

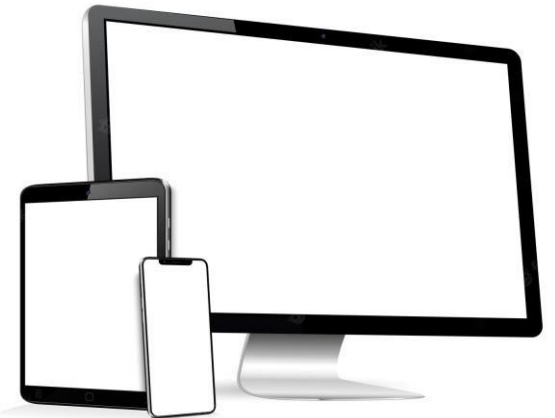


Online mapy a nástroje, Google Earth Engine

Mgr. Katarína Onačillová, PhD.

Výhody

- bez potreby inštalácie
- rýchlosť
- výber a využitie dát (GEE – „cloud“ = dostupné odkiaľkoľvek, z akéhokoľvek zariadenia)
- cenová dostupnosť – mnoho bezplatných nástrojov
- spolupráca
- informácie v reálnom čase



Nevýhody

- pre pokročilejšie analýzy – potreba znalosti skriptovania
- obmedzené funkcie
- niektoré platformy/funkcie platené
- len online







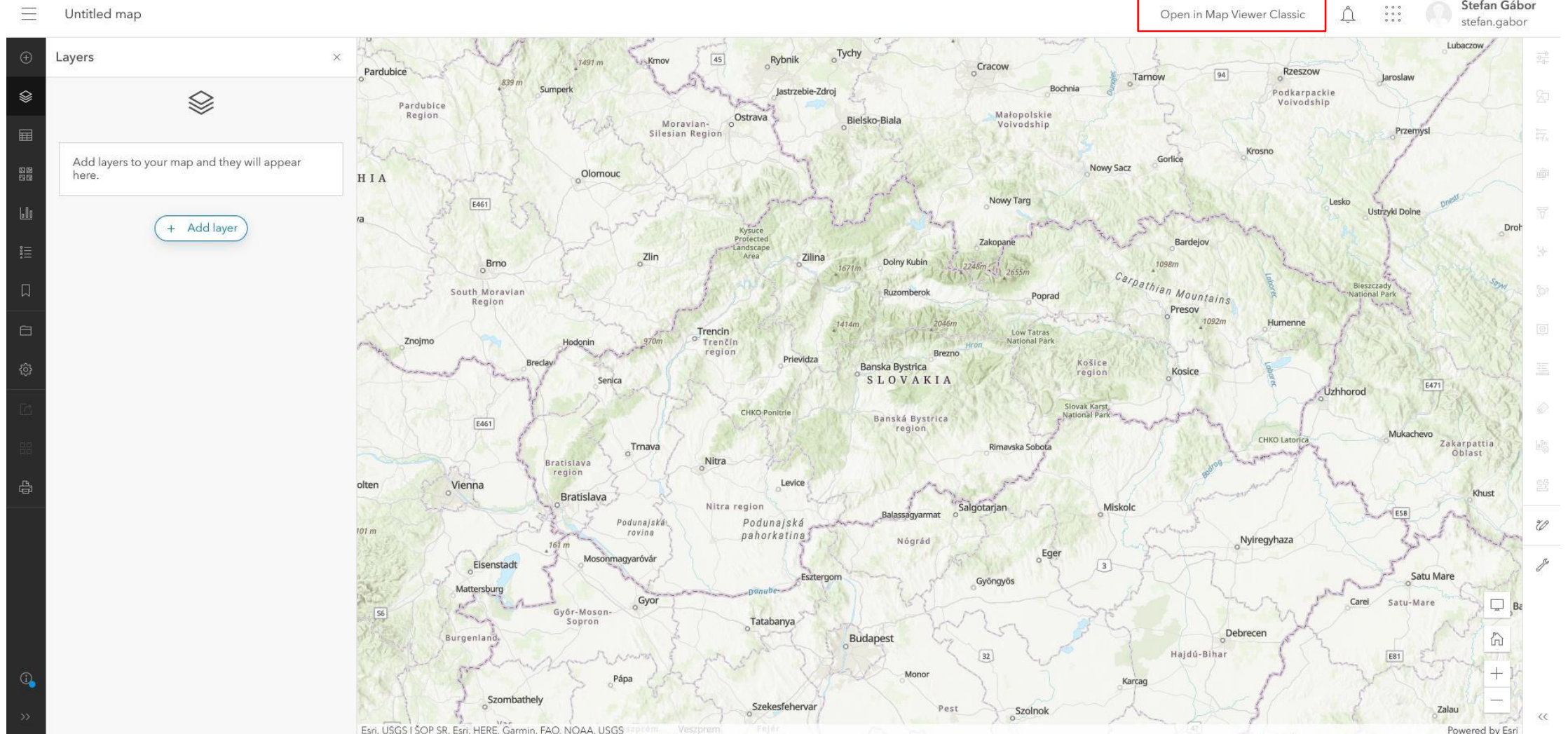
ArcGIS Online

Spojte ľudí, umiestnenia a údaje použitím interaktívnych máp. Pracujte s inteligentnými štýlmi založenými na údajoch a intuitívnymi analytickými nástrojmi. Podelte sa o svoje poznatky so svetom alebo s konkrétnymi skupinami.

[Dozvedieť sa viac o ArcGIS Online](#)

[Prihlásiť sa](#)

ArcGIS Online



The screenshot displays the ArcGIS Online web interface. At the top left, the text "Untitled map" is visible. On the right side of the top bar, a red rectangular box highlights the button "Open in Map Viewer Classic". To the right of this button are icons for notifications, a grid, and a user profile for "Štefan Gábor" with the email "stefan.gabor".

On the left side, there is a "Layers" panel with a stack of layers icon and a text box that says "Add layers to your map and they will appear here." Below this text is a blue button labeled "+ Add layer".

The main area is a topographic map of Central Europe, showing parts of Poland, Slovakia, and Hungary. Major cities like Ostrava, Bratislava, and Budapest are labeled. The Carpathian Mountains are also visible. The map includes various geographical features like rivers, lakes, and elevation contours.

At the bottom of the map, there is a footer with the text "Esri, USGS | SOP SR, Esri, HERE, Garmin, FAO, NOAA, USGS" and "Powered by Esri".

ArcGIS Online

Home ▾ My Map

Open in Map Viewer New Map Štefan ▾

Details Add ▾ Basemap Analysis Save ▾ Share Print ▾ Directions Measure Bookmarks Find address or place

About Content Legend

Make your own map

It's easy to make your own map. Just follow these steps:

- 1. Choose an area.**
Pan and zoom the map to an area or search by its name or address.
- 2. Decide what to show.**
Choose a Basemap then Add layers on top of it.
- 3. Add more to your map.**
Add map notes to draw features on the map.
Display descriptive text, images, and charts for map features in a pop-up.
- 4. Save and share your map.**
Give your map a name and description then share it with other people.

Trust Center Contact Esri Report Abuse

Esri, USGS | SOP SR, Esri, HERE, Garmin, Foursquare, FAO, METI/NASA, USGS

ArcGIS Online

Home ▾ My Map

Open in Map Viewer New Map Štefan ▾

Details Add ▾ Edit Basemap Analysis Save ▾ Share Print ▾ Directions Measure Bookmarks Find address or place

Change Style
okres - okres - okres 3

1 Choose an attribute to show
NZ_10
Add attribute

2 Select a drawing style

Counts and Amounts (Color)

Counts and Amounts (Size)

Location (Single symbol)

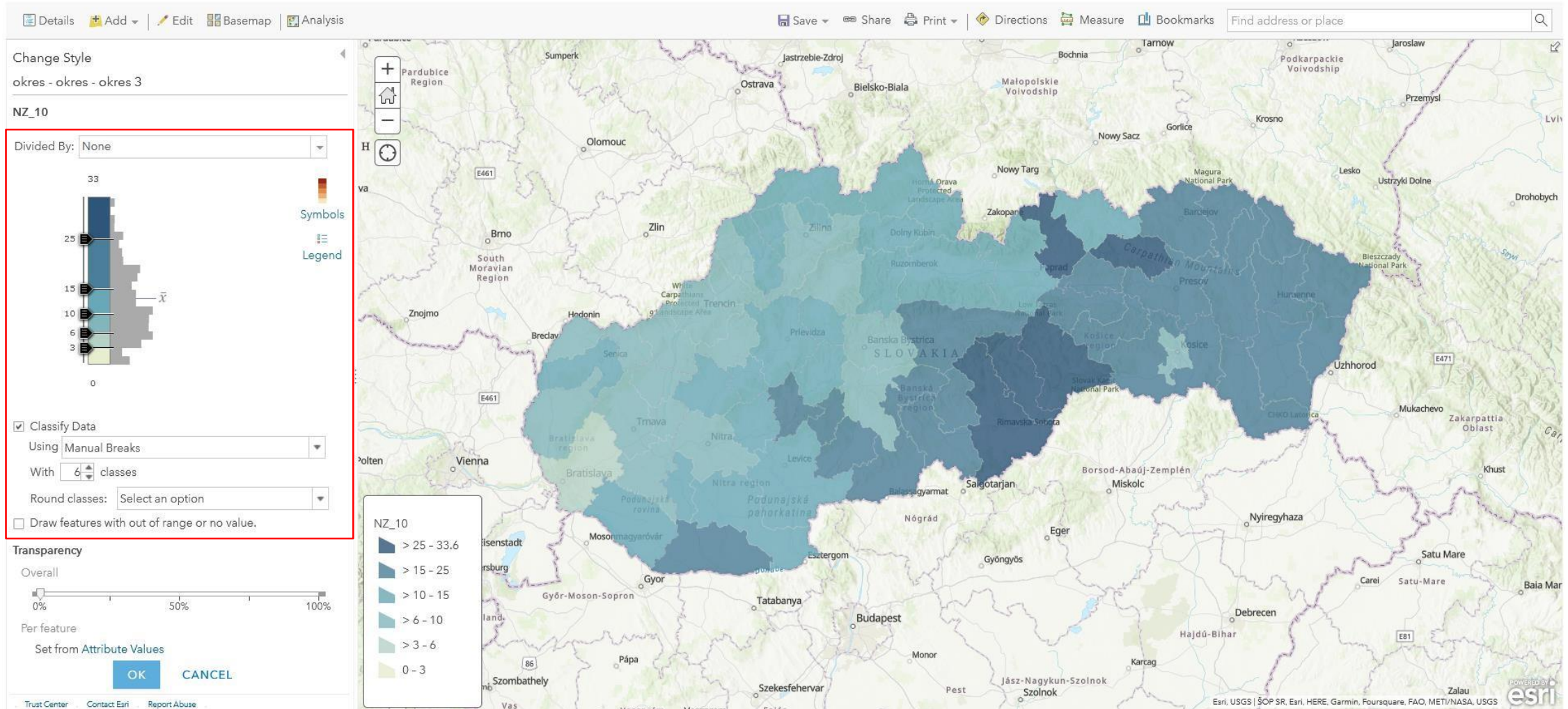
DONE CANCEL

NZ_10
> 20
13.5
< 7

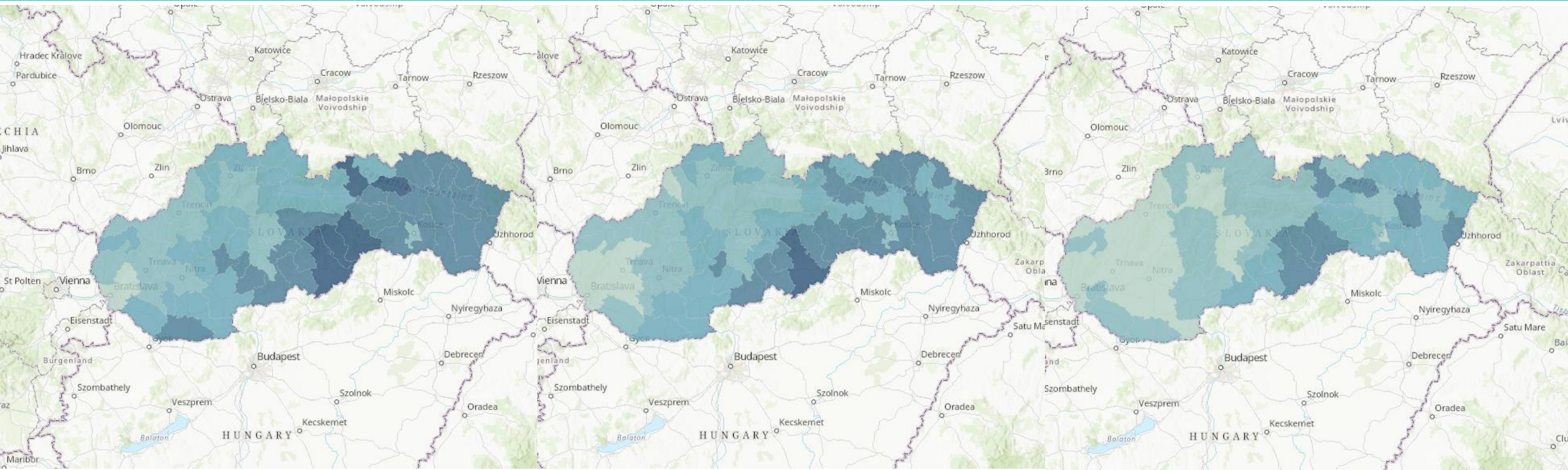
ArcGIS Online

Home ▾ My Map

Open in Map Viewer New Map Štefan ▾



ArcGIS Online



2010

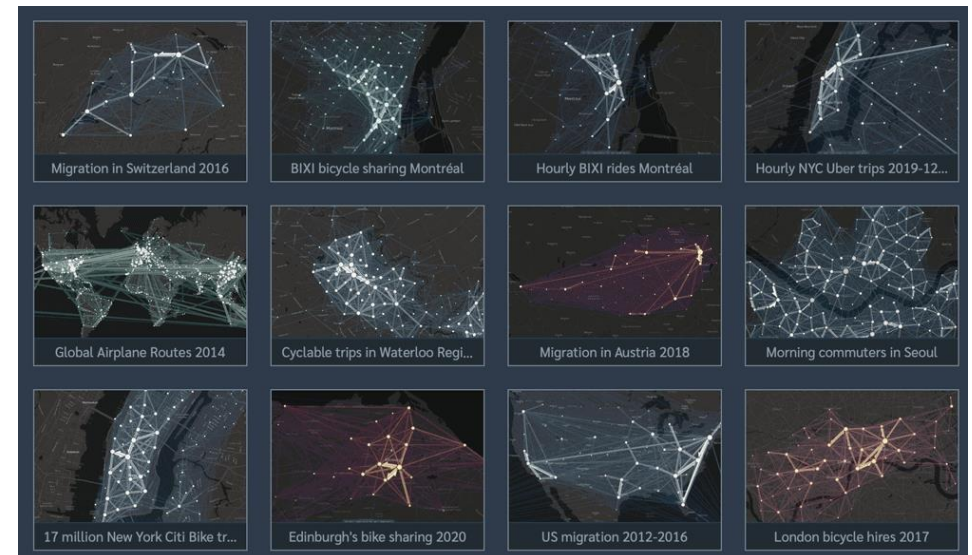
2015

2020



Flowmap.blue

- interaktívna webová aplikácia
- jazyk JavaScript
- tvorca: Ilya Boyandin
- statická a dynamická simulácia O-D tokov v rôznych časových obdobiach
- zobrazenie aj najmenších tokov, ktoré by mohli ostať v statickej podobe skryté



Flowmap.blue

Flowmap.blue template spreadsheet ☆ 📄 🔄

Súbor Upraviť Zobrazíť Vložiť Formát Údaje Nástroje Rozšírenia Pomocník

100% iba zobrazenie

A1	fx	property		
		A	B	C
1		property	value	comment
2		title	Template Spreadsheet	references
3		description	This is just a template prepared to help you publish your dataset. Make a copy of this spreadsheet by going to "File" / "Make a copy..." then you can fill your data in. You must be logged in for this to work.	First step: make a copy of this spreadsheet by going to "File" / "Make a copy..."
4		source.name	Not specified	
5		source.url	http://some.url.here	
6		createdBy.name	Your name	
7		createdBy.email	Your email	← We may contact you asking for a permission to add your flow map to the list of examples on the homepage of flowmap.blue.
8		createdBy.url	http://your.website	
9		mapbox.accessToken		← (optional) If you link or embed your map on a web site where you expect high traffic, please, register and use your own Mapbox access token. https://account.mapbox.com/
10		mapbox.mapStyle		← (optional) Custom Mapbox style URL (you can fine tune map rendering or upload your shapes as a tileset or a dataset and add them as a layer). Your style must be public. We recommend to base your style on the "Light" template. https://docs.mapbox.com/help/tutorials/create-a-custom-style/
11		colors.scheme	Default	
12		colors.darkMode	yes	
13		animate.flows	no	
14		clustering	yes	
15		flows.sheets	flows	← Here you can list multiple comma-separated sheet names if you want to split your flows data into several subsets. There will be a drop-down menu in the UI with the subsets to select from. Here is an example: → https://flowmap.blue/1mK1ZMxNmGiSSxMhtoKO5h7nxyDMXFC_
16		msg.locationTooltip.incoming	Incoming trips	← Here you can customize some of the messages.
17		msg.locationTooltip.outgoing	Outgoing trips	
18		msg.locationTooltip.internal	Internal & round trips	
19		msg.flowTooltip.numOfTrips	Number of trips	
20		msg.totalCount.allTrips	{0} trips	
21		msg.totalCount.countOfTrips	{0} of {1} trips	

properties locations flows

a) šablóna tabuľky Google

A1	fx	id			
		A	B	C	D
1		id	name	lat	lon
2		1	New York	40.713543	-74.011219
3		2	London	51.507425	-0.127738
4		3	Rio de Janeiro	-22.906241	-43.180244
5					
6					

If you only have the location names in your dataset and no geographic coordinates, our Geocoding utility can be of help → <https://flowmap.blue/geocoding>

b) hárok *locations*

A1	fx	origin			
		A	B	C	D
1		origin	dest	count	time
2		1	2	42	↑ It's better to delete the unused columns if you have many rows in your dataset ↑
3		2	1	51	
4		3	1	50	← The "time" column is optional. Supported formats: YYYY-MM-DD HH:MM:SS, YYYY-MM-DD HH:MM, YYYY-MM-DD, YYYY-MM, YYYY
5		2	3	40	
6		1	3	22	Use the OD-matrix data conversion tool if your movement counts are stored as an OD-matrix. →
7		3	2	42	
8					https://flowmap.blue/od-matrix-converter

c) hárok *flows*

Flowmap.blue



mapa je dostupná na [tomto linku](#)

Flowmapper

Flow Mapper File View Tools Help Contact About Geo-Social

Base Map **Regions** Nodes **Flows**

Base Map: [?](#)
Esri Light Gray Canvas

Display base map references

Base map opacity(%): [?](#) 100

Projection: [?](#)
Albers Equal Area Europe

Add title [?](#)

Add description [?](#)

Add north arrow

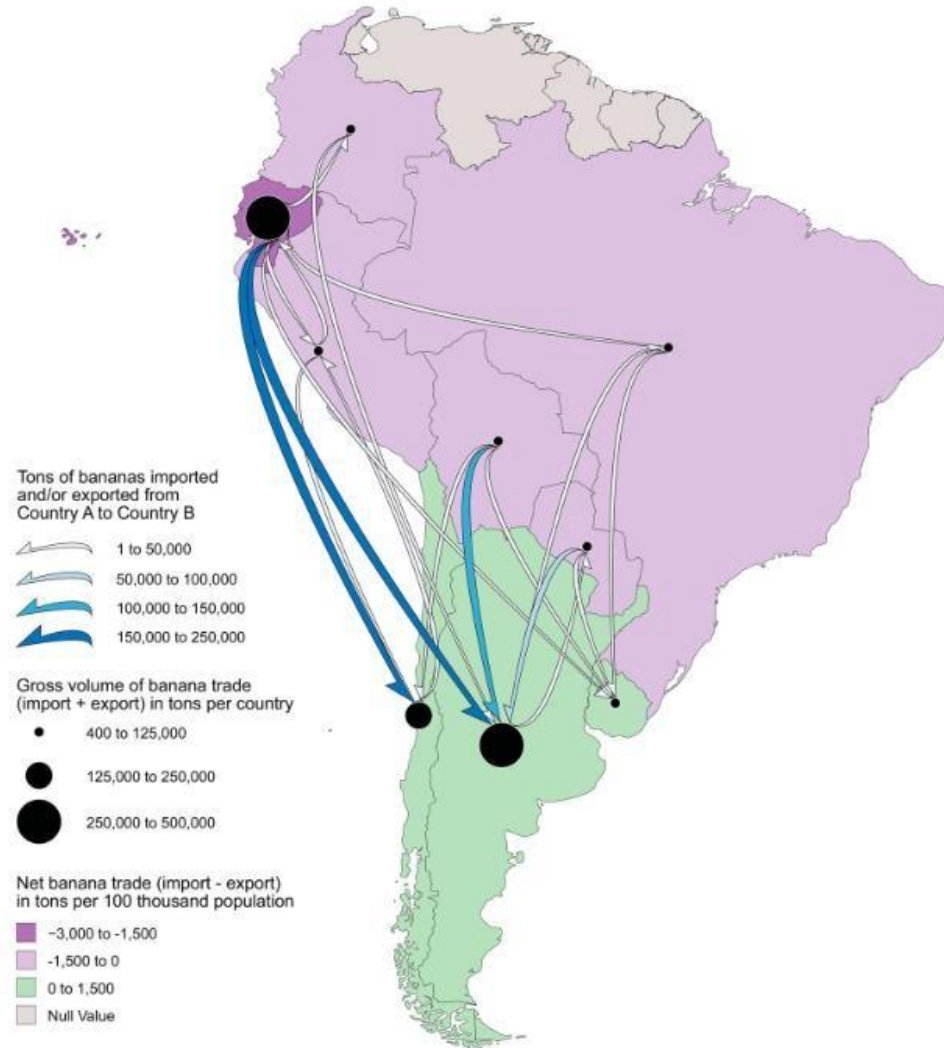
Add projection label

Upload custom references [?](#)

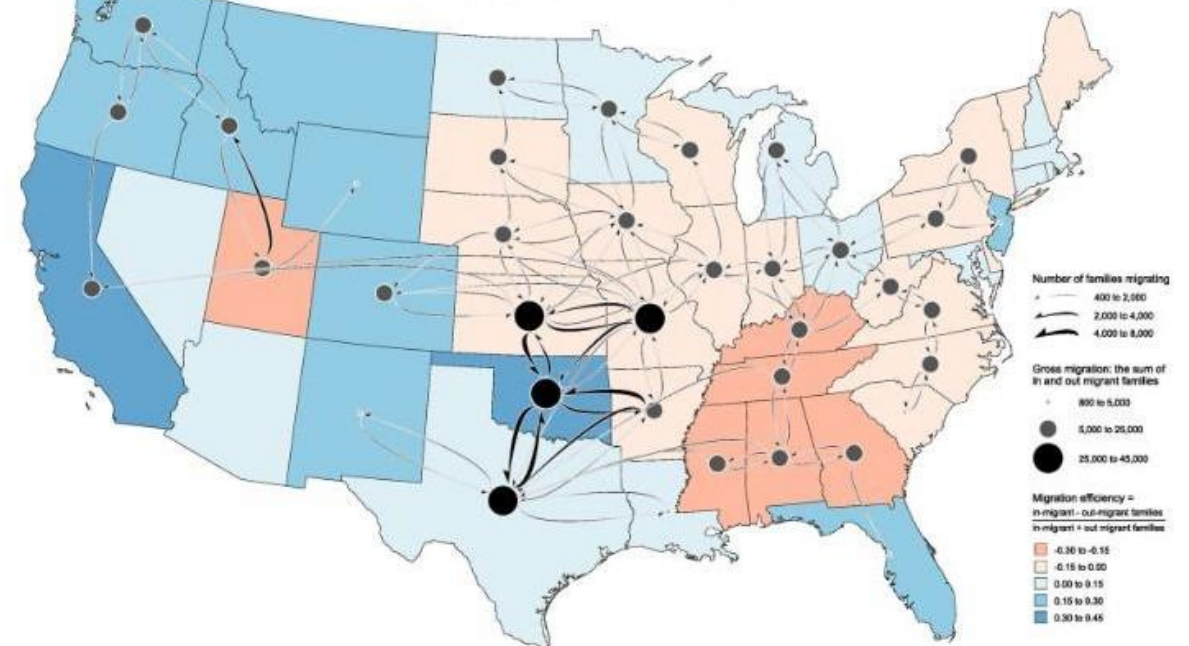
500 km

Flowmapper

Banana trade between countries in South America



Family migration between 1887 and 1924



Koylu, Tian, Windsor, 2022



Google Earth Engine

~ využitie sily cloudu

- Cloudová platforma pre geopriestorové analýzy
- Voľne prístupný katalóg dát > 200 datasetov, > 5 PB dát
- Import vlastných dát a ich integrácia s datasetmi GEE
- Aplikácia rôznych algoritmov
- Export mapových výstupov, tabuliek, grafov...

The Earth Engine Public Data Catalog



Landsat and Sentinel
Raw, TOA, SR, ...



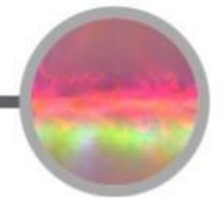
MODIS
Daily, NBAR, LST, ...



Terrain
SRTM, GTOPO, NED, ...



Land Cover
GlobCover, NLCD, ...



Atmospheric
NOAA NCEP, OMI, ...

... and many more, updating daily!

> 200 public datasets

> 5 million images

> 4000 new images every day

> 5 petabytes of data



Google Earth Engine

~ využitie sily cloudu

- Prevažné využitie JavaScript
- Nie je potrebné byť expertom v kódovaní, mnoho tutoriálov je dostupných aj online:
- <https://developers.google.com/earth-engine/getstarted>
- <https://developers.google.com/earth-engine/tutorials>

The screenshot shows the Google Earth Engine website interface. The browser address bar displays the URL: `developers.google.com/earth-engine/tutorials/community/modis-ndvi-time-series-animation`. The page title is "Google Earth Engine". On the left, there is a navigation menu with a "Filter" input field and a list of categories: "Community Overview", "Tutorials" (expanded), "Explore", "Writing a Tutorial", "Style Guide", and "JavaScript Tutorials" (expanded). Under "JavaScript Tutorials", the "MODIS NDVI Times Series Animation" tutorial is highlighted. The main content area shows the tutorial title "MODIS NDVI Times Series Animation" with a bookmark icon and a "Send feedback" button. Below the title, the author is listed as "jdbcode" with links for "EDIT ON GITHUB", "REPORT ISSUE", and "PAGE HISTORY". A blue banner contains a star icon and the text: "Tutorials contributed by the Earth Engine developer community are not part of the official Earth Engine product documentation." Below this, there is a link "Open In Code Editor". The main text of the tutorial reads: "Time series animations of Earth observation imagery are captivating and engaging. In this tutorial, you'll learn how to generate an animated GIF representing 20-year median NDVI for serial 16-day MODIS composites spanning January 1st through December 31st. The following image is an example of the resulting animation." Below the text is a satellite image of the African continent, showing a color gradient from green (vegetation) to brown (arid/semi-arid regions).



Google Earth Engine

~ využitie sily cloudu

Príklady kódov,
uložené skripty

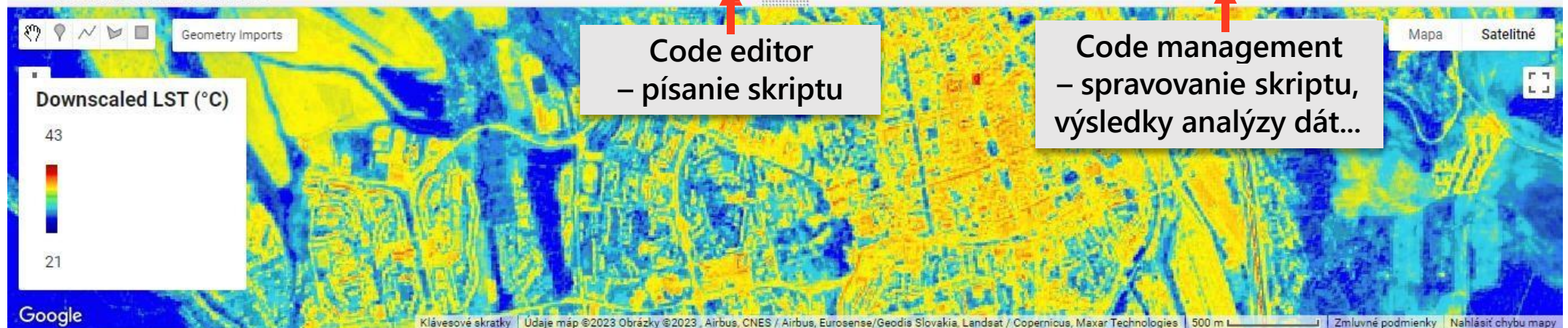
The screenshot shows the Google Earth Engine web interface. On the left, the 'Scripts' panel lists several scripts, including 'downscaling_27_9', 'emissivity', 'karst_sinkholes', 'maya', 'no2_concentrations_london', and 'veronika_DP'. A red arrow points from the text 'Príklady kódov, uložené skripty' to this list. The main area is the 'Code editor' for a script named 'downscaling_0404...'. It contains the following code:

```
Imports (2 entries)
  var study_area: Polygon, 4 vertices
  var geometry_random_points: Polygon, 4 vertices
1
2 //LST CALCULATION:
3
4 // #####
5
6 //Select Landsat 8 Surface Reflectance dataset coverage
7 var L8 = ee.ImageCollection("LANDSAT/LC08/C01/T1_SR")
8   .filterBounds(study_area)
9   .filterDate("2018-08-21","2018-08-30")
10  .filterMetadata("CLOUD_COVER", "less_than", 5);
11  //print(L8, "L8");
12
13
14 //Visualization parameters
15
```

On the right, the 'Inspector' panel shows the output of the script: 'ImageCollection COPERNICUS/S2_SR (3 elements) Sentinel-2 image collection'. Below this, a scatter plot titled 'Correlation LST - NDVI based on Landsat 8 image' is displayed. The plot shows a negative correlation between LST (°C) on the y-axis (ranging from 20 to 50) and NDVI on the x-axis (ranging from -0.5 to 1.0). A red regression line is drawn through the blue data points. A red arrow points from the text 'Code management - spravovanie skriptu, výsledky analýzy dát...' to the Inspector panel.

Code editor
– písanie skriptu

Code management
– spravovanie skriptu,
výsledky analýzy dát...





Google Earth Engine

~ porovnanie tradičnej metódy analýzy s analýzou v GEE

ANALÝZA ZMIEN LESA V OBDOBÍ MEDZI ROKMI 2000 – 2010

TRADIČNÝ POSTUP

- Výber záujmového územia
 - Príprava dát:
 - stiahnutie a uloženie satelitnej scény (snímky) počas vegetačného obdobia (1 scéna ~ 1 GB/zip)
 - orezanie scény a zmozaikovanie (výsledná scéna ~ 1.75 GB)
- = ~48 scén za rok * 11 rokov = ~528 scén = ~ 924 GB
- + aplikácia korekcií, odstránenie oblačnosti, vytvorenie výslednej kompozície za 1 rok, výpočet vegetačného indexu NDVI (+ďalšie stovky GB)
- Analýza dát

➔ *Niekoľko mesiacov práce pre dosiahnutie výsledku*

GOOGLE EARTH ENGINE

V GEE získa skúsenejší programátor ten istý výsledok za ~1 hodinu a pomocou 100 riadkov kódu

The screenshot displays the Google Earth Engine web interface. At the top, there's a search bar and navigation tabs for 'Scripts', 'Docs', and 'Assets'. The 'Scripts' tab is active, showing a code editor with a JavaScript function named 'bustClouds'. The function uses 'ee.Algorithms.Landsat.simpleCloudScore' to calculate cloud scores and 'ee.Reducer.min()' to find pixels not in all bands. Below the code editor, the 'Inspector' and 'Console' panels are visible. The console shows the output of the script, including 'bandNames' and a 'List (7 elements)'. The main map area shows a satellite view of a region with a semi-transparent overlay representing the cloud-masked data. A 'Change Year visualization parameters' dialog box is open in the bottom left, showing options for '1 band (Grayscale)' and '3 bands (RGB)', with a 'Range' set from 2000 to 2010.

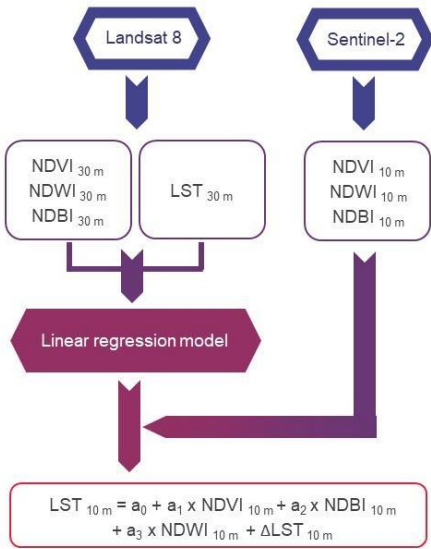


Google Earth Engine

~ príklad využitia

Combining Landsat 8 and Sentinel-2 Data in Google Earth Engine to Derive Higher Resolution Land Surface Temperature Maps

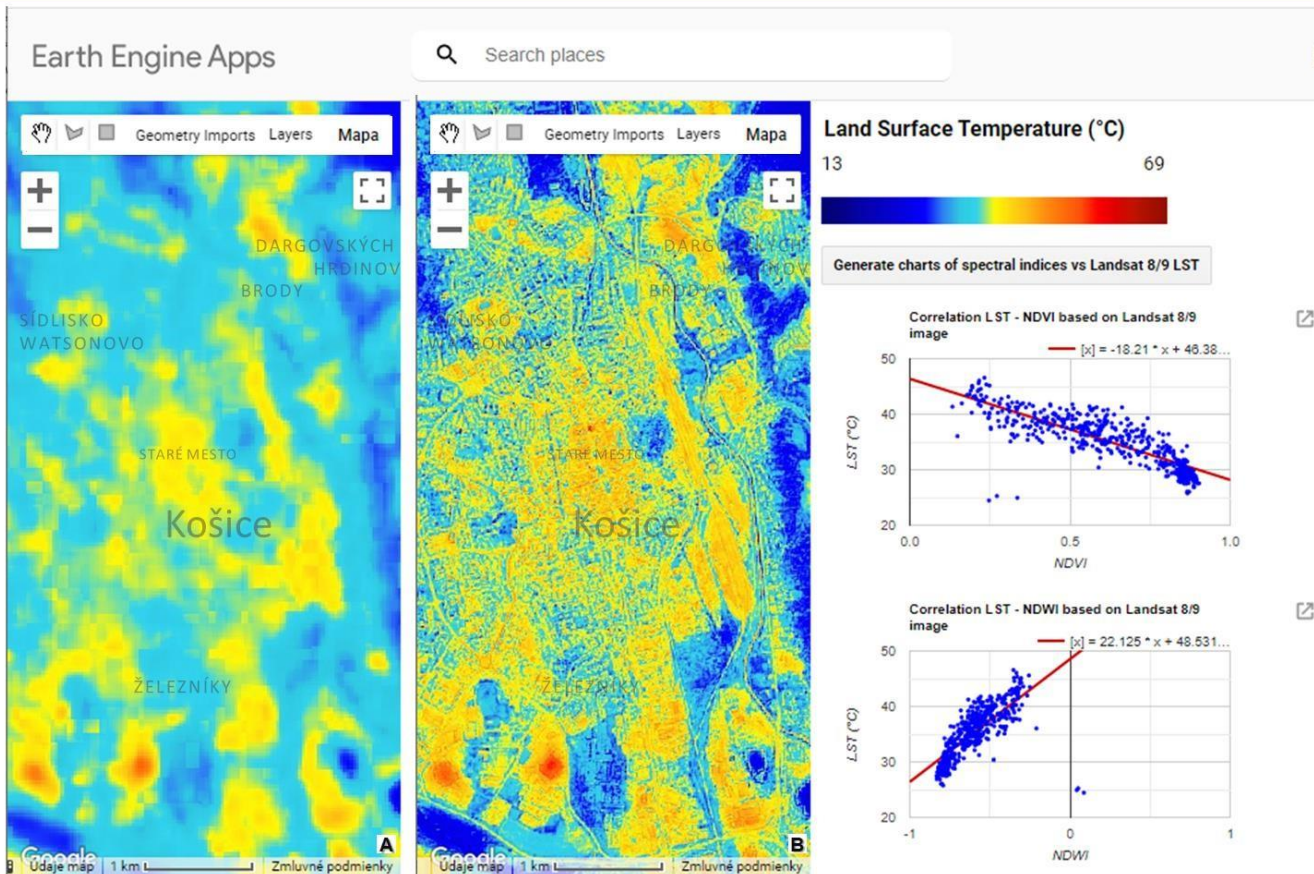
THE FLOWCHART OF PROCEDURAL STEPS



SUPPLEMENTARY MATERIAL

The GEE application for downscaling Landsat LST imagery to 10 m spatial resolution: <https://danielp.users.earthengine.app/view/lst-downscaling>

The source code of the application and a short manual on how to use it: <https://github.com/palubad/LST-downscaling-to-10m-GEE>



Example of the custom output of the implementation of the L8 LST downscaling at 10 m resolution, over the city of Košice, Slovakia, in Google Earth Engine. LST derived: A) from Landsat 8 TIRS data at 30 m resolution, B) as downscaled LST at 10 m resolution with residuals

Kombinácia dát z družíc Landsat 8 a Sentinel-2 v Google Earth Engine pre odvodenie máp teploty povrchu krajinej pokrývky (LST) vo vyššom priestorovom rozlíšení

<https://danielp.users.earthengine.app/view/lst-downscaling>

ONAČILLOVÁ, K., GALLAY, M., PÉLIOVÁ, A., PALUBA, D., TOKARČÍK, O., LAUBERTO VÁ, D. (2022). Combining Landsat 8 and Sentinel-2 Data in Google Earth Engine to Derive Higher Resolution Land Surface Temperature Maps in Urban Environment. *Remote Sensing*, 14(16), 4076.



Google Earth Engine

PRAKTICKÁ UKÁŽKA



Use `print(...)` to write to this console.

Welcome to Earth Engine!
Please use the help menu above (?) to learn more about how to use Earth Engine, or [visit our help page](#) for support.



Welcome to Google Earth Engine

Earth Engine is Google's geospatial science platform in the cloud. Earth Engine is now available for paid commercial use, and remains free for academic and noncommercial use.

Let's get started:

[I WANT TO REGISTER A NEW PROJECT](#)

[I'M AUTHORIZED FOR AN EXISTING CLOUD PROJECT](#)

Want to use Earth Engine noncommercially without using a Google Cloud Project? [Sign up here](#).

You are currently signed in as [kegasteam@gmail.com](#). [Switch account](#).

Get started using Earth Engine

Earth Engine, Google's geospatial science platform in Google Cloud, is available for [paid commercial use](#) and [remains free for academic and research use](#). [Learn more about Google Cloud projects.](#)

Let's get started:



Use with a Cloud Project

Choose or create a Google Cloud Project to collaborate with colleagues, monitor usage, and connect with other Cloud products.



Use without a Cloud Project

Noncommercial users can use Earth Engine without creating Cloud Projects. (Not recommended)



Have an existing project? [Click here to go to the Code Editor](#)

How do you want to use Earth Engine?

- Paid usage**
Commercial businesses, government operations. [See examples](#)
- Unpaid usage**
Non-profits, education, government research, training, media. [See examples](#)

Project type*

Academia & Research

Please note: If you will be accessing Earth Engine as a customer of a Google Cloud Platform reseller, please contact your reseller for terms and pricing governing your use of Earth Engine.

BACK

NEXT

Your information here is subject to [Google Cloud's Privacy Policy](#)

Create or choose a Cloud Project to register:

Create a new project in Google Cloud, or choose one you are authorized to access to enable the API:

- Create a new Google Cloud Project**

Organization*

No organization

Project-ID*

ee-katarina

Choose a unique ID. This cannot be changed later.

Project Name (optional)

Earth Engine Default Project

Choose a name to help you identify the Cloud Project.

- Choose an existing Google Cloud Project**

BACK

CONTINUE TO SUMMARY

Create or choose a Cloud Project to register:

Create a new project in Google Cloud, or choose one you are authorized to access to enable the API:

Create a new Google Cloud Project

Organization

Project ID*

Choose a unique ID. This cannot be changed later.

Project Name (optional)

Choose a name to help you identify the Cloud Project.

Choose an existing Google Cloud Project

BACK


CONTINUE TO SUMMARY

 You must accept the [Cloud Terms of Service](#) before a Cloud Project can be created.



Welcome Katarina Onacillova!

Create and manage your Google Cloud instances, disks, networks, and other resources in one place.

 **Katarina Onacillova**
kegasteam@gmail.com

SWITCH ACCOUNT

Country

Terms of Service

I agree to the [Google Cloud Platform Terms of Service](#), and the terms of service of [any applicable services and APIs](#).

Email updates

I would like to receive periodic emails on news, product updates and special offers from Google Cloud and Google Cloud Partners.


AGREE AND CONTINUE

Confirm your Cloud Project information

Project usage

Academia & Research 

Project info

ee-kegasteam 
Earth Engine Default Project

BACK

CONFIRM AND CONTINUE

Project information cannot be changed later



▼ Owner

No accessible repositories. Click Refresh to check again.

▼ Writer

No accessible repositories. Click Refresh to check again.

▼ Reader

No accessible repositories. Click Refresh to check again.

▼ Archive

No accessible repositories. Click Refresh to check again.

▶ Examples



Use `print(...)` to write to this console.

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Let's get started:

[I WANT TO REGISTER A NEW PROJECT](#)

[I'M AUTHORIZED FOR AN EXISTING CLOUD PROJECT](#)

Want to use Earth Engine noncommercially without using a Google Cloud Project? [Sign up here](#).

You are currently signed in as [kegasteam@gmail.com](#). [Switch account](#).

Scripts Docs Assets

Filter scripts... NEW ↕ ↻

- Owner
No accessible repositories. Click Refresh to check again.
- Writer
No accessible repositories. Click Refresh to check again.
- Reader
No accessible repositories. Click Refresh to check again.
- Archive
No accessible repositories. Click Refresh to check again.
- Examples


1

Get Link Save Run Reset Apps

Inspector Console Tasks

Use print(...) to write to this console.

Welcome to Earth Engine!
Please use the help menu (🗉) to learn more about how to use Earth Engine, or [visit our help page](#) for support.

 Welcome to Google Earth Engine

Select an existing Cloud Project:

Project
ee-kegasteam

BACK SELECT



Filter scripts...

NEW



- Owner
- Writer
- Reader
- Archive
- Examples

1

Use print(...) to write to this console.

Welcome to Earth Engine!
Please use the help menu above (?) to learn more about how to use Earth Engine, or [visit our help page](#) for support.

Earth Engine Code Editor



Welcome to the Earth Engine Code Editor!

To take a tour of its features, click Next, or hit Esc to exit.

- Left Panel
- Editor Panel
- Right Panel
- UI Root
- Search Box
- Cloud Project

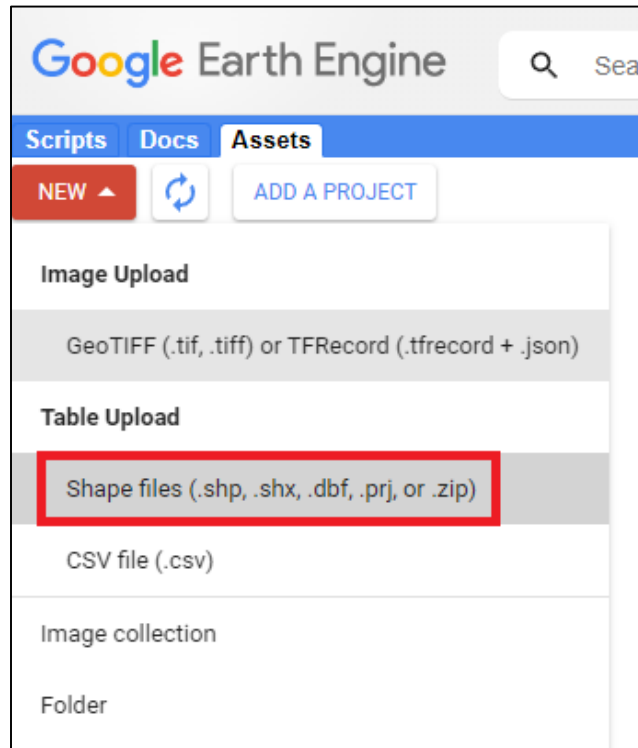
Previous

Next

1. Nahratie vlastných vektorových dát do GEE

(administratívnych hraníc SR)

1.



2.

Upload a new shapefile asset

Source files

SELECT

Please drag and drop or select files for this asset.
Allowed extensions: shp, zip, dbf, prj, shx, cpq, fix, qix, sbn or shp.xml.

hranice_sr.zip

Asset ID

projects/ee-kegasteam/assets/

Properties

Metadata properties about the asset which can be edited during asset upload and after ingestion. The "system:time_start" property is used as the primary date of the asset.

Advanced options

Character encoding

UTF-8

Maximum error

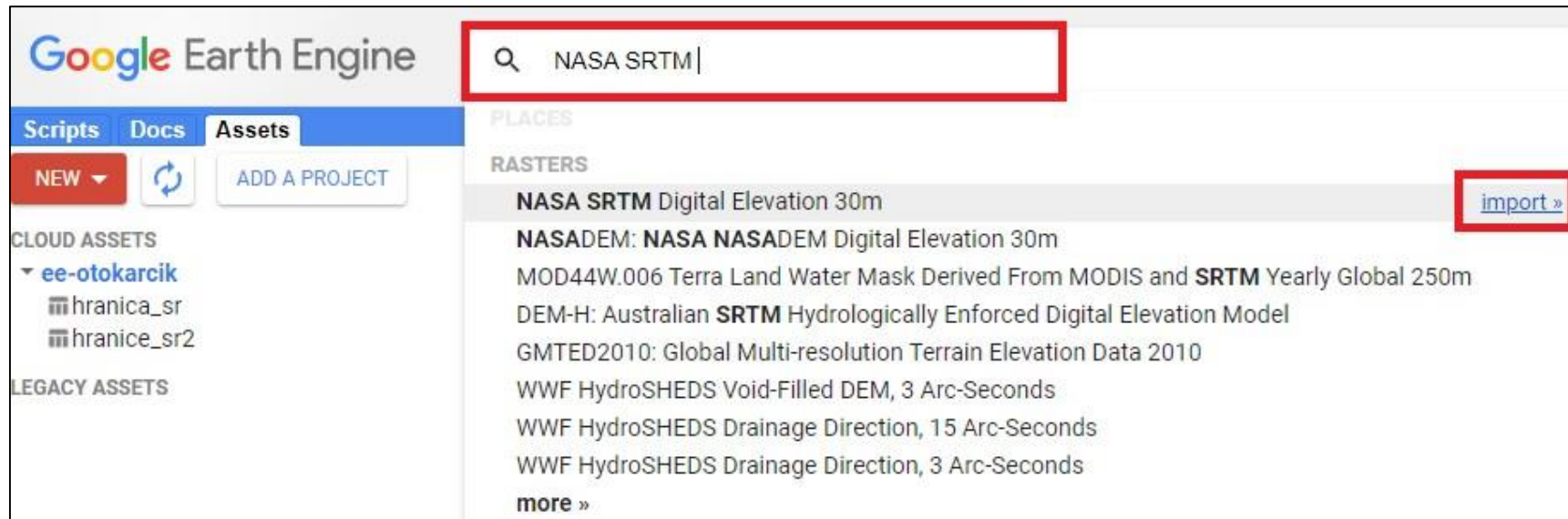
1.0

Split large geometries

[Learn more](#) about how uploaded files are processed.

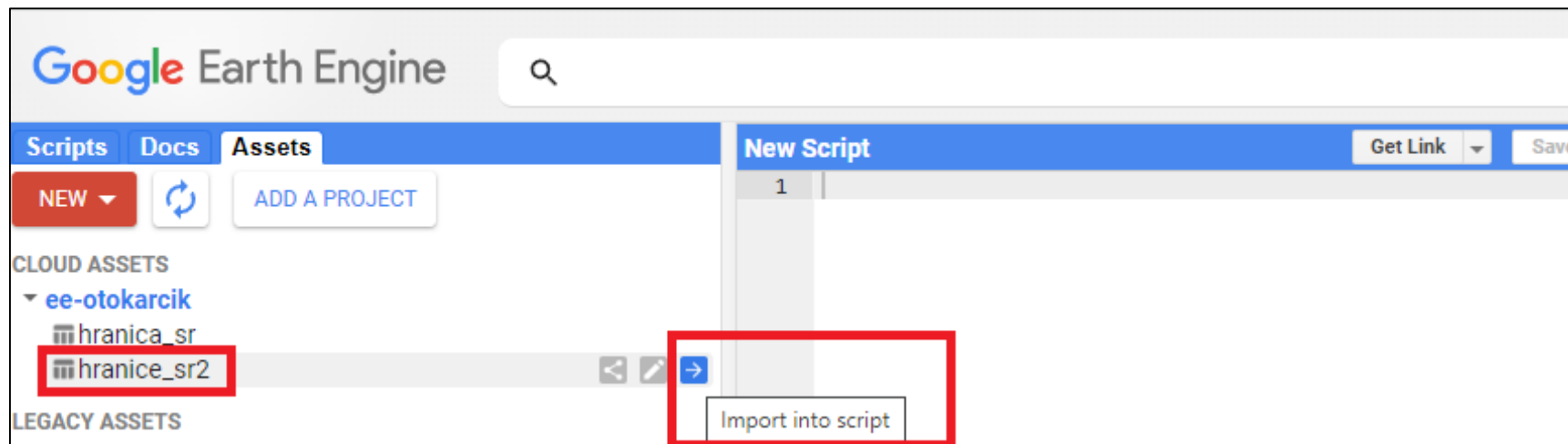
2. Import potřebných dát do skriptu (NASA SRTM Digital elevation, hranice SR)

3.



The screenshot shows the Google Earth Engine interface. The search bar at the top right contains the text "NASA SRTM". Below the search bar, the "RASTERS" section is visible, listing various datasets. The first item, "NASA SRTM Digital Elevation 30m", is highlighted, and an "import »" button is visible to its right. The left sidebar shows the "Assets" tab with a project named "ee-otokarcik" containing assets "hranica_sr" and "hranice_sr2".

4.

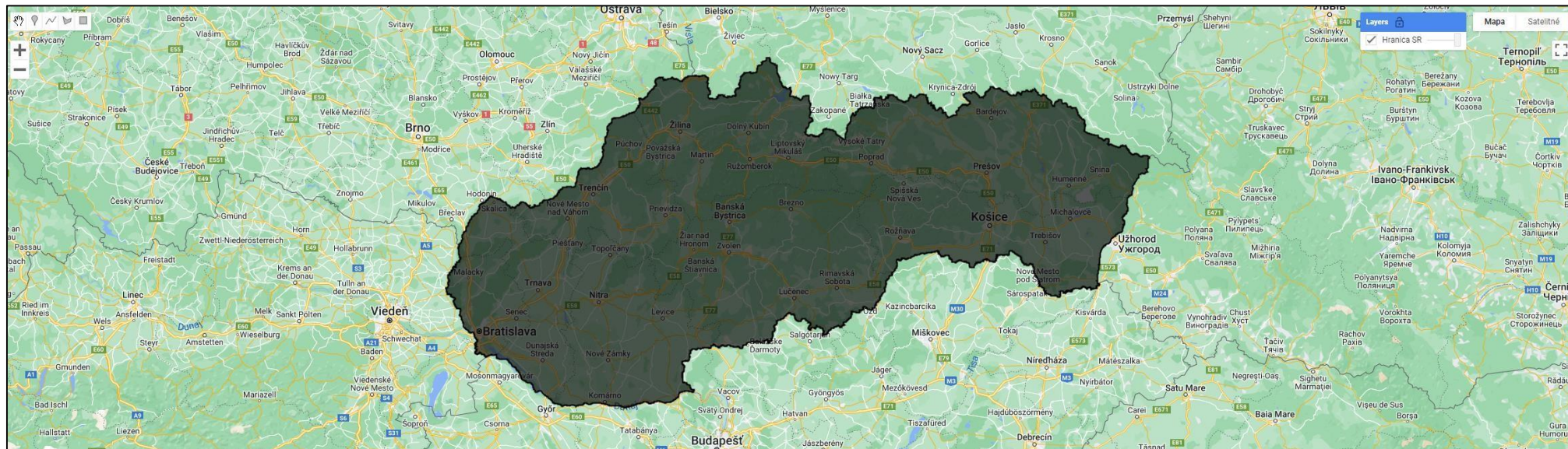


The screenshot shows the Google Earth Engine interface with a "New Script" window open. The "Assets" tab is selected, and the asset "hranice_sr2" is highlighted. A red box highlights the "Import into script" button located below the asset name. The "New Script" window shows a single line of code with the number "1".

3. Nastavenie geometrie pre tabuľku a pridanie administratívnych hraníc do mapového okna

```
var sr=table.geometry();  
Map.addLayer(sr, {color:"black"}, "Hranica SR");
```

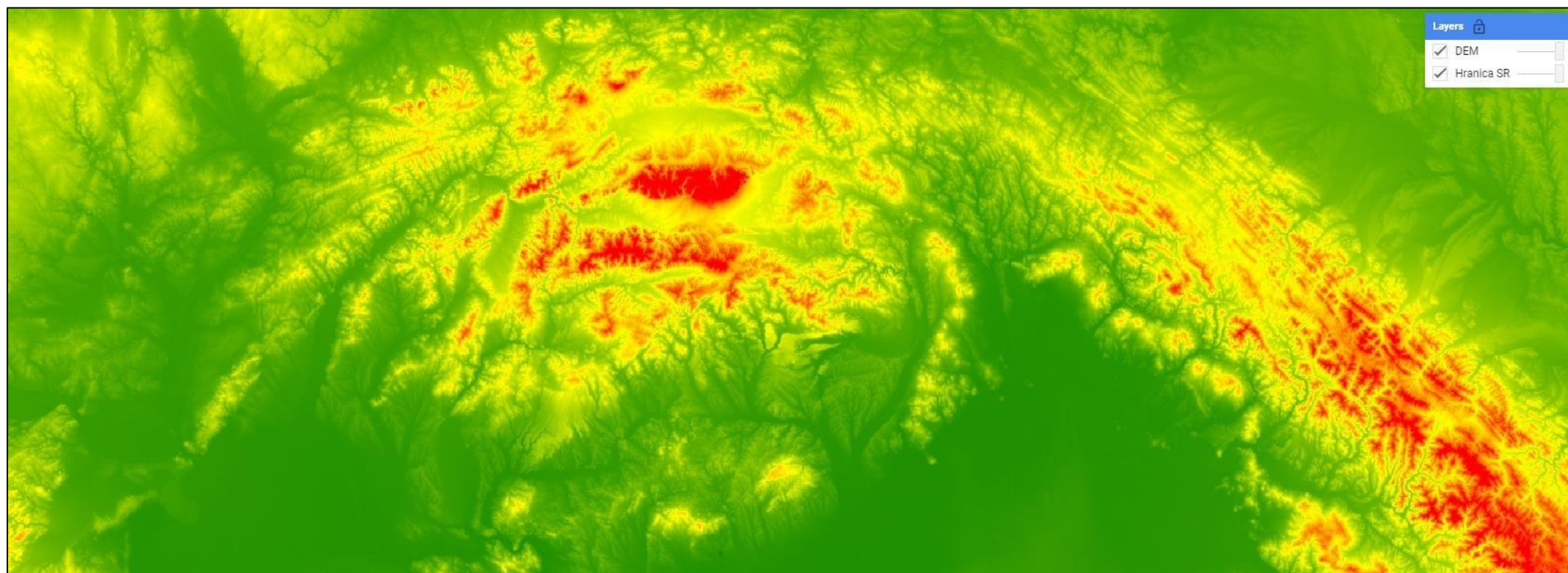
```
New Script *  
Imports (2 entries)   
  ▶ var table: Table projects/ee-onacillovakatarina-kega/assets/hranice_sr  
  ▶ var image: Image "NASA SRTM Digital Elevation 30m" (1 band)   
1 //importované hranice SR majú formát tabuľky, preto jej pre vizualizáciu potrebujeme pridať geometriu  
2  
3 var sr=table.geometry();  
4  
5 //pomocou funkcie "Map.addLayer" pridáme hranice SR do mapového okna, nastavíme farbu a vrstvu pomenujeme  
6 Map.addLayer(sr, {color:"black"}, "Hranica SR");  
7
```



4. Pridanie DEM do mapového okna

```
Map.addLayer(image, {min:0, max:1500, palette:"green, yellow, red"}, "DEM");
```

```
//do mapového okna pridáme digitálny výškový model (DEM), nastavíme farebnú škálu a intervaly  
Map.addLayer(image, {min:0, max:1500, palette:"green, yellow, red"}, "DEM");
```

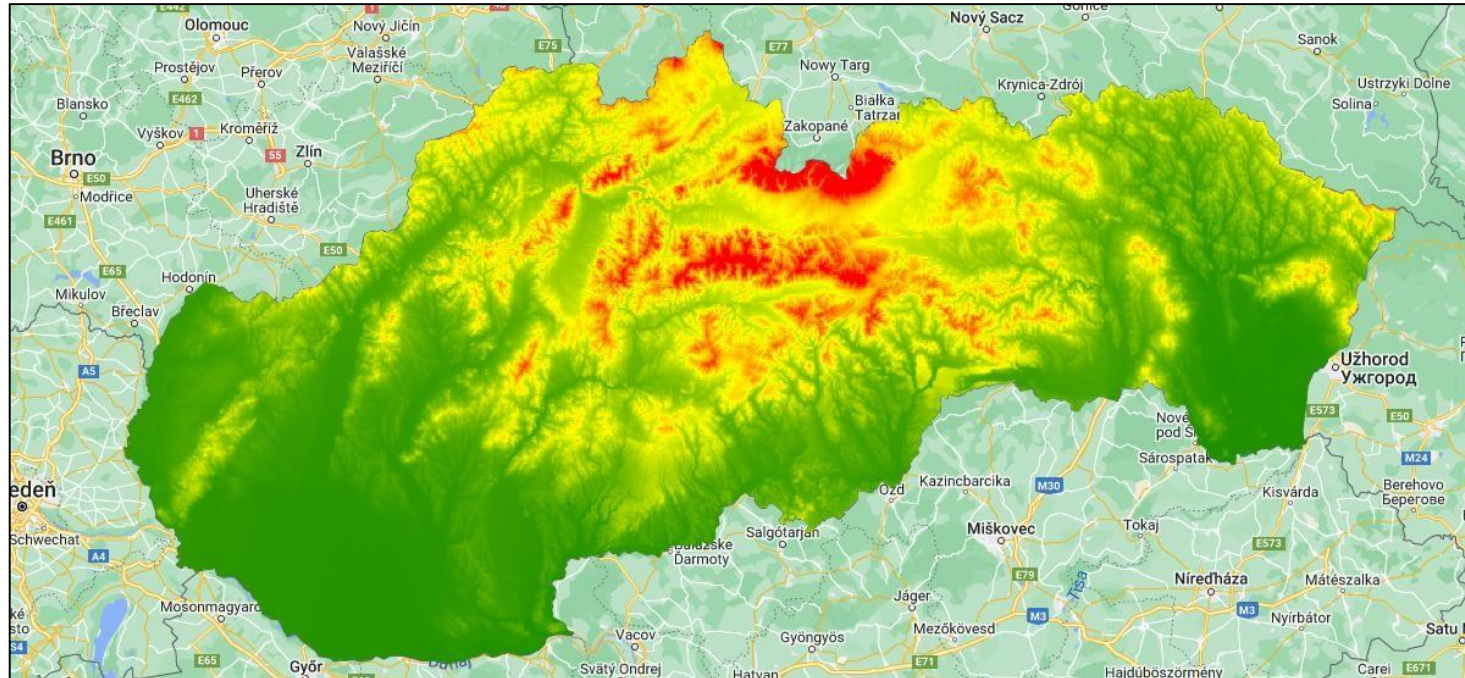


5. Orezanie DEM podľa hraníc SR

```
var clip_sr=image.clip(sr);
```

```
Map.addLayer(clip_sr, {min:0, max:1500, palette:"green, yellow, red"}, "DEM_sr");
```

```
//pomocou nástroja clip orežeme DEM podľa hraníc SR//  
var clip_sr= image.clip(sr);  
  
//orezané DEM pridáme do mapového okna opäť pomocou nástroja Map.addLayer//  
Map.addLayer(clip_sr, {min:0, max:1500, palette:"green, yellow, red"}, "DEM_sr");
```



6. Analýzy terénu pomocou príkazu „ee.Terrain“ a pridanie výsledkov do mapového okna

```
var hillshade= ee.Terrain.hillshade(clip_sr);  
var slope=ee.Terrain.slope(clip_sr);  
var aspect=ee.Terrain.aspect(clip_sr);  
Map.addLayer(hillshade, {min:0, max:255}, "Hillshade");  
Map.addLayer(slope, {min:0, max:40, palette:"green, yellow, red"}, "Slope");  
Map.addLayer(aspect, {min:0, max:360, palette:"green, yellow, red, blue"}, "Aspect");
```

```
//s orezaným DEM urobíme ešte ďalšie analýzy: tieňovaný reliéf (hillshade), mapu sklonov(slope) a orientáciu voči svetovým stranám, použijeme nástroj "ee.Terrain"/>  
var hillshade= ee.Terrain.hillshade(clip_sr);  
var slope=ee.Terrain.slope(clip_sr);  
var aspect=ee.Terrain.aspect(clip_sr);  
  
//výsledky analýz pridáme do mapového okna//  
Map.addLayer(hillshade, {min:0, max:255}, "Hillshade");  
Map.addLayer(slope, {min:0, max:40, palette:"green, yellow, red"}, "Slope");  
Map.addLayer(aspect, {min:0, max:360, palette:"green, yellow, red, blue"}, "Aspect");
```



7. Export mapy na disk

```
Export.image.toDrive({image: clip_sr, description: 'Digitální výškový model SR', scale: 20,  
                    region: sr, maxPixels: 1e13,});
```

```
//export mapy na disk//  
Export.image.toDrive({image: clip_sr, description: 'Digitální výškový model SR', scale: 20, region: sr, maxPixels: 1e13,});
```

- CSACHOVÁ, S., KAŇUK, J., GESSERT, A., NOVOTNÝ, L., GÁBOR, Š., ŠUPINSKÝ, J. 2022. *Geopriestorové technológie v bádateľsky orientovanom vyučovaní geografie*, Košice (Univerzita Pavla Jozefa Šafárika v Košiciach).
- GÁBOR, Š. 2022: Implementácia nástroja ArcGIS Online do bádateľsky orientovaného vyučovacieho procesu v geografii. *Geografické informácie* (in press).
- GÁBOR, Š., PREGI, L., NOVOTNÝ, L. 2022: Vizualizácia O-D tokov pomocou online mapovej aplikácie Flowmap.blue. In *Sborník abstraktů z XXV. kongresu České geografické společnosti společně s 18. kongresem Slovenskej geografickej spoločnosti, 6-8. září 2022*, Olomouc (Univerzita Palackého v Olomouci), p. 55.
- ONAČILLOVÁ, K., GALLAY, M., PÉLIOVÁ, A., PALUBA, D., TOKARČÍK, O., LAUBERTOVÁ, D. 2022. Combining Landsat 8 and Sentinel-2 Data in Google Earth Engine to Derive Higher Resolution Land Surface Temperature Maps in Urban Environment. *Remote Sensing*, 14(16), 4076.
- PREGI, L., NOVOTNÝ, L., GÁBOR, Š. 2022: Vizualizácia priestorových procesov pomocou online mapovej aplikácie Flowmap.blue. *Kartografické listy*, 30(1), 21-38.



Ďakujeme za pozornosť!

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