

Arctica - Carta non blanca. Openstreetmap for Arctic Archipelago.

Pawel Strus ^{a,*}, Andrzej Skoczek ^a, Faustyna Mężyk ^a, Mateusz Podgórn ^a

^a *University of the National Education Commission, Krakow, pawel.strus@uken.krakow.pl, andrzej.skoczek@student.uken.krakow.pl, faustyna.mezyk@student.uken.krakow.pl, mateusz.podgorni@student.uken.krakow.pl*

* Corresponding author

Keywords: mapping Arctic, volunteer cartography, OpenstreetMap

Abstract:

For several years, we have been conducting research and experiments on the use of the OpenStreetMap map as a reliable source of data in geographical research. We work under the auspices of the Geoinformation Research Team of the University of the National Education Commission, Krakow. The team consists of students of geography, geodesy and academics coordinating the work.

Our research consists of three main parts.

First, we follow all changes in the OpenStreetMap creation technology. We look for scientific sources describing the creation of the map and its use in various disciplines of spatial sciences. We focus on tags - markers, attributes that correspond to the type of object in OSM. We try to select the right tag for the right object (e.g. a terminal moraine as an example from physical geography or historical monuments on the Gettysburg battlefield - human geography).

Second, we actively create the map - this is the hardest stage, requiring systematic work on the computer using various OpenStreetMap editors (mainly JOSM and ID). We encourage students to work and we usually have optimistic results. Few weeks after the start of the project, the full composition of the cartographic team is clarified. Students who survived the initial inconveniences, such as the monotony of the work stay on drawing the map, gaining valuable experience

Thirdly, we create so-called cartographic polygons in various locations in Europe. We search for an area that meets the appropriate conditions, e.g. a peripheral place, valuable in terms of nature, but with an empty OSM map or, on the contrary, a tourist area, where the map requires additional supplementation. So far, we have worked, for example, on the Peljesac peninsula in Croatia, in the Santa Claus Village in Rovaniemi, Finland, the wild Bieszczady Mountains in Poland. We always try to supplement the map to the limits of the method (so-called micromapping) - we mark all small objects, benches, waste bins, notice boards, add information about the opening hours of shops and public utility buildings. Our work has been presented at many scientific conferences including State of the Map World in Nairobi (Strus 2024)

In connection with the upcoming international cartographic conference, we decided to move our activities to the Canadian Arctic. The decision was simple, because OpenStreetMap for the Arctic archipelago is supplemented to a very small extent.

A team of about 10 people started working. Each participant in the project was tasked with taking over "their own" island under their patronage. The most advanced work is on Table Island, Lowther Island, Dundas Island. After some changes have been made, the map is updated, and the data is sent to the server. A good example is Table Island, where the river network has been supplemented and the coastline, which was originally very "toothbrush shaped", has been changed.

Our goal is to supplement the objects for several dozen Arctic islands and then continue work on larger objects, such as Ellesmere Island or Baffin Island.



Figure 1. Example of early stage o OSM work, the periodic waterbodies are entered on the map , in the next step periodic watercourses, areas covered with polygonal soils, relief elements will be drawn

What objects can be marked in such a seemingly uniform environment? First of all, the coastline, which was previously generated automatically, must be supplemented and refined. Second main factor is landcover: ice fields, tundra, bare rocks dominate – in terms of land cover, cliffs and various types of glacial valleys in terms of relief. An important element is temporary lakes and streams, however, marking them is quite subjective, because they often change their boundaries (lakes) and length (streams) depending on, for example, the season. A tag was found for each element mentioned in the OSM marking system (e.g. natural:water / stream = intermittent in the case of an episodic stream). Inputting natural objects to Openstreetmap involves some risk. Objects in conducted on the basis of satellite imagery (e.g. Maxar), where the instantaneous state of land cover is recorded. Typically, an imaging date is adopted for the period with the smallest snow cover and the largest area of extrusion lakes. This state, of course, can fluctuate from year to year especially in the face of global warming. Once the data is entered into the map, we will systematically verify it with other types of data. It should also be mentioned that the josm editor allows the use of external data sources, both in the form of protocols that make the data available on the Internet (WMS, WMTS) and placed on the computer disk. In this way, we use, for example, ArcticDEM (<https://www.pgc.umn.edu/data/arcticdem/>) as a topographic background.

Our work is not just simple map drawing. We try to keep track of trends and phenomena in the world of volunteer cartography, also using classic literature on the subject (e.g. Hacar 2002, Haklay 2010, Mashadi et al. 2015)

We are still in early stages of the project, but by the time of the performance in Vancouver, a large part of the Archipelago islands will certainly gain a new - cartographic face

Acknowledgements

We would like to thank the authorities of our University (UKEN Krakow) for the financial support that allows us to pursue the topics we dream about.

We would like to thank the OpenStreetMap Poland Association for its constant support in our projects.

References

Hacar, M. (2022). Analyzing the behaviors of OpenStreetMap volunteers in mapping building polygons using a machine learning approach. *ISPRS International Journal of Geo-Information*, 11(1), 70.

Haklay, M. (2010). How good is volunteered geographical information? A comparative study of OpenStreetMap and Ordnance Survey datasets. *Environment and planning B: Planning and design*, 37(4), 682-703.

Mashhadi, A., Quattrone, G., & Capra, L. (2015). The impact of society on volunteered geographic information: The case of OpenStreetMap. *OpenStreetMap in GIScience: Experiences, research, and applications*, 125-141.

Strus P. (2024, September 6-8). Beyond the seventh mountain, beyond the seventh river - Openstreetmap as a base map in geographical research [Conference presentation]. State of the Map World conference 2024, Nairobi, Kenya, <https://2024.stateofthemap.org/sessions/CDT3PZ/>