JAMES RENNIE BEQUEST

REPORT ON EXPEDITION / PROJECT / CONFERENCE

**Expedition/Project/
Conference Title:**   Google Earth Engine Summit

Travel Dates: 11ᵗʰ – 16ᵗʰ June 2018

Location: Dublin, Ireland

Group member(s):   Gergana Daskalova

Aims: Participate in the Google Earth Engine (GEE) Summit in Dublin, Ireland. The GEE Summit is an interdisciplinary event bringing together GEE users such as academic researchers, policy consultants and government officials for the purposes of knowledge exchange via talks and advanced training through a series of workshops.

OUTCOME (not less than 300 words):-

Conference summary
The Google Earth Engine (https://developers.google.com/earth-engine/) is an online platform for extremely efficient analysis of remote-sensing data. The Google Earth Engine Summit is different to traditional conferences in that it combined intensive training on analysing remote-sensing data with presentations and the sharing of research. I was one of 200 selected participants from around the world. A core element of the Summit is the Hackathon where we 1) presented our research and 2) over the course of two days, worked on a new analysis as a group. We then linked the hackathon analyses to our own research and on the final day of the conference, our group presented our results. I was part of the "Analysing land-use trends in Bosnia" Hackathon. This presentation and hackathon allowed me to share my research at the University of Edinburgh, but also to explore an entirely new research problem with global experts in the field. My group presented the algorithm we developed for analyses of land-use trends on the last day of the Summit.

Outcome
The over-arching outcome of my participation in the Google Earth Engine Summit was the advancement of my analytical skills through the use of a cutting-edge tool – the Earth Engine. With the help of the James Rennie Bequest, I engaged with an international group of researchers and had the opportunity to learn from experts in the remote-sensing fields, whilst also sharing the findings of my own research. The Summit delivered several specific and measurable outcomes:

- I developed programming scripts to analyse changes in land-use, spectral reflectance and forest cover change (Figure 1).
- I developed an interactive web application (Figure 3).
- I shared the findings of my research on forest cover change and biodiversity.
- I learned about new tools, such as machine-learning and breakpoint algorithms.
- I participated in a hackathon where my group analyses land abandonment trends.
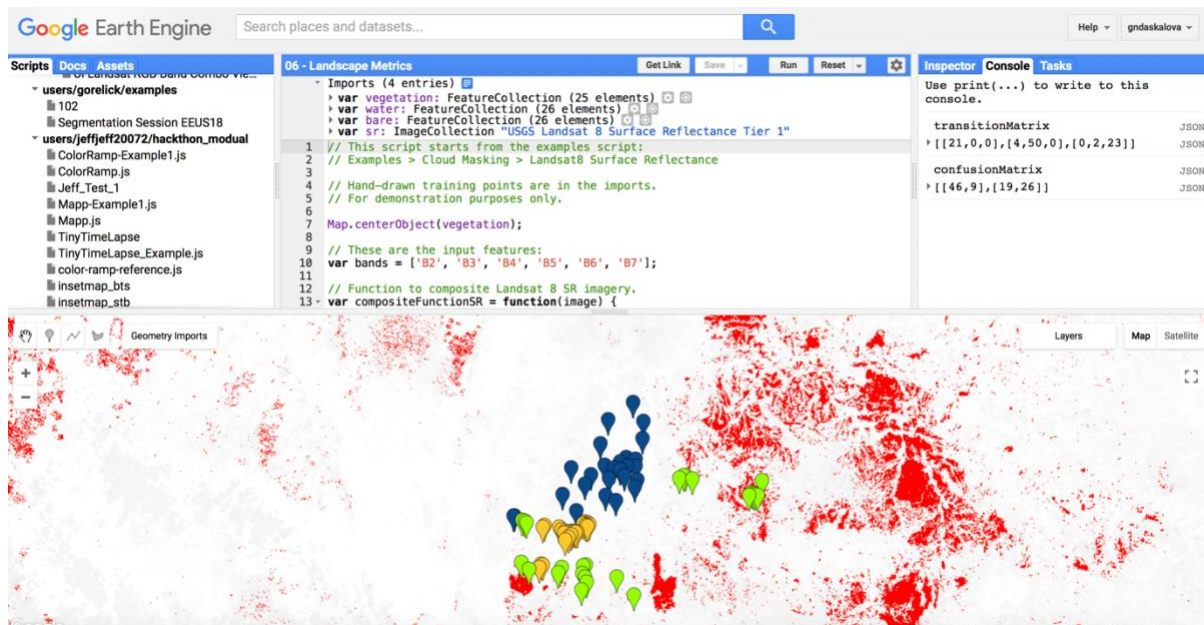
Figure 1. Sample analysis of changes in vegetation cover before and after fires. I developed programming scripts through the Google Earth Engine Code Editor.

Career and training benefits

The Summit was an excellent opportunity to advance my skills in analysing large-scale remote-sensing data. Specifically, I participated in the following workshops:

- Change Detection from Landsat composites
- Monitoring with Breakpoint Algorithms
- Building User Interfaces in Earth Engine
- Introduction to TensorFlow models and Earth Engine
- Building Scalable (static) Websites from Earth Engine data

The hackathon and presentation sessions extended my academic network and presented me with an international platform to discuss my research on the effects of land-use change on biodiversity around the world. The training during the Summit introduced me to new analytical tools (Figure 2, left) which I then applied to regions of focal interest for my PhD (Figure 2, right). Finally, an additional benefit was learning how to present remote-sensing analyses in an engaging and easy to understand ways through web applications (Figure 3), which improved my ability to share and communicate my research to diverse audiences.
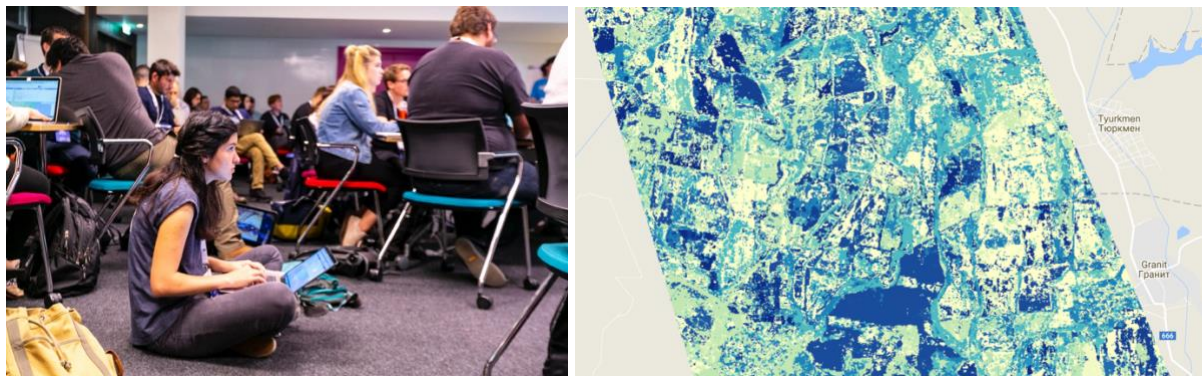

Figure 2. Training workshops (left) and the product of a land-use trend analysis – an analytical approach I learned during the Summit (right). Map shows the timing of land abandonment near Tyurkmen, Bulgaria (darker areas were abandoned later, i.e., 2014, whereas lighter areas were abandoned around the 1990s).
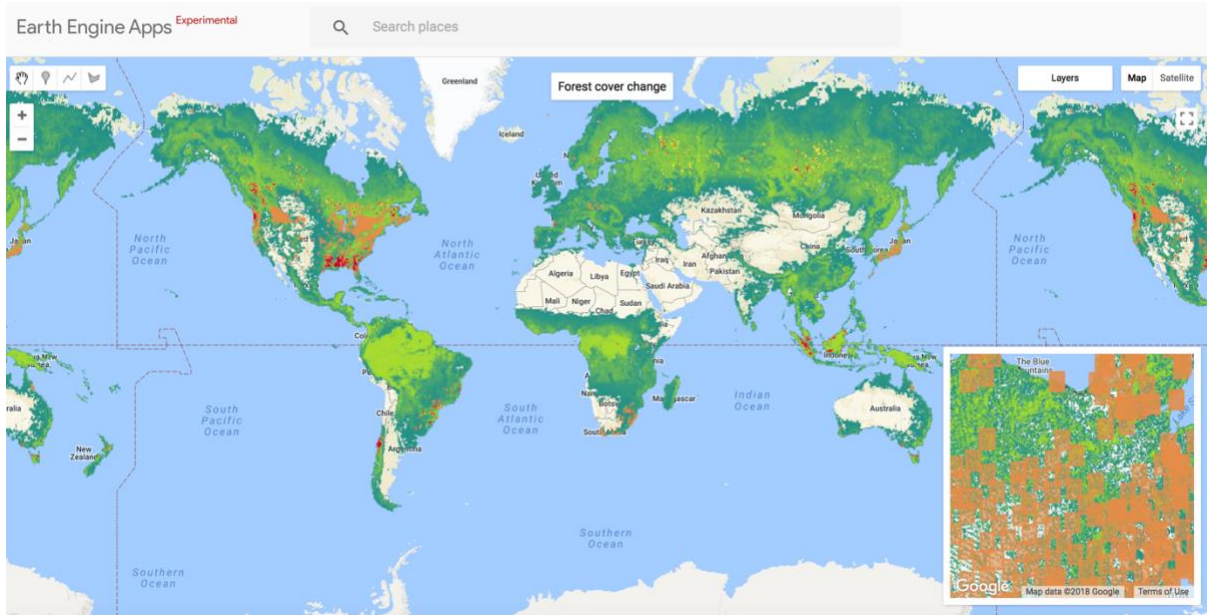
Figure 3. Screenshot of interactive web app of global forest cover change and biodiversity monitoring. During the Summit, I learned how to develop maps into interactive web applications, which are great for science communication and engagement. My app visualises global changes in forest cover (both gains and losses) and the places for which we have temporal records of populations and ecological communities (in orange).