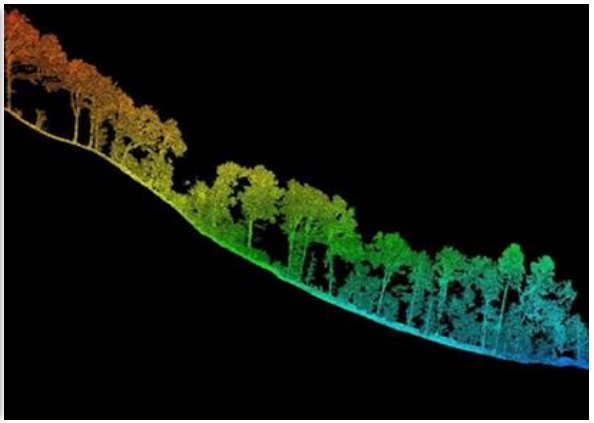
Diplomový seminár

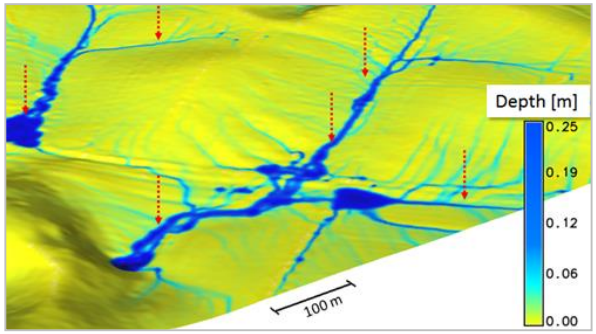
Ústav informatiky
Prírodovedecká fakulta
UPJŠ v Košiciach

Tematické prieniky geografie a geoinformatiky a informatiky na ÚGE



Michal GALLAY

Institute of Gegraphy
Faculty of Science
Pavol Jozef Šafárik University in Košice



geografia.science.upjs.sk

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Prírodovedecká fakulta UPJŠ

Ústav | Ľudia | Štúdium | Výskum | Podujatia | Geographia Cassoviensis

Rýchla navigácia
- Projekty
- Vedecké semináre
- Košická pobočka SGS
- Spolupráca
- Geographia Cassoviensis

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Home

Vitajte na stránke Ústavu geografie Prírodovedeckej fakulty Univerzity Pavla Jozefa Šafárika v Košiciach (UGE). Nájdete nás aj na facebooku.

Veda a výskum

Na stránke prezentujeme odborné zameranie pracovníkov ÚGE, výskumné aktivity a riešené projekty.

Štúdium

Stránka je určená aj pre záujemcov o štúdium geografie, súčasných študentov a absolventov.

Zo života ÚGE
- Pozvánka na prvý košický Missing Maps Mapathon
- Krajina na dotyk počas Noci výskumníkov 2017
- Medzinárodný maratón mieru 2017

Kalendár

« <						
Po	Ut	St	Št	Pi		
25	26	27	28	29		
2	3	4	5	6		
9	10	11	12	13		
16	17	18	19	20		
23	24	25	26	27		
30	31	1	2	3		

Aktuality
Wed, 8, Nov, 2017, 1
3D modelovanie kra
krajiny a masívne ge
Thu, 9, Nov, 2017, 9:
Klub učiteľov geogra

Home ▸ Štruktúra ústavu ▸ **Oddelenie geoinformatiky**

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Home ▸ Výskum ▸ **Výber publikácií**

Najnovšie publikácie

HOFIERKA, J., LACKO, M., ZUBAL, S. (2017). Parallelization of interpolation, solar radiation and water flow simulation modules in GRASS GIS using OpenMP. *Computers & Geosciences,* 107, 20-27.

BUCHER, S. (2017). A Spatial Bibliometric Analysis of Central European Sociology Journals in the Web of Science Database. *Polish Sociological Review,* 198, 255-261.

BUCHER, S. (2017). Environmental performance as one of the indicators of sustainable development in Asia, *Journal of Environmental Biology*, 38 (1), 67-74.

SLIVKOVÁ, S., **BUCHER, S.** (2017): Dark tourism and its reflection in post-conflict destinations of Slovakia and Croatia. *Geojournal of Tourism and Geosites,* 19 (1), 22-34.

NOVOTNÝ, L., PREGI, L. (2017). Selective migration of population subgroups by educational attainment in the urban region of Bratislava. *Geografický časopis,* 69 (1), 21-39. (PDF)

BARABAS, D., BÓNA J., KLEIN D., BALÁŽOVIČOVÁ L. (2017). Morphometric and geological conditions for sediment accumulation in the Udava River, Outer Carpathians, Slovakia. *Journal of Geographical Sciences*, 27(8), 981-998.

CHODKOWSKA-MISZCZUK, J., **KULLA, M., NOVOTNÝ, L.** (2017). The role of policy support in agricultural biogas energy production in Visegrad countries. *Bulletin of Geography*, 35(1), 19–34.

HOFIERKA, J., GALLAY, M., KAŇUK, J., ŠAŠAK, J. (2017). Modelling Karst Landscape with Massive Airborne and Terrestrial Laser Scanning Data. In: Ivan, I., Singleton, A., Horák, J., Inspektor, T. (eds.) *The Rise of Big Spatial Data, Lecture Notes in Geoinformation and*

State-of-the-art in geospatial science

- Wide use of sensors (data loggers, remote sensing, IoT)
- Generating large amount of data where location matters
  - Often 3D points + atributes
- Integration of various kinds of big data
  - Airborne +terrestrial scanning + multispectral + hyperspectral.
- Processing and analysis of the big data is challenging with standard geospatial tools (desktop GIS).
  - Surprisingly, most of the current GIS software exploits these advances in a very limited way.
  - Still many operations are executed by a single process.
  - Some geospatial tasks are more complex and computationally very intensive.

Collection of high resolution spatial data

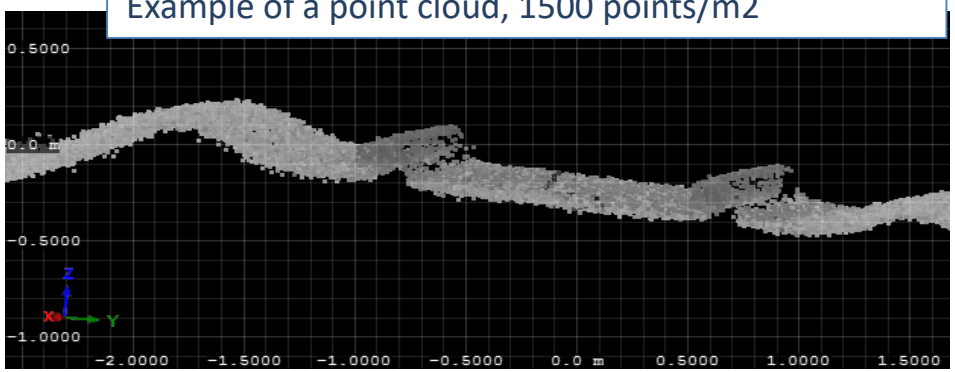
Riegl VUX-1 **laser** scanner + **digital** camera

AISA Kestrel 10 **hyperspectral** camera

Collection of high resolution spatial data

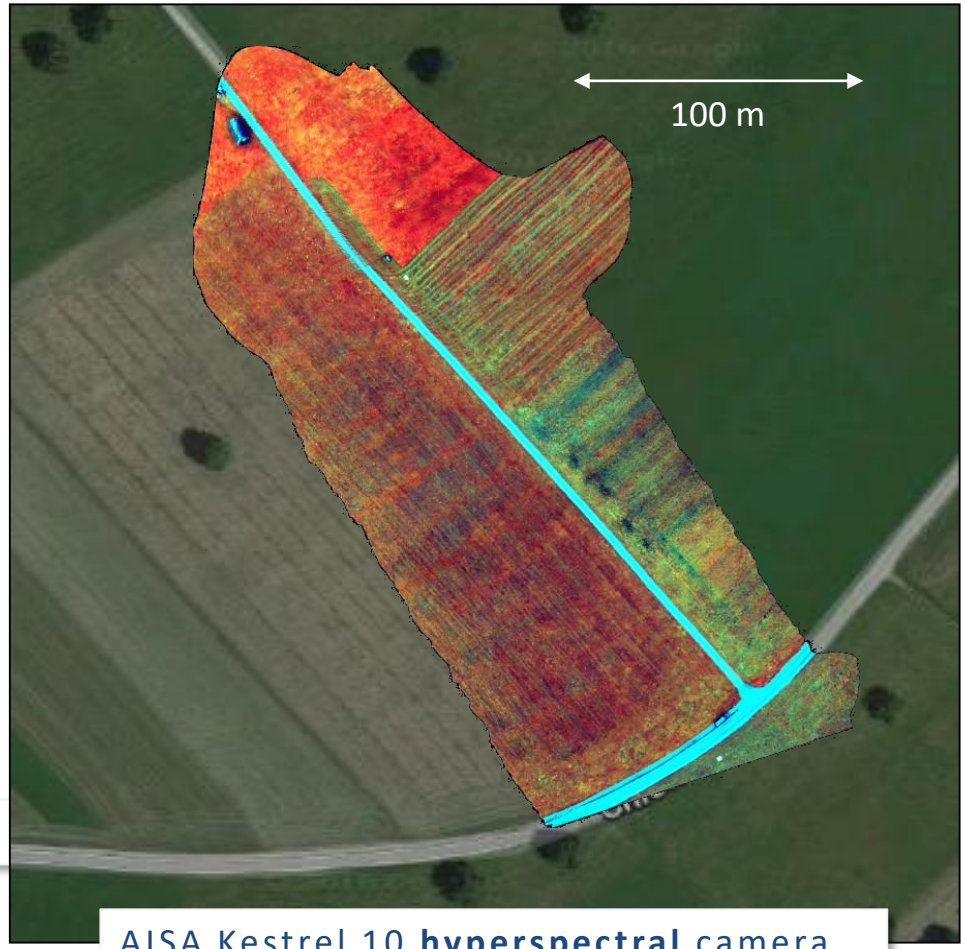
High accuracy in geometric domain

Example of a point cloud, 1500 points/m2



Riegl VUX-1 **laser** scanner + **digital** camera

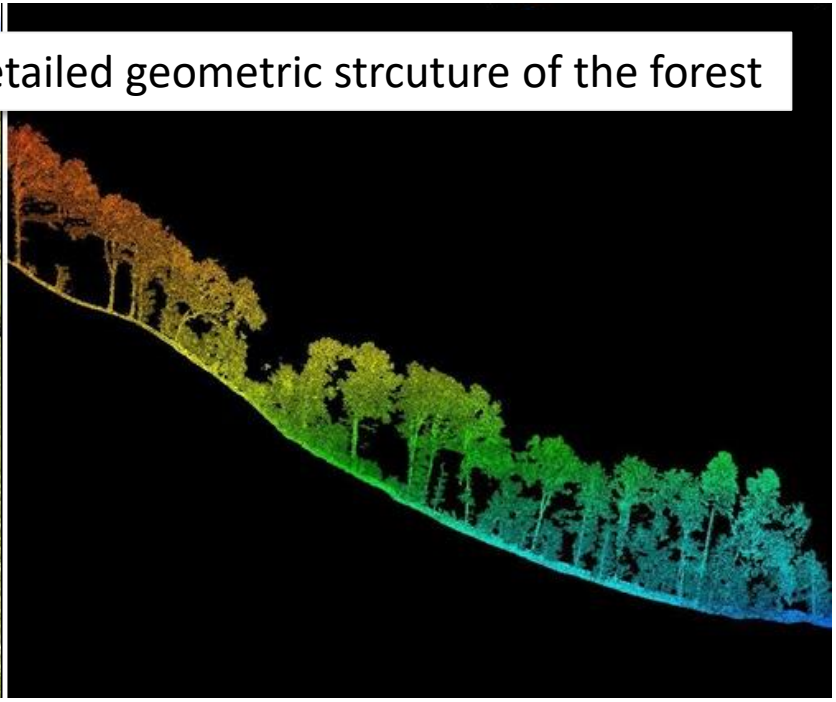
High accuracy in spectral domain



AISA Kestrel 10 **hyperspectral** camera

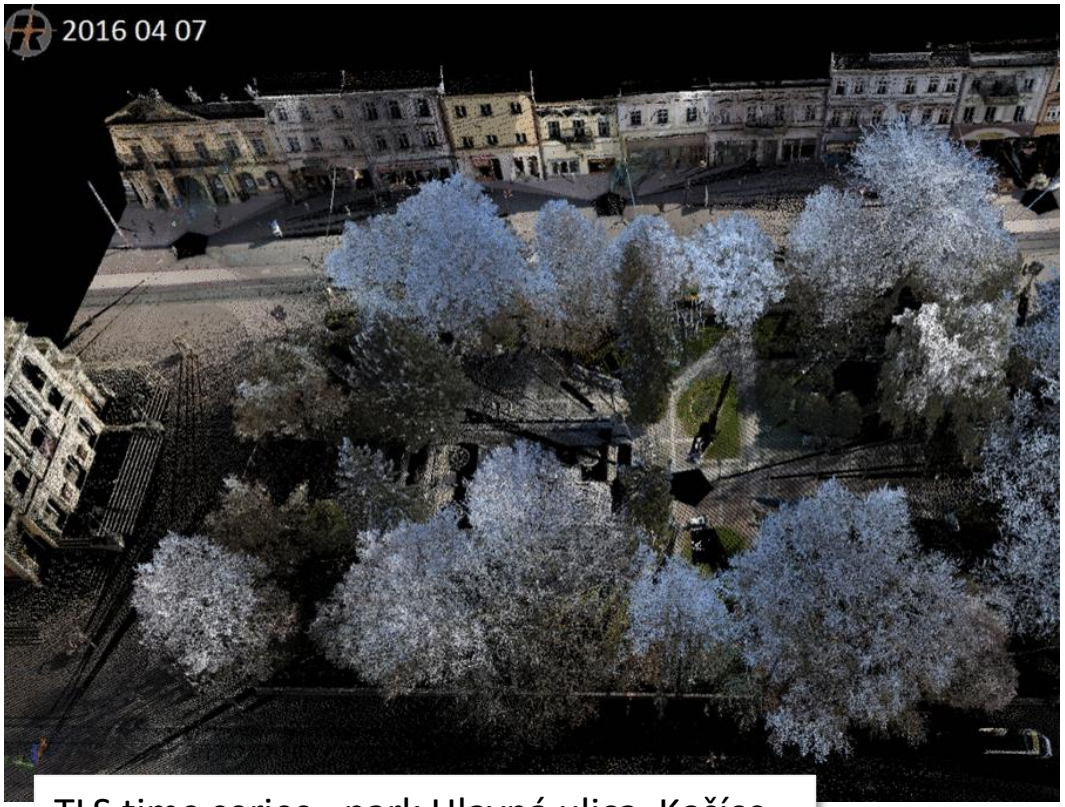
Laser scanning in the Alps, Austria for Technical University in Vienna

Highly detailed geometric strcuture of the forest

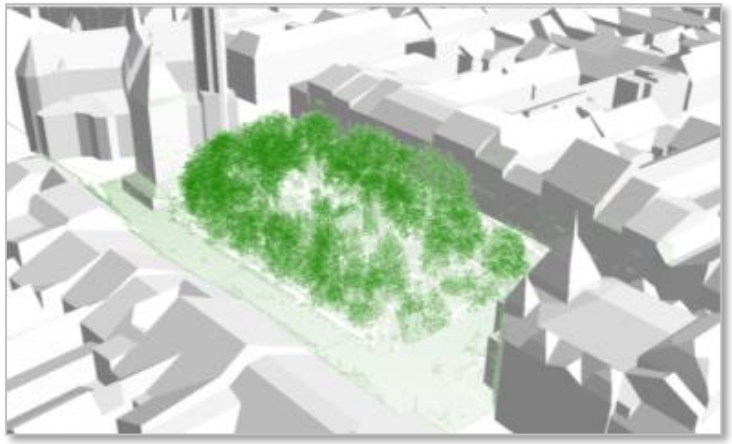


Collection of high resolution spatial data

- Time series of terrestrial laser scanning data
- Synchronous with the Sentinelom 2A sattellite

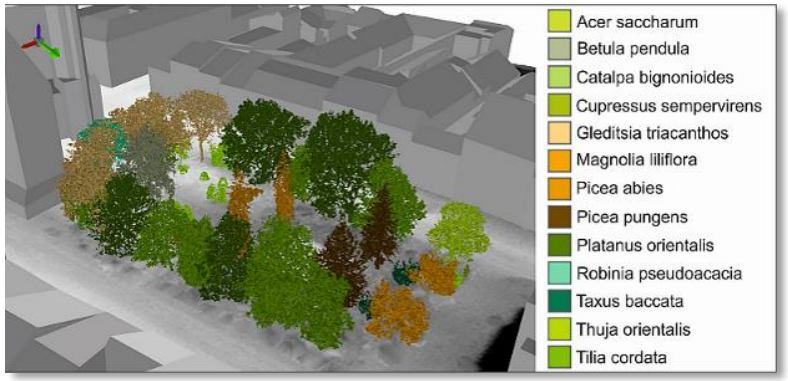


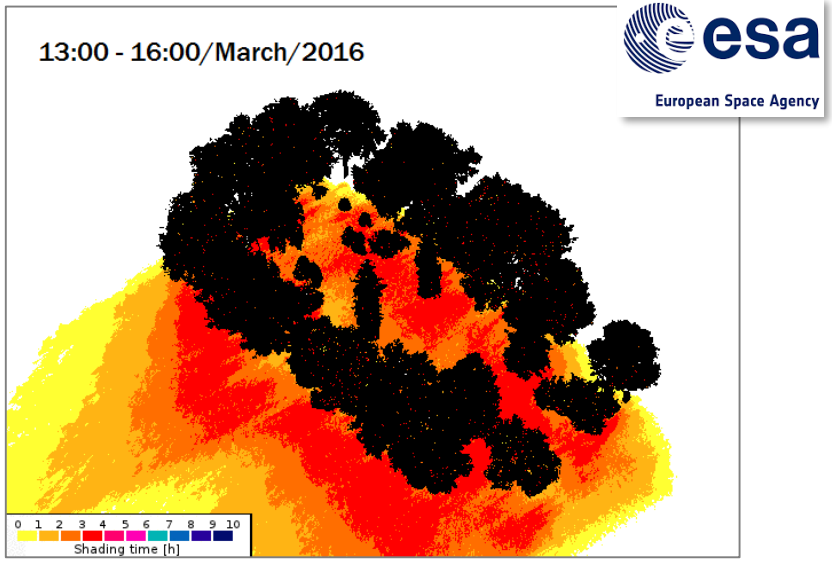
TLS time series - park Hlavná ulica, Košíce

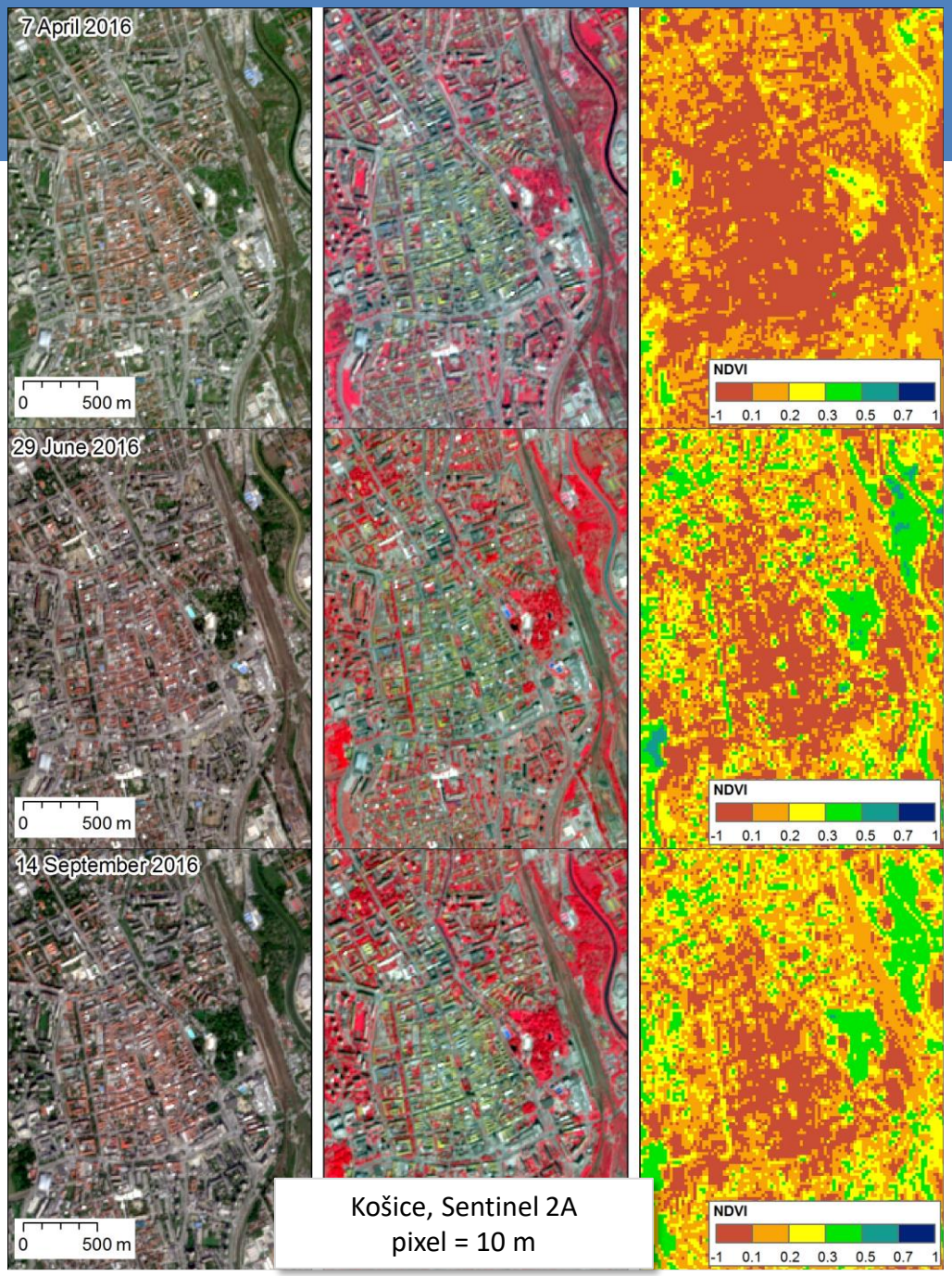


Methodology of processing and analysis of big 3D data

- Time series of terrestrial laser scanning data for validating solar transmitrance from Sentinel 2A satellite.





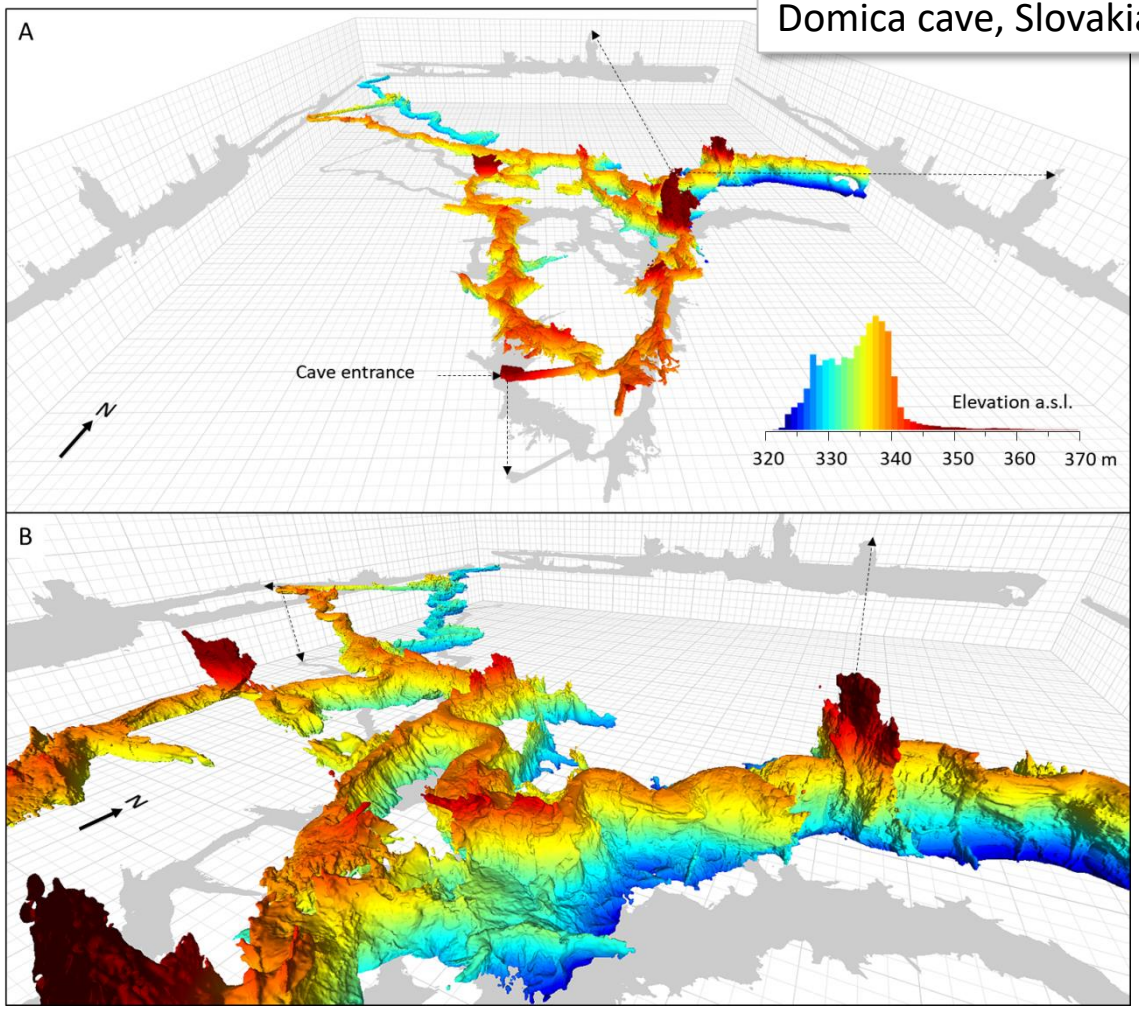


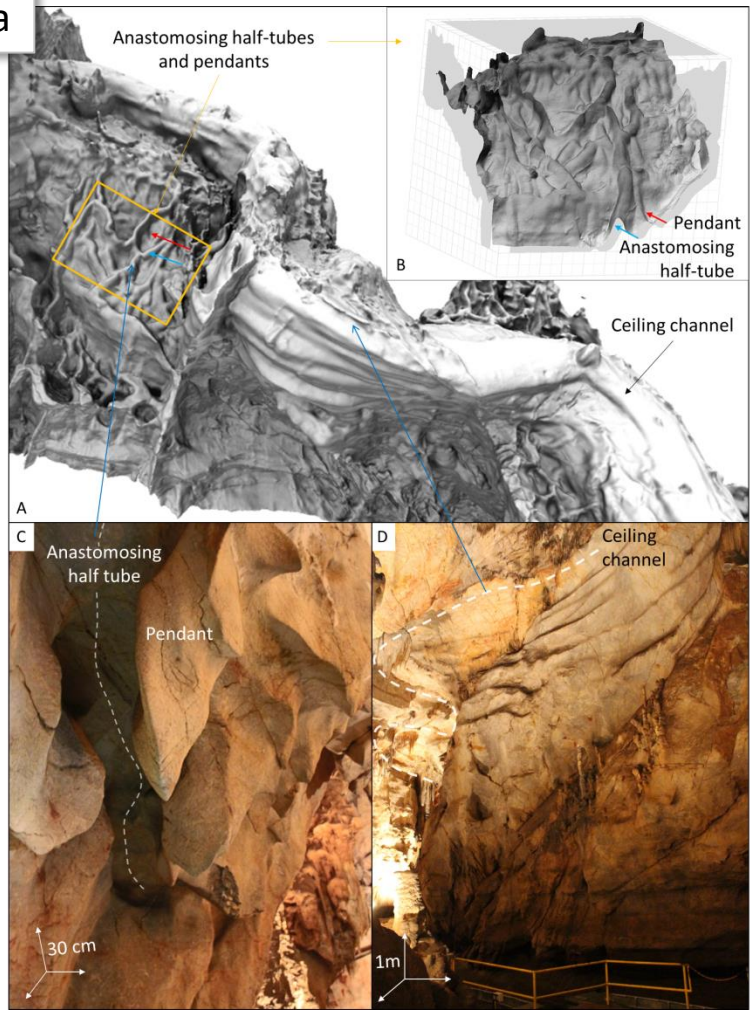
Košice, Sentinel 2A
pixel = 10 m

Methodology of processing and analysis of big 3D data

- Efficient cave laser scanning, 3D meshing and 3D geomorphometry (cave surface analysis)

Domica cave, Slovakia



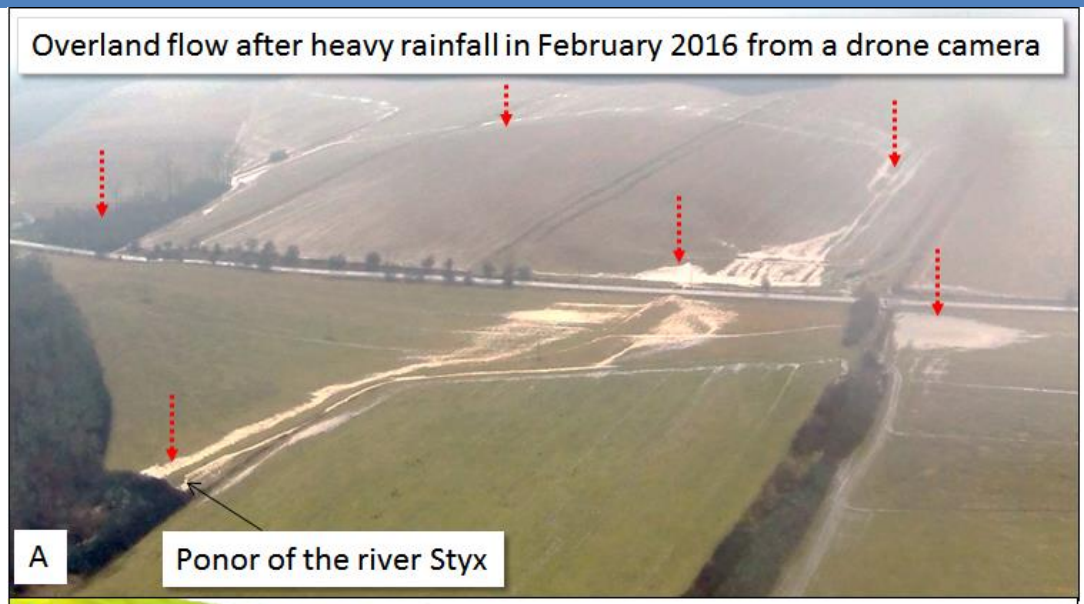


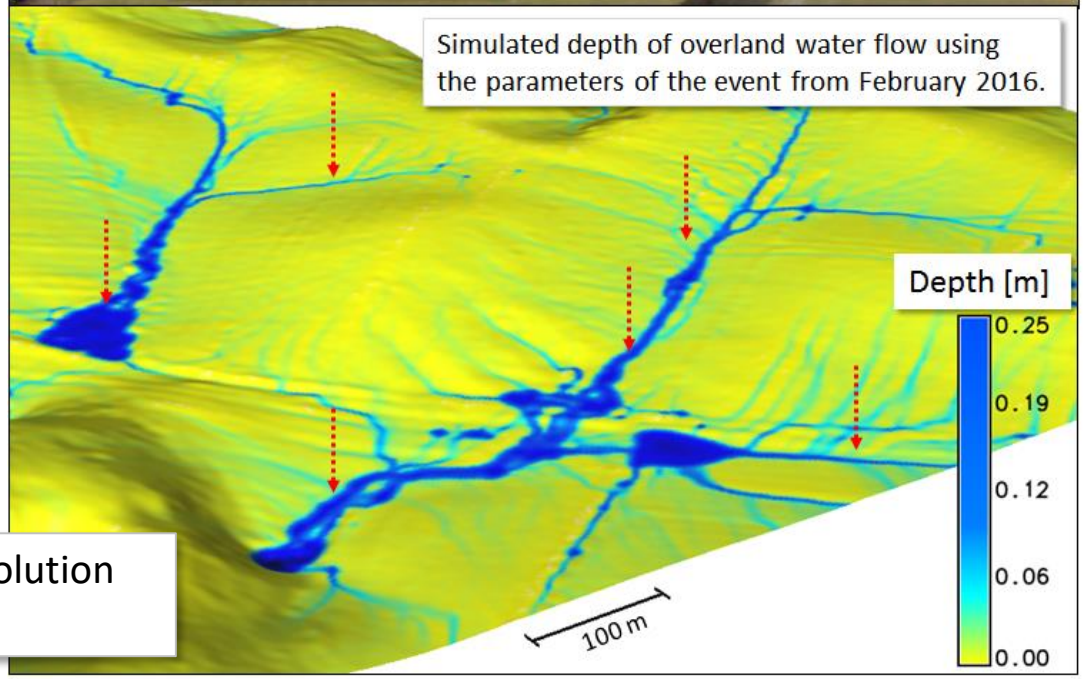
Parallelization of existing GIS routines

- Parallelization of existing routines GIS
  - spatial interpolation,
  - solar radiation
  - water flow simulation modules in GRASS GIS using OpenMP

grass gis
Bringing advanced geospatial technologies to the world

Spatial resolution	Original version	1 Thread		2 Threads		4 Threads	
	Time (s)	Time (s)	Speed-up	Time (s)	Speed-up	Time (s)	Speed-up
2 m	13,598	11,323	1.20	5,832	2.33	3,255	4.18
5 m	2,622	2,184	1.20	1,137	2.31	642	4.08

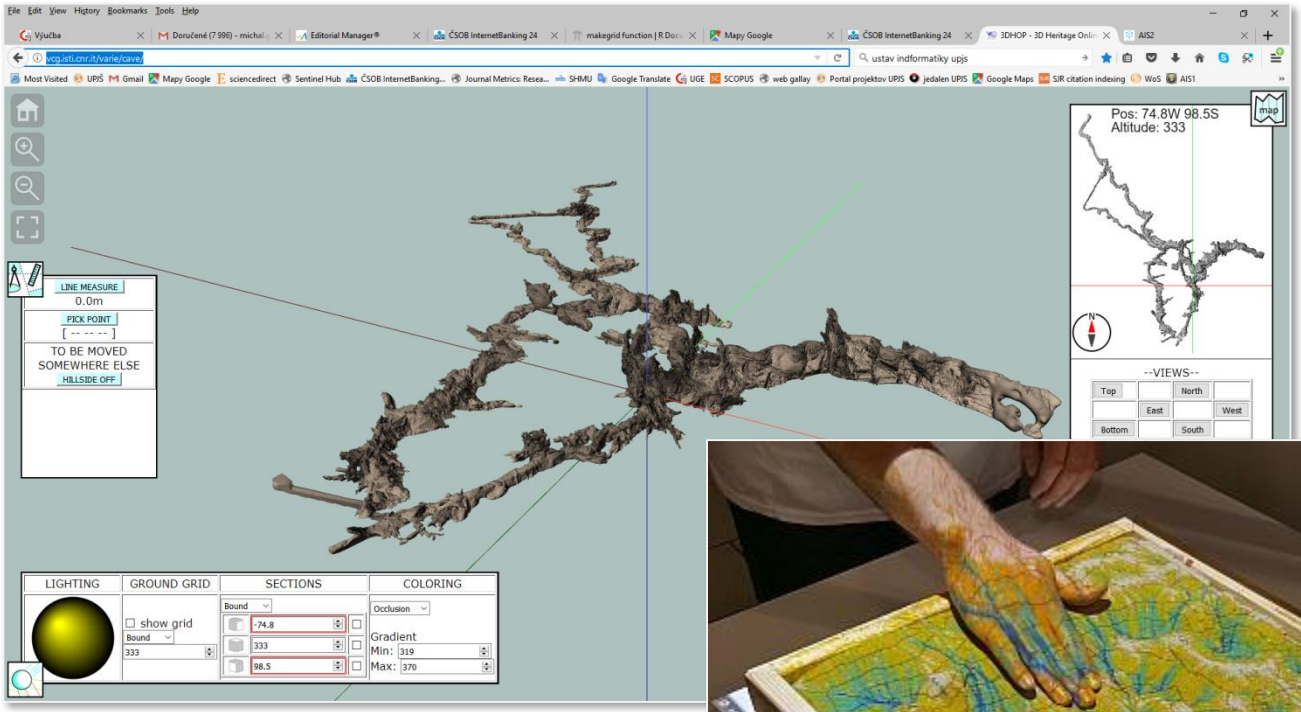


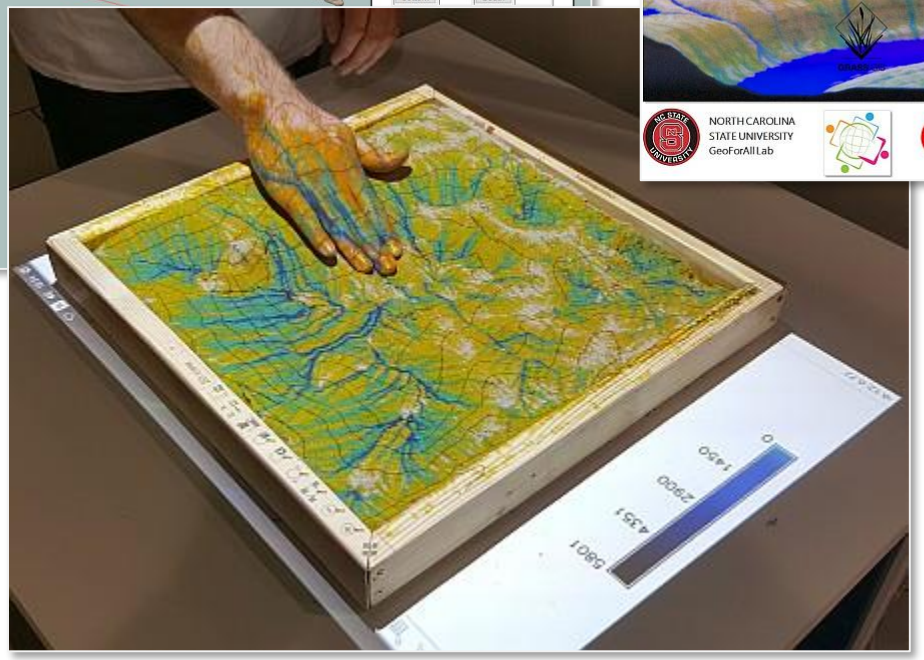


Simulated flood based on high resolution laser scaning digitel terrain model

Interactive 3D visualisation

http://vcg.isti.cnr.it/varie/cave/





http://geo.ics.upjs.sk/index.php/19-zo-zivota-ustavu/441-krajina-na-dotyk-pocas-noci-vyskumnikov

Riešené geoinformatické témy diplomových prác s informatickým zameraním

- Michal Lacko (2017, Mgr., ÚGE) - **Spracovanie dát z bezpilotných leteckých zariadení pre potreby poľnohospodárstva**
- Phong Nguyen Tien (2018, ÚGE) – **Modelovanie distribúcie slnečného žiarenia pomocou 3D modelov miest a open-source GRASS GIS-u**
- Antónia Matisová (2018, Bc., ÚINF) – **Identifikácia kvapľov v 3D modeli jaskyne Domica**

Hlavné okruhy

- Big-spatial-data processing
- Extraction of objects (buildings, landforms)
- Algorithms for distributed computing
- 3D visualisation ()

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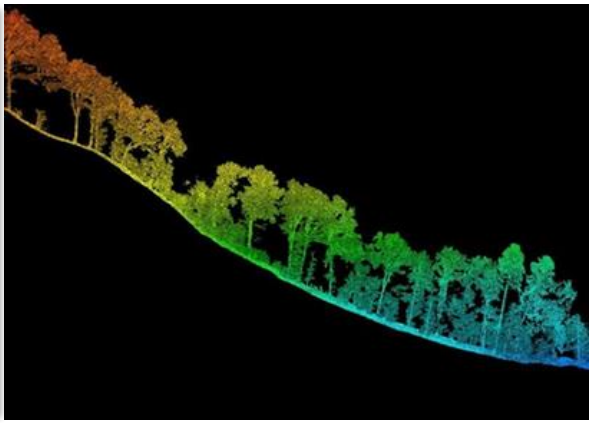
Ďakujem za pozornosť !



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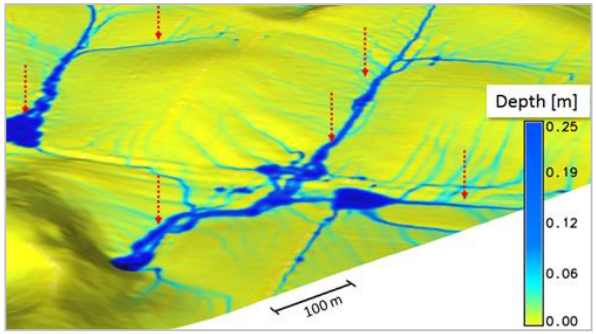

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