	**<0,001**	**<0,001**	0,078	**<0,001**

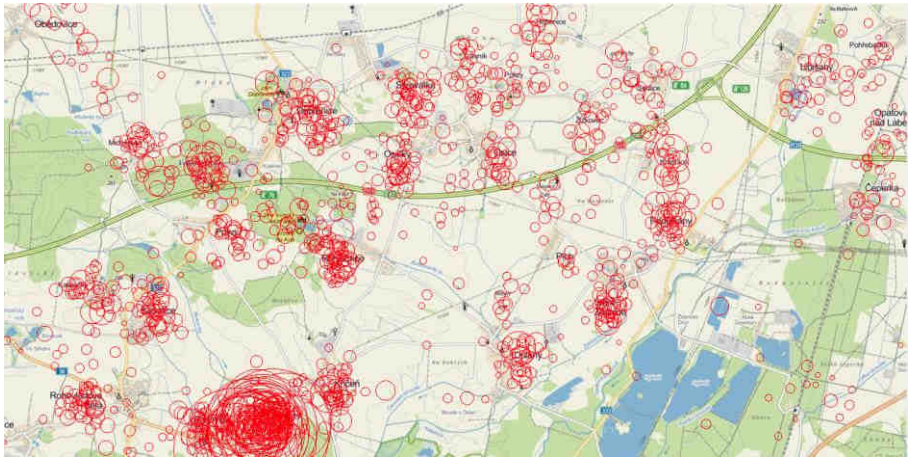


Experiment Shading-Mapy.cz

Závěr:

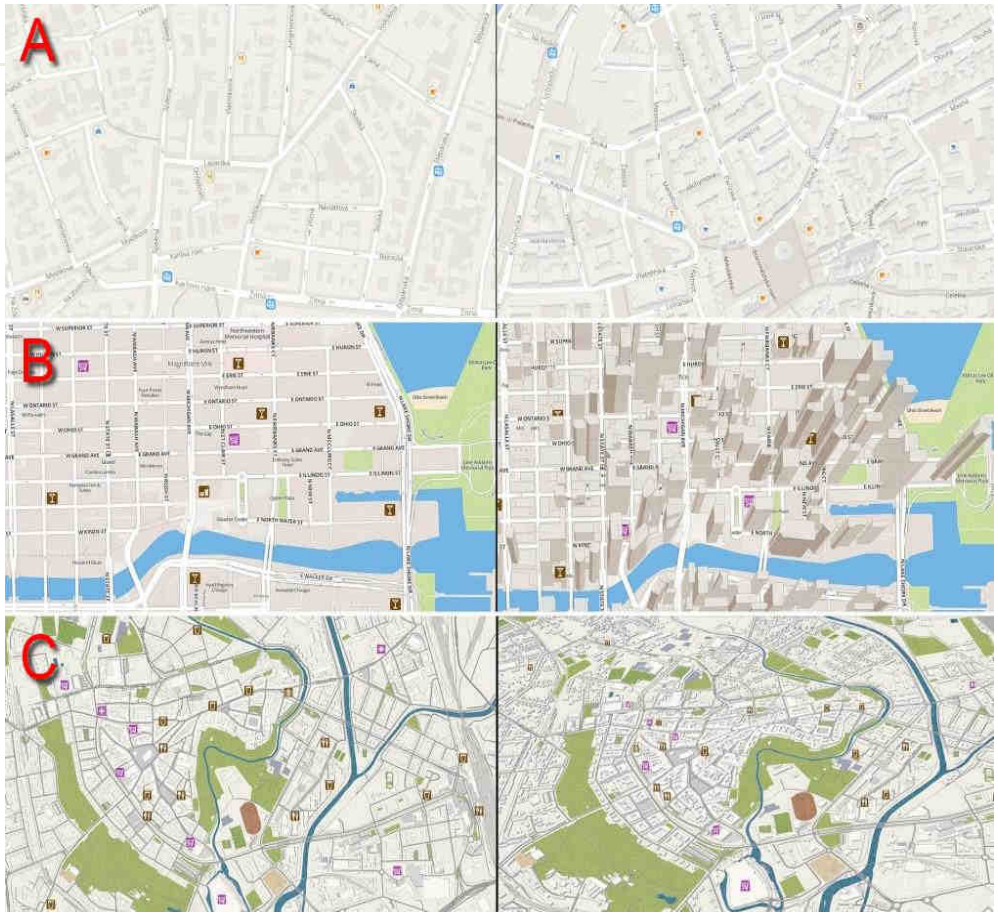
„Stínované mapy jsou pro vyhledávání obce i vrcholu méně vhodné než jejich varianta bez stínování, a to zejména v případě hledání obce“



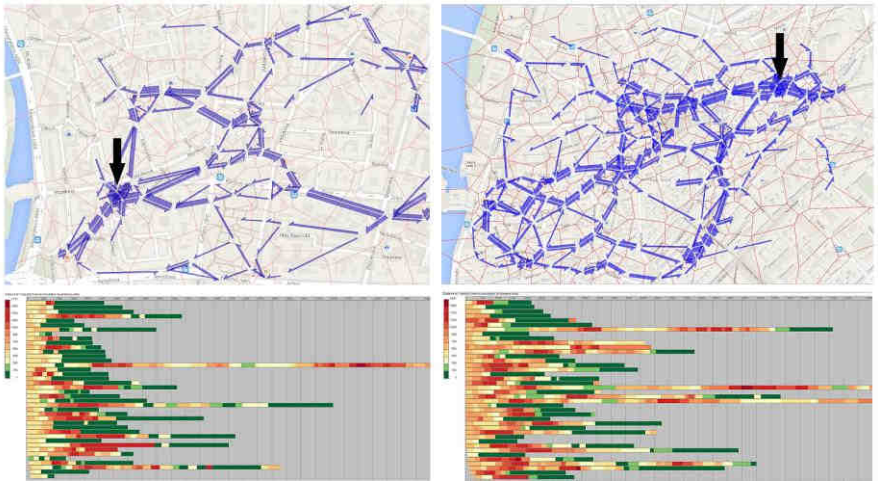


Experiment
3D Cities

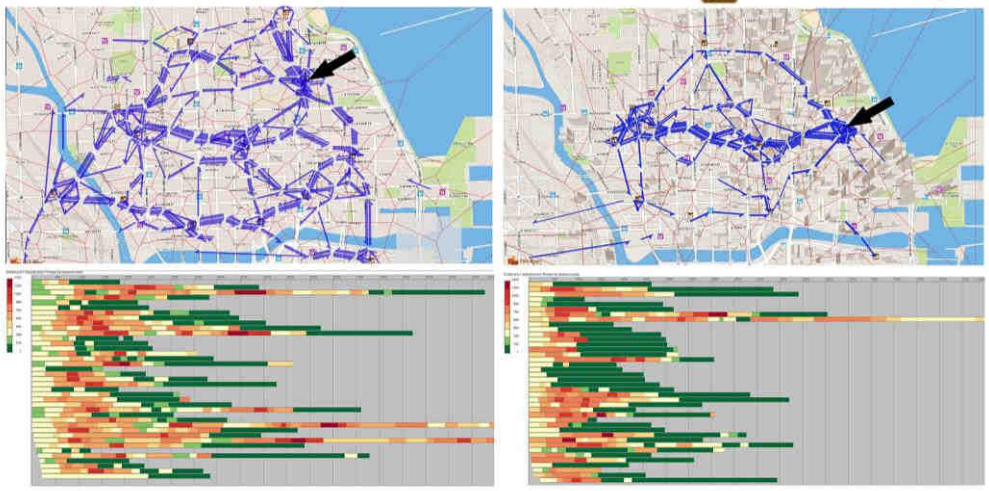
- H1: Z hlediska estetiky budou respondenti v dotazníku preferovat 3D mapu
- H2: Z hlediska vhodnosti budou respondenti v dotazníku preferovat 2D mapu
- H3: Hledání bodového znaku bude nejobtížnější na stimulu č. 9 s nakloněnou mapou
- H4: Hledání bodového znaku bude jednodušší na 2D variantě stimulů bez 3D budov



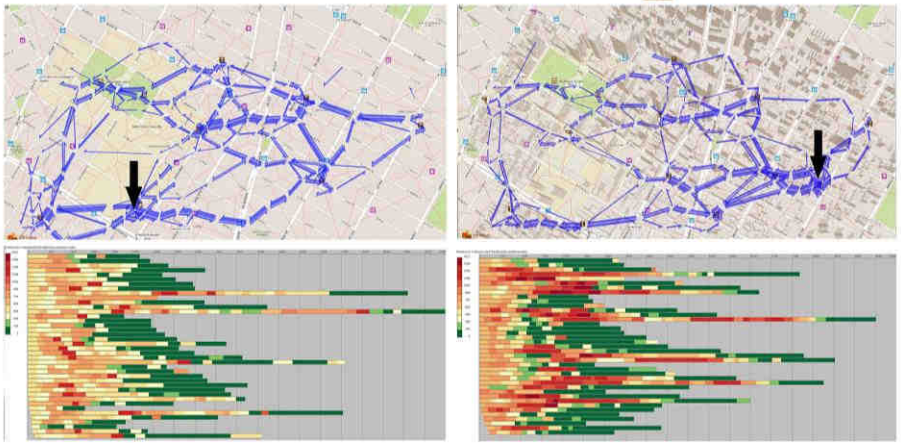
2D Otázka 2a & 2b - Najděte a označte v mapě „Ubytování“ 3D



2D Otázka 7a & 7b - Najděte a označte v mapě „Divadlo“ 3D



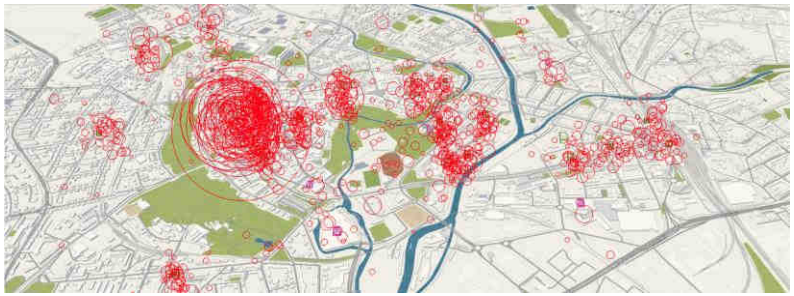
2D Otázka 5a & 5b - Najděte a označte v mapě „Fastfood“ 3D



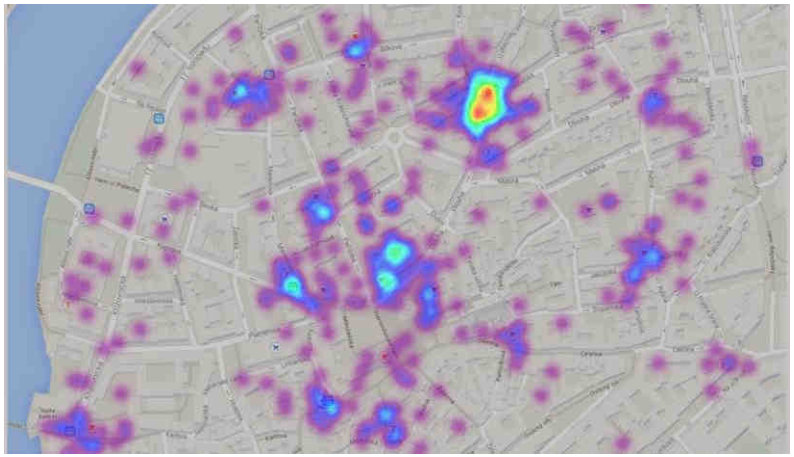
Experiment 3D Cities

Závěr:

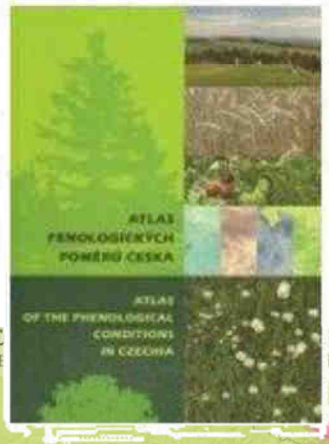
„Jako nevhodné se ukázalo použití nakloněné 3D varianty stimulu pocházejícího z portálu F4Map“

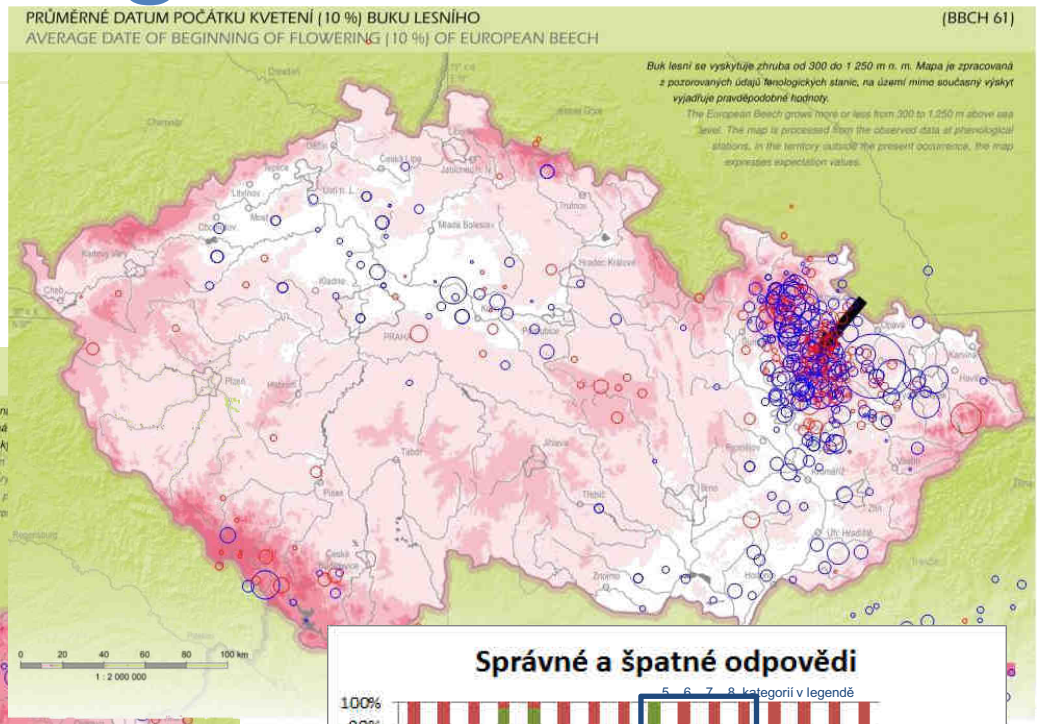


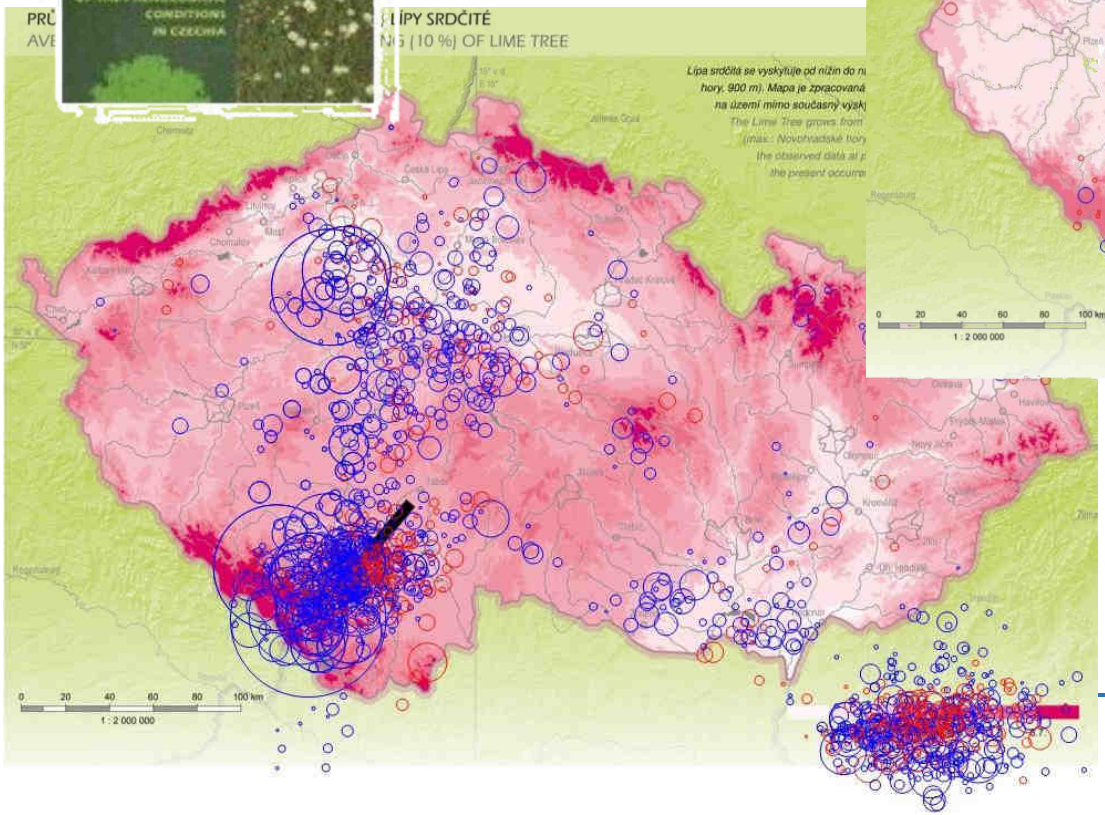
„U ostatních stimulů byla v některých případech vhodnější 2D mapa, v jiných případech 3D mapa“

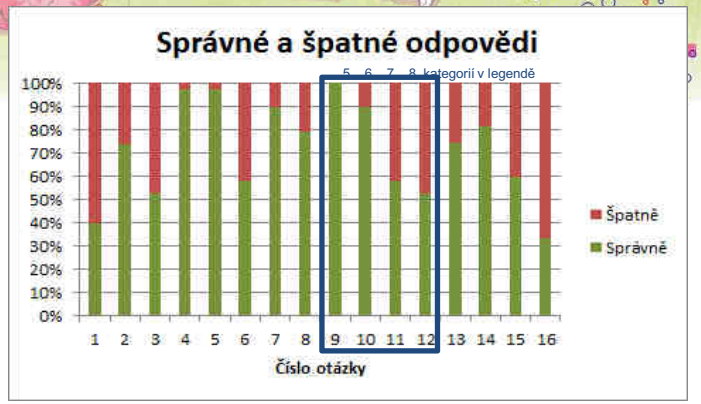


Hodnocení Fenologického atlasu





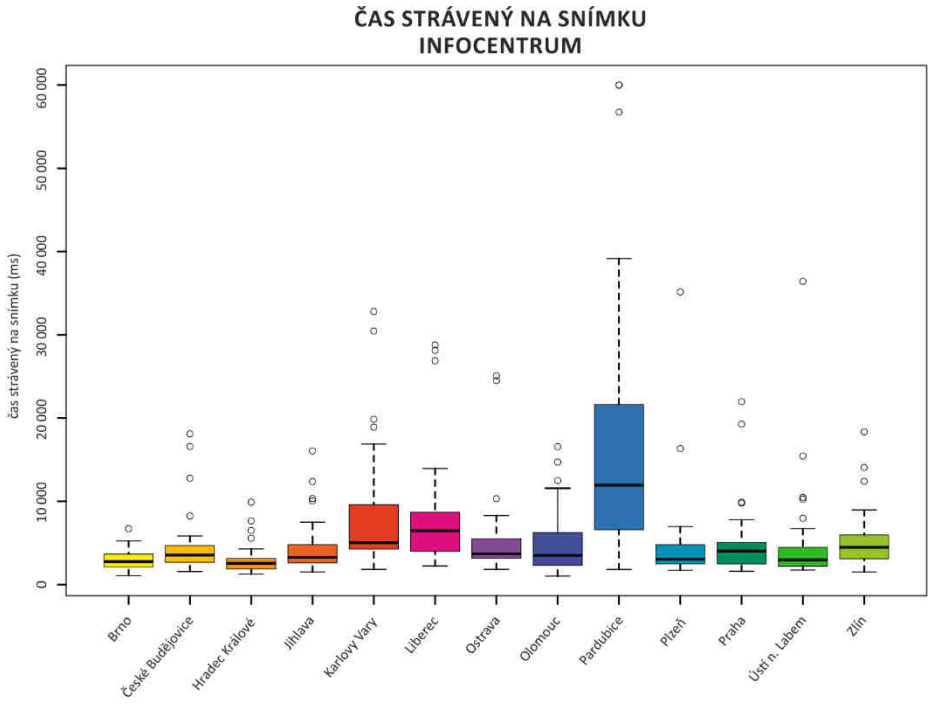


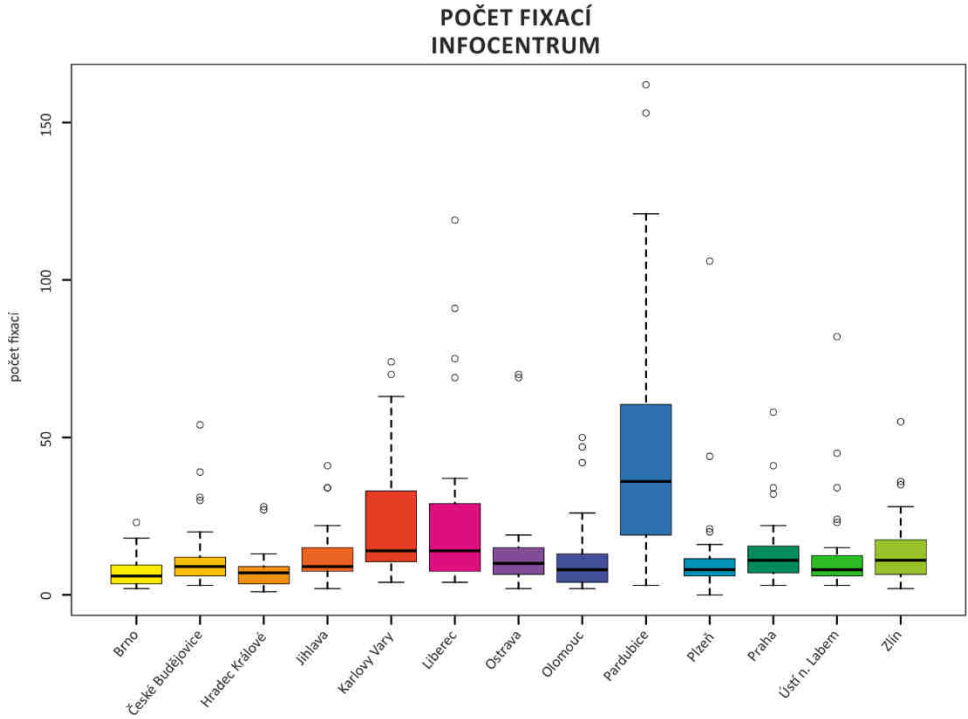


KATEDRA GEOINFORMATIKY
Univerzita Palackého v Olomouci

Hodnocení propagačních trhacích map

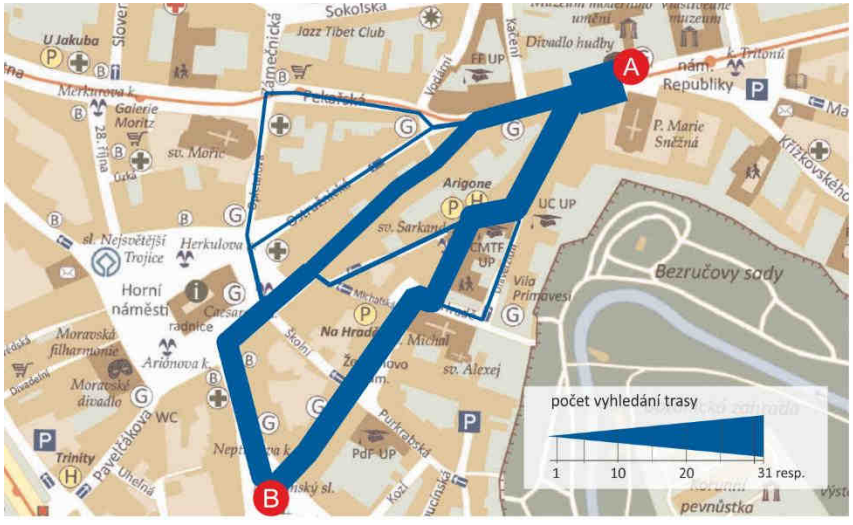
Úkol: Najdi informační centrum



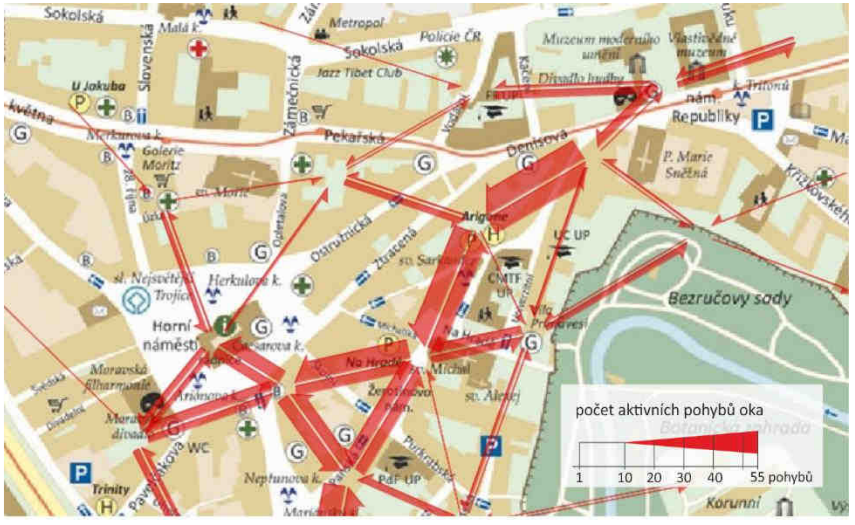


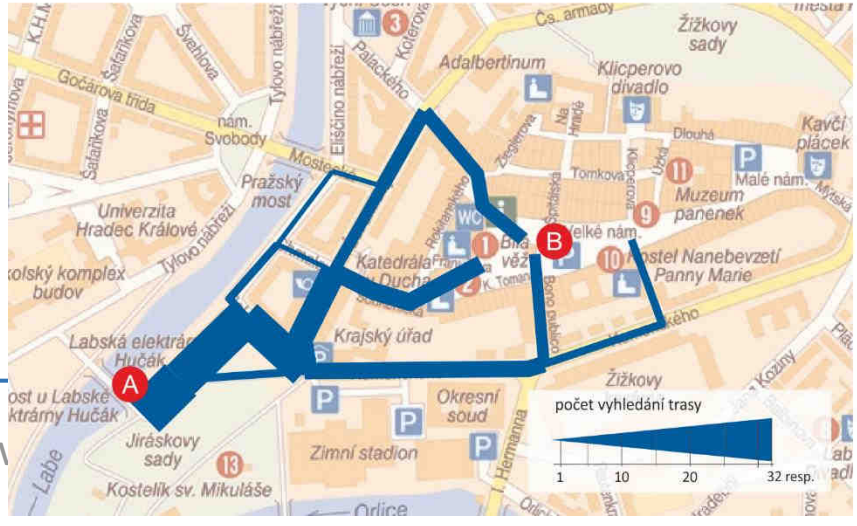
Úkol: Najdi trasu z bodu A do bodu B

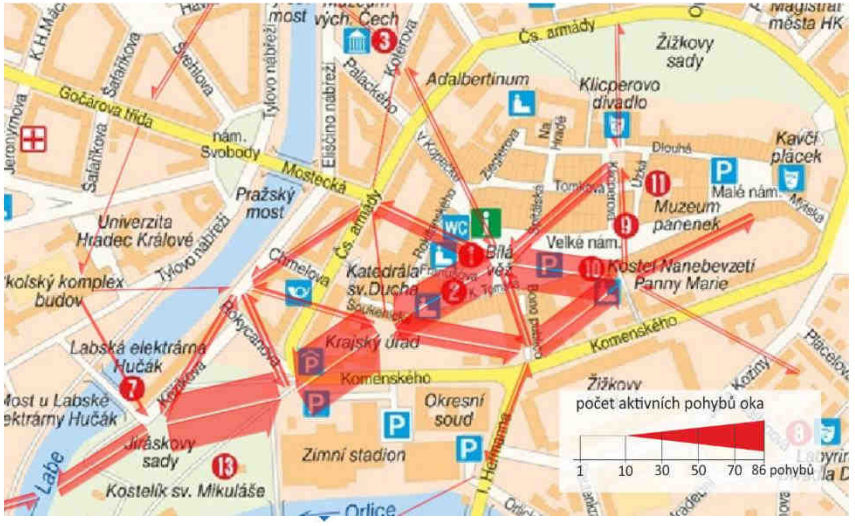
Kartodiagram – zvolená trasa



FlowMap – agregované trajektorie očí







Eye-tracking Group at Department of Geoinformatics Palacký University in Olomouc, Czech Republic

ABOUT US | RESEARCH PROJECTS | STUDENTS PROJECTS | PUBLICATIONS | EXPERIMENTS | CONTACTS

Eye-tracking group in Olomouc

Department of Geoinformatics at Palacký University in Olomouc is engaged in the wide area of cartographic research topics. Feeling the absence of objective evaluation of cartography products, since June 2011 we have started the research on cognitive visualization using eye-tracking. Research orientation of our group is the application of the eye-tracking technology and cognitive sciences in the field of **evaluation and optimization of maps**.

The team is formed by young scientists interested in different aspects of geographic information visualization. Research topics deal with cognition of maps complexity, 3D visualization, uncertainty, map elements and layout and other themes, leading us to the only aim - **to do better maps**.

The laboratory is equiped with **SMI RED 250** eye-tracker. It allows to record eye-movements with a frequency of 250 Hz. We are also usinge three pieces of low-cost **EyeTribe tracker**. Eye-movement measurement can be enhanced by EEG measurement with the use of **Emotiv EPOC** device.
For data analyses, we are using SMI BeGaze software, opensource application OGAMA, V-Analytics, R Studio for statistics and some other tools for specific types of analyses.

www.eyetracking.upol.cz

3D TISK V KARTOGRAFII

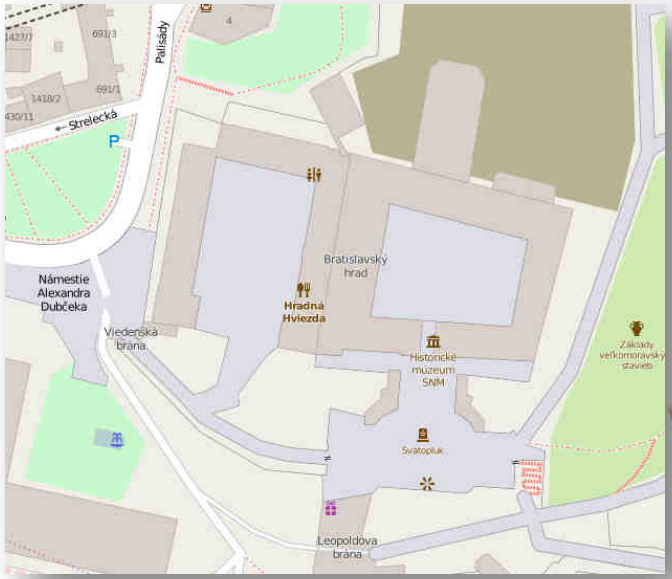
3D tisk na KGI

- **výzkum na poli 3D tisku v kartografii**
- uživatelské aspekty reálných map a tyflomap
- 3D tisk tematických map
- tvorba reálných modelů terénu
- 3D tisk tyflomap
  - automatizace tvorby tyflomap z prostorových databází
  - tvorba multimediálních tyflomap na 3D tiskárnách
  - kombinace DEM a tyflomap

Technické parametry (verze říjen 2015)

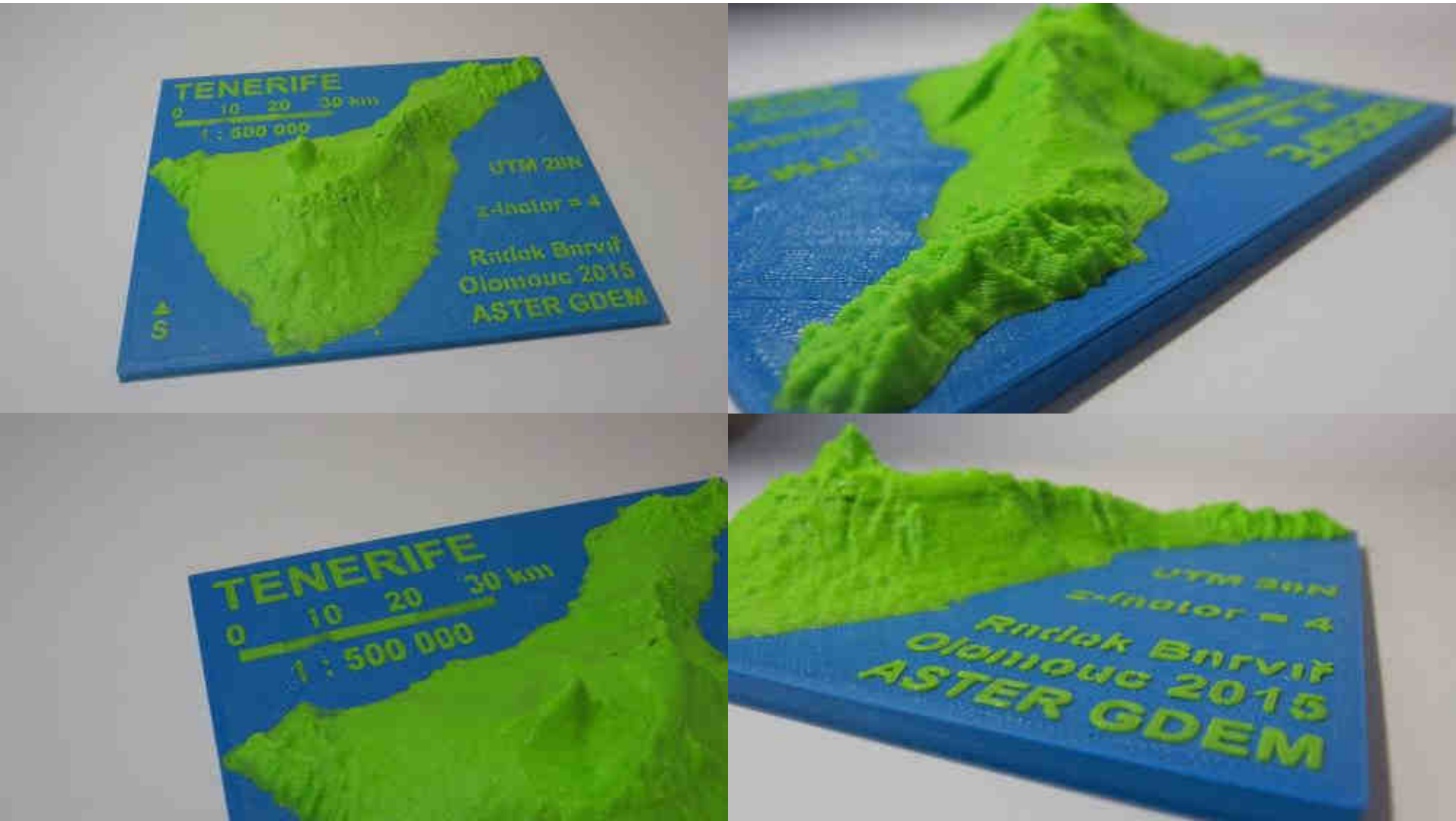
- Pracovní plocha - 8000 cm^3 (200x200x200 mm)
- Otevřený design pro snadnou manipulaci
- Integrované LCD pro práci bez počítače
- Podpora SD karet (8 GB v balení) a USB
- Velikost trysky 0,4 mm
- Jednoduchý barevný tisk po vrstvách
- Výška vrstvy od 0,05 mm
- Vyhřívaná podložka s rovnoměrným chladnutím
- Maximální rychlost 200 mm/s
- Podporované materiály - PLA, ABS, PET, HIPS, Flex PP, Ninjaflex, Laywood, Laybrick, Nylon, Bamboofill, Bronzefill, ASA, T-Glase, filamenty s uhlíkovým vláknem...
- Velikost kroku v X/Y ose - 0,01 mm
- Průměrná spotřeba 50 W (tisk PLA) nebo 90 W (tisk ABS), rozměry 42x42x38 cm, váha 6,5 kg
- Speciálně optimalizovaný firmware pro tichý tisk

Generování tyflomap z prostorových databází



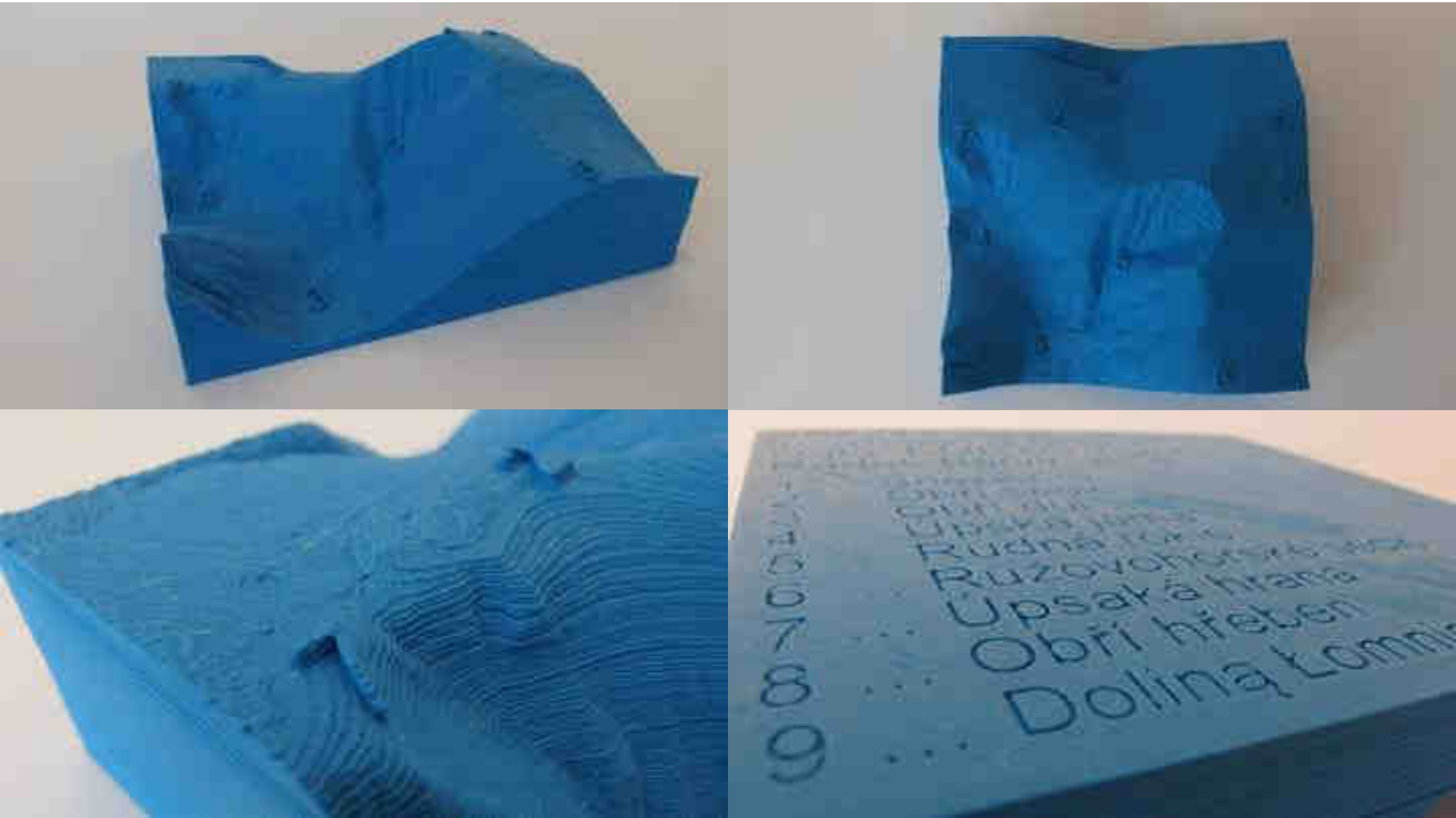
VÍCEBAREVNÉ PROVEDENÍ Z PLASTU

dvoubarevný model ostrova Tenerife



POPISY NA MODELU

model Sněžky s alfanumerickými znaky



MODEL Z ČÁSTÍ

složený model České republiky (9 map. listů, 70 cm, 1 : 700 000)

Interaktivní propojení tematické složky

projektor – tematická složka

dotyk – interaktivita (přes obrazovku, tablet atd.)

nové možnosti **interaktivity** a pochopení mapy

TANGIBLE LANDSCAPES

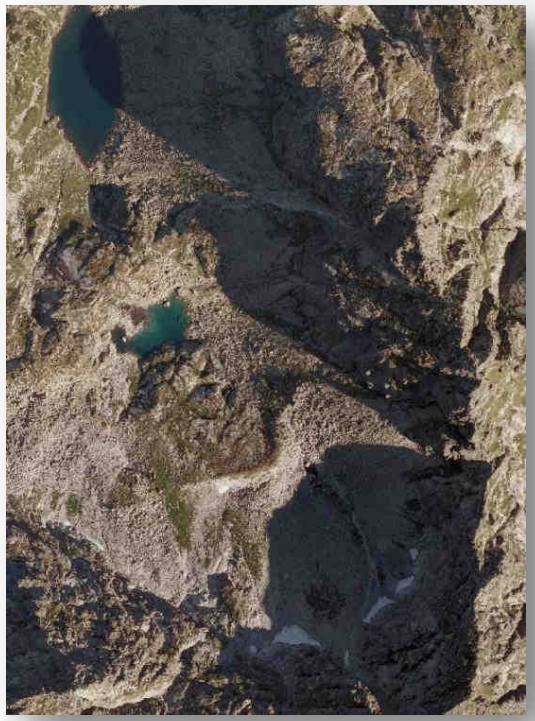
- Microsoft KINECT
- kinetický písek
- 3D výtisk modelu reliéfu
- projektor
- GRASS GIS

- využití pro analýzy nad DEM

Plnobarevný 3D tisk – MCOR IRIS

- **kancelářský papír** jako materiál
- **95%** úspora oproti jiným materiálům než papír
- **patentovaný** inkoust prochází skrz papír
- téměř „**neomezené**“ možnosti
- více než **1 milion** barev

- **vysoký potenciál nejen pro kartografii**



http://mcortechnologies.com/3d-printers/iris/