

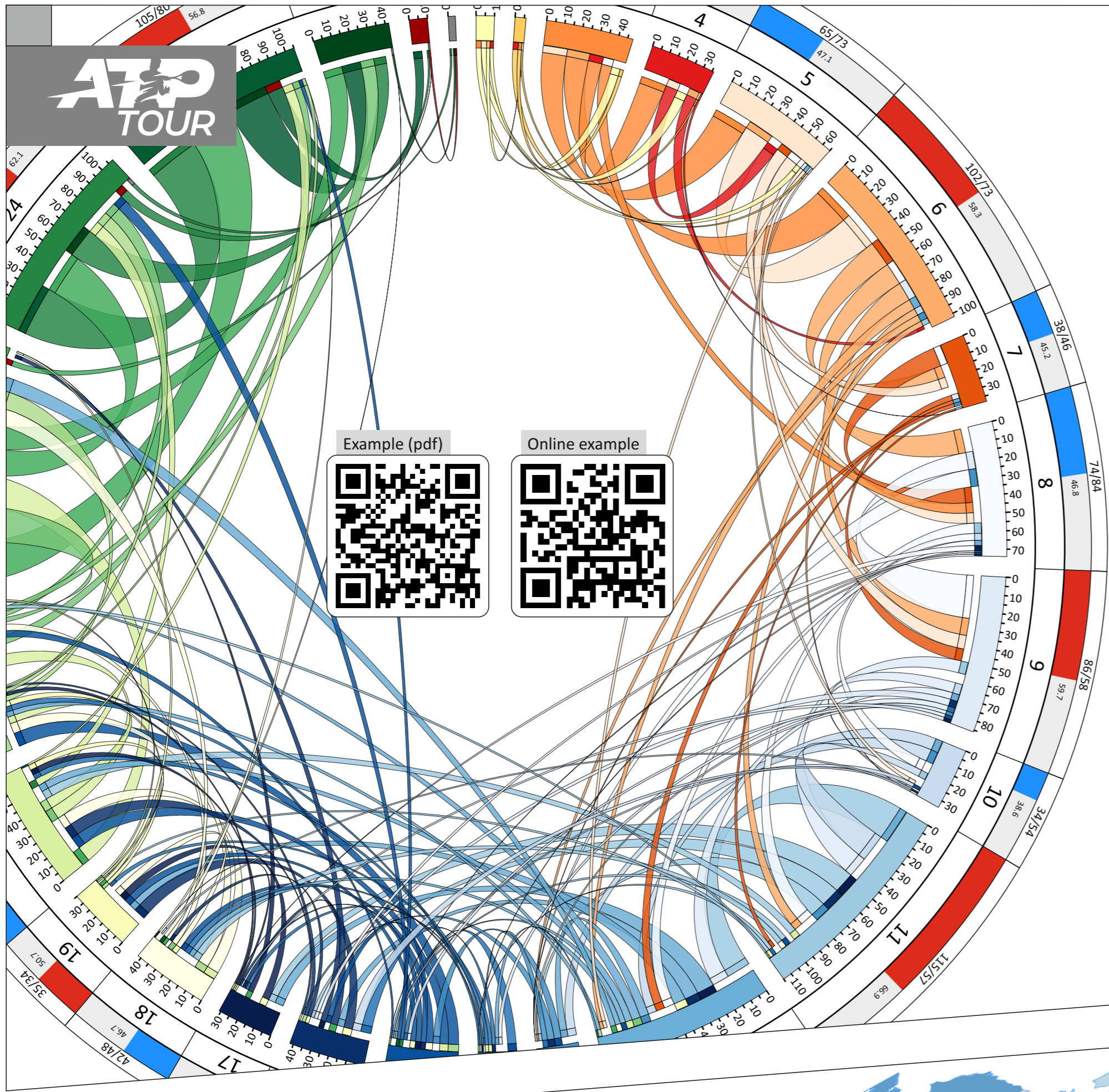
Geodata visualization in sports geography - selected examples of important sports events



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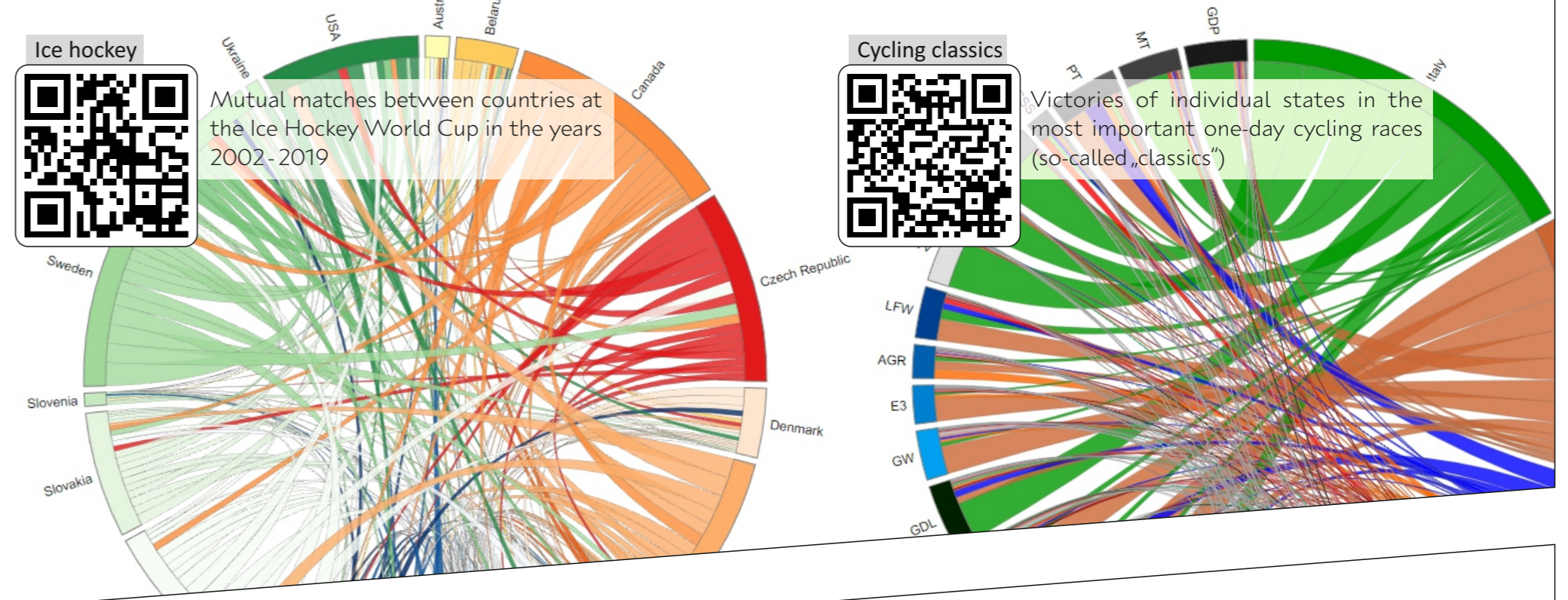
Sporting events take place just like any other human activity in space. This is sometimes directly connected to a single, in many cases even iconic place (e.g. important venues for football or tennis matches, car and horse races, etc.) In the case of some sporting events, the imaginary sports ground is the territory of the entire region, or even the entire state. A typical example of such event is, for example, cycling stage races, the route of which changes every year, and new places are always added to the imaginary map of sports venues. In addition to the spatial dimension itself, the amount of available historical statistics from individual events gives us opportunities to process them, using data visualization methods used in geography and related disciplines. Just a precisely capturing the possibilities of processing various statistics using standard data visualization methods that is the object of interest in our contribution. It is a kind of connection between the generally attractive topic of sport and geography, while the processing of individual statistics using the methods used in geography / cartography can also be transformed by increasing interest among the wider community in these scientific disciplines. We believe that compelling data visualization is key to widely communicating of research findings and, perhaps most importantly, can be an important means of inspiring current and future students to work with quantitative data.

Keywords: Data visualisation, D3, chord diagrams, dashboard, Olympic Games, Tour de France, ATP Tour, Peter Sagan



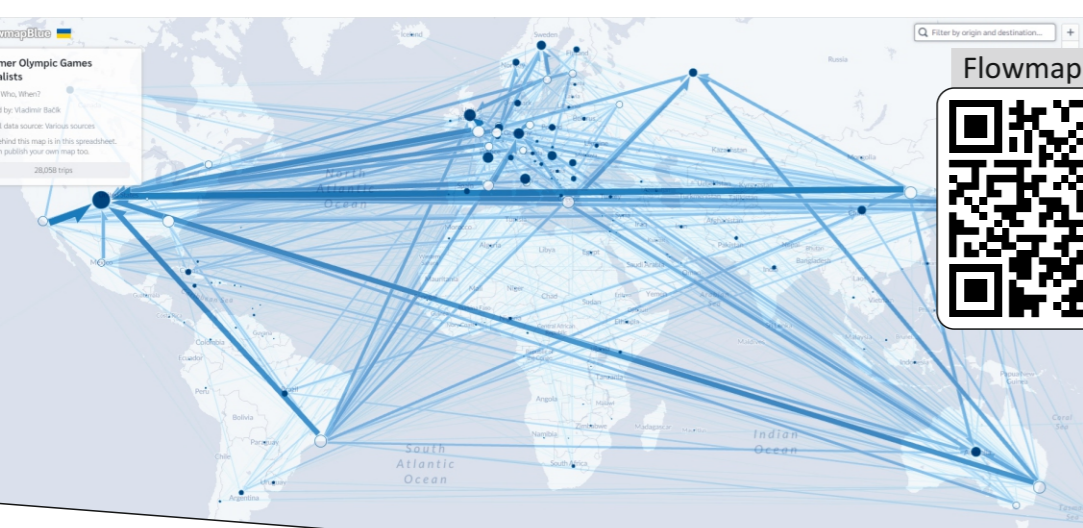
Tennis ATP No. 1 players

In this part we focused on the representation of the mutual match balance between all players no. 1 players of ATP ranking in the so-called "open era" using chord diagrams. This is an example of circular visualization, which has been very popular in recent years and quite often used in the display of migration flows between individual regions of the world (Abel, Sander (2014), Abel, Cohen (2019), Abel, Heo (2018)). Mutual relationships (matches) between tennis players can be displayed in a very attractive way. The static diagram was created using an online service available at <http://mkweb.bcgsc.ca/tableviewer/>. The author of this is Martin Krzywinski and it is easily accessible after appropriate modification of the input data (mutual matches between tennis players are entered in a square matrix in txt format). This static version is more suitable for offline presentation, as it can impress the client with its attractive display. Due to the large amount of displayed data, it is advisable to use the interactive version, created using the D3 library (Bostock, M., Ogievetsky, V., a Heer, J., 2011). This allows displaying the mutual match balance between any players in an interactive form. We consider such a representation suitable precisely for a similar representation of the mutual match balance between teams / players in any sports field. Due to its attractive circular design, it can also be used as a replacement for a standard column chart capturing e.g. the number of victories of an athlete in a given sport (various disciplines).

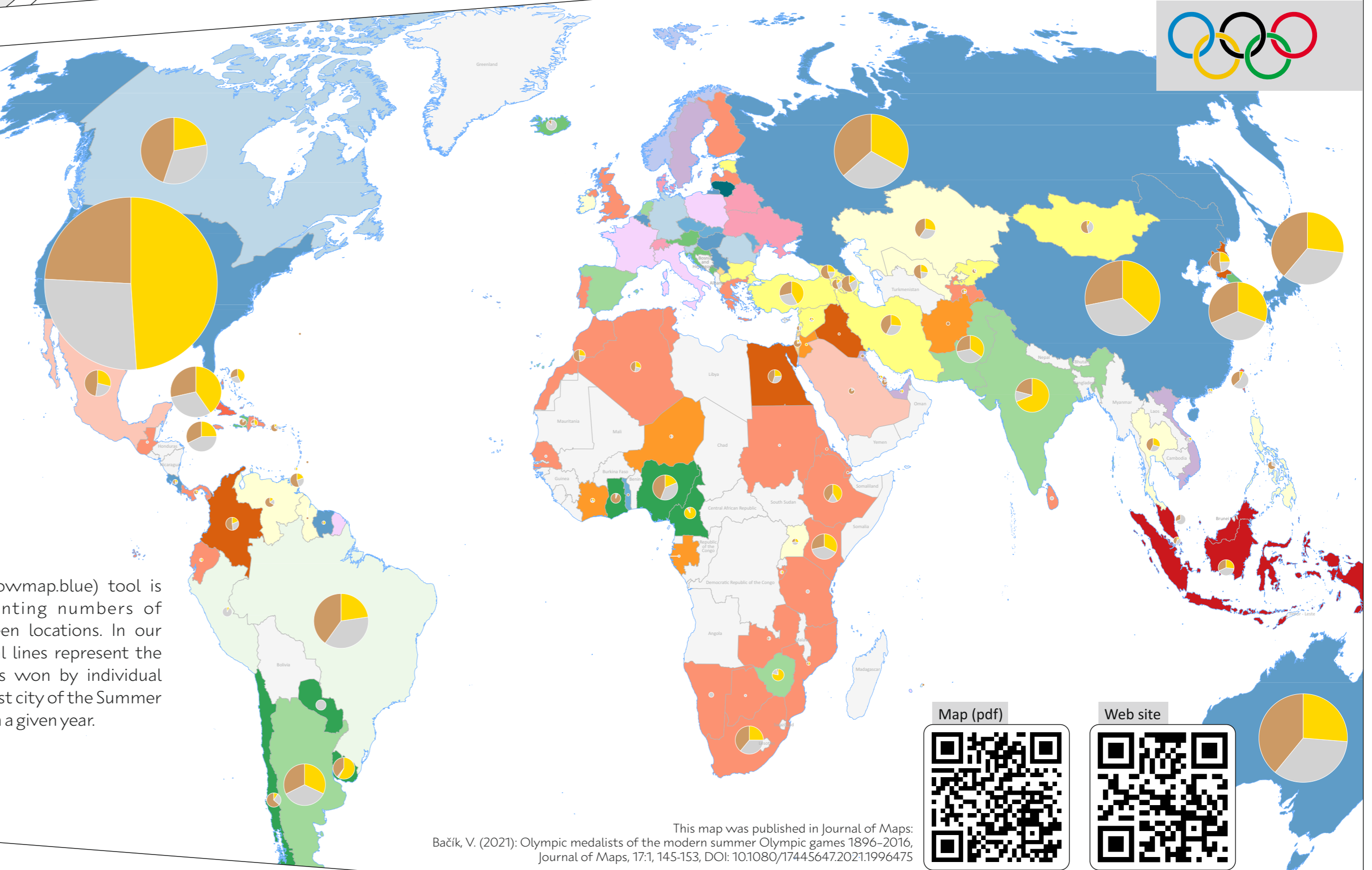


Summer Olympic Games

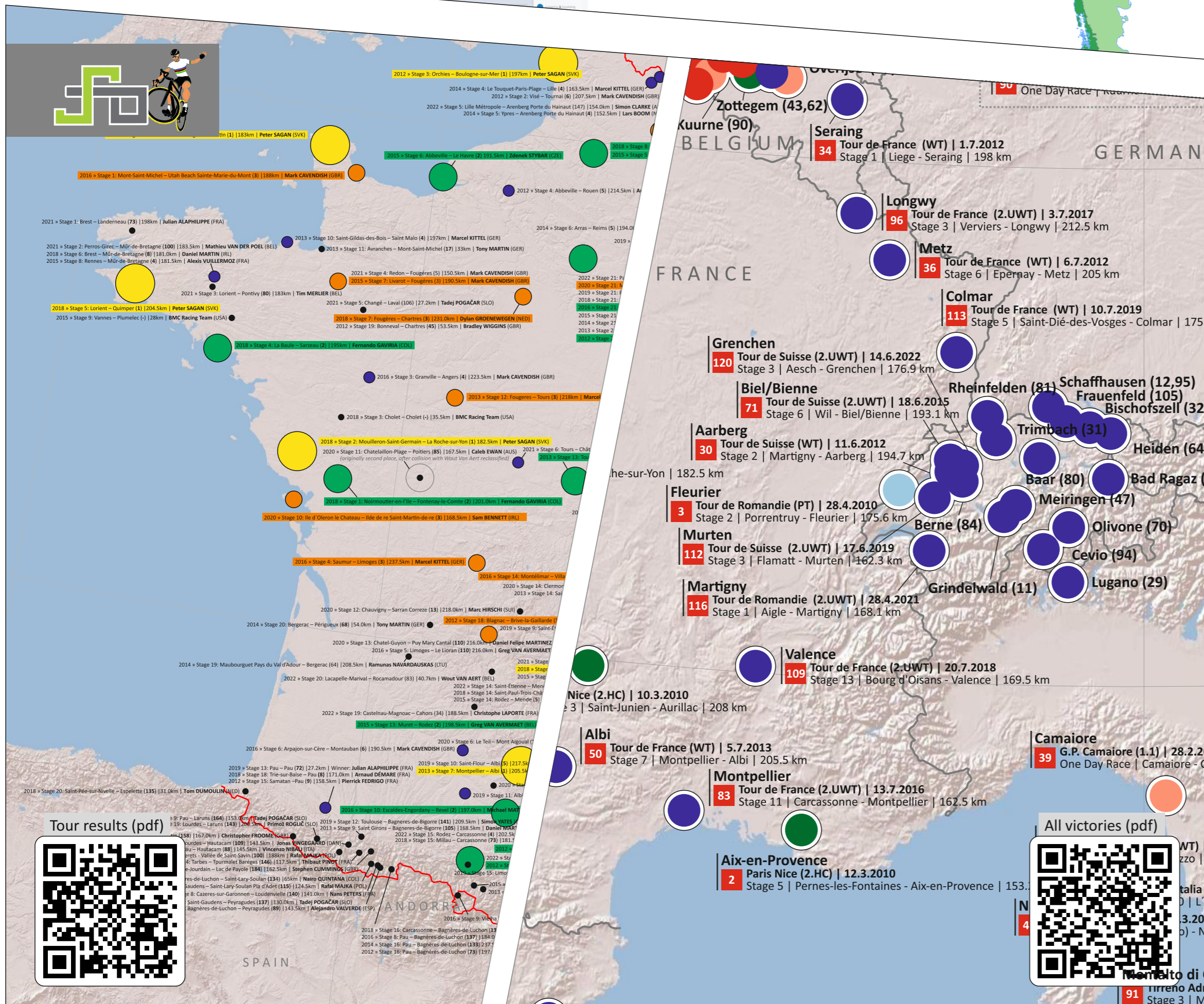
In this part, we focused on the presentation of historical statistics in the winning of Olympic medals at the level of individuals between 1896 - 2016. The results are presented on a map showing the number of medalists in each country. In total, we recorded 33152 Olympic medals in the database altogether, which were won by a total of 24287 athletes. These represented a total of 149 countries, including those that no longer exist due to geopolitical changes in the last century. All medals awarded at the level of states and individual sports are displayed in a detailed preview on the website, which is an integral part of this research. The individual data are stored in a MySQL. The site was created to allow the visitor to get as much information as possible about the Olympic medalists (the site was updated also for summer Olympic games in Tokyo in 2021). For this reason, we have placed a search form on the page (with the possibility of entering several criteria), which displays the number of medals for individual countries, as well as individual sports. All information is supplemented by graphical visualization. This is done using the HTML-Graphs library (created by Gerd Tengler) and Highcharts.js. The site also contains map outputs (a display of the number of medals - all, gold, silver, bronze), which use the D3 library and the TopoJSON data format for geometry storage.



FlowmapBlue (flowmap.blue) tool is used to representing numbers of movement between locations. In our case, the individual lines represent the number of medals won by individual countries in the host city of the Summer Olympic Games in a given year.



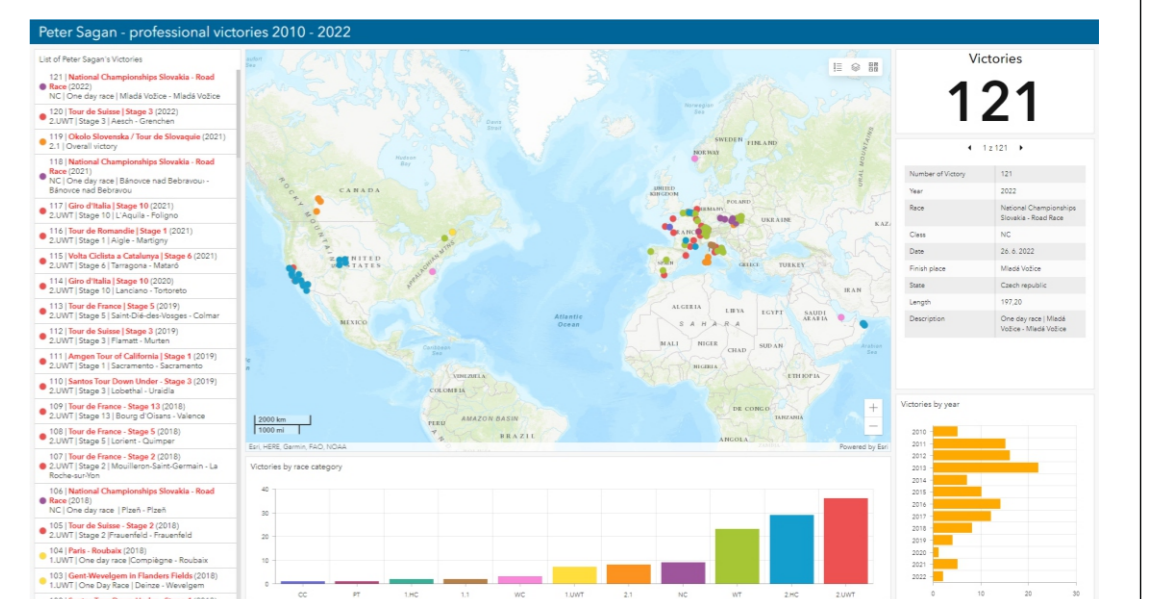
This map was published in Journal of Maps: Bačík, V. (2021): Olympic medalists of the modern summer Olympic games 1896-2016, Journal of Maps, 17:1, 145-153. DOI: 10.1080/17445647.2021.1996475



Peter Sagan & Tour de France

The Tour de France is the most important cycling stage race in the world. Its history began to be written in 1903. In addition to the stories of cycling legends themselves, the Tour de France is also very interesting from the point of view of the geographical space in which the individual stages take place. In our research dedicated to this topic, we have identified a total more than 700 stage centres and more than 300 important mountain climbs of the 2nd, 1st and HC categories in the long-term history of this race. Some results focused on the spatial dimension of the race were published in the publications Bačík, V., Klobučník, M. 2017; Bačík, V., Klobučník, M. 2018. In the last decade, Slovakian Peter Sagan has been one of the most visible men in the world peloton. In addition to winning 12 stages and 7 green jerseys at the Tour, he was also able to make a significant impact in other races during his career. It was just these successes that led us to the processing of map outputs showing the individual successes of Peter Sagan and the Tour de France, as well as overall within the UCI calendar. Peter Sagan has many fans all over the world, and it is through these map outputs that we want to popularize the work of geographers to a wide community of people.

In addition to the standard cartographic interpretation, both maps are also available online using the so-called "dashboards" created in the ArcGIS Online. This tool enables an interactive display of the achieved results supplemented with selected graphic elements. The Experience builder tool was used for combining dashboards designed for PC or mobile devices (responsive design).



Selected publications of the authors dedicated to the spatial dimension of the Tour de France:

Bačík, V., Klobučník, M. (2018): Possibilities of using selected visualization methods for historical analysis of sporting event - an example of stage cycling race Tour de France. *Questiones Geographicae*, Volume 37, Issue 3 (2018), 5-24. doi: 10.2478/quageo-2018-0022

Bačík, V., Klobučník, M. (2017): Stage finishes - Mapping the locations and results of Tour de France (1903-2016). *Journal of Maps*, Volume 13, Issue 1 (2017), 82-89. DOI: 10.1080/17445647.2017.1381193