Snow Vision

Process Book

Introduction

- Each year, due to climate change and global warming, there is less snowfall in winter.
- We want to raise awareness for this issue!
- Therefore, we show average monthly snow depths measured at hundreds of stations in the European Alps.

Our Path

We first searched for a suitable dataset with timeline data to be able to create interesting animations. Finally, we found one on Kaggle. Then, we explored the data to get an overview of what features we can plot.

The next part comprised brainstorming: "W*hat do we want to visualize and how?"*
We depict average monthly snow depths using a Voronoi map, radial line plots, bar plots, and line plots over time to show long-term trends at arbitrary locations.

After sketching the visualizations, we implemented them using D3 and plain JavaScript. When all the plots were finished, we plugged them together and fine-tuned our website. After sketching the visualizations, we implemented them using D3 and plain JavaScript. When all the plots were finished, we plugged them together and fine-tuned our website.

Challenges - General

We dealt with a huge dataset comprising ~1.5 million snow depth measurements. To achieve better performance, we split the data into smaller csv files each including the measurements of only a single stations. Because not every station provides the same amount of observations, in particular, measurements in the 19th century are rare, we restrict our visualizations to the time period of 1964-2019 to enable better information content and comparisons between stations.

Another challenge was web development and getting familiar with the library D3. The asynchronous principles of JavaScript were also not always intuitive.

Moreover, all visual components had to be merged into a coherent website.

Challenges - Visualizations

Since we are dealing with a huge dataset, we need to optimize our code such that all visualizations are generated quickly without blocking the interactive user interface. In particular, the interactive map needs to load a lot of data

Implementing the animated map turned out to be quite complex since we are showing a large amount of data at once. However, we managed to create a version that runs smoothly and is highly interactive!

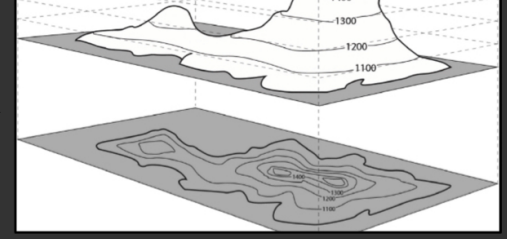
For the **radar plot**, there were two main challenges: the first one was to modify the original implementation by setting the zero value to the first internal circumference (instead of the center). The second one was animating the plot by displaying the data points, representing the average monthly snow depth, one after the other.

A challenge for the **bar plot** was that the dataset had to be pre-processed as the bar plot depicts values for a single station and it is inefficient to load the complete dataset.

For the **double line plot**, we had to merge the datasets of two snow stations to create a shared x-axis but opponent y-axis. The asynchronous loading of the data came with some difficulties. Also, because two stations can provide very different observations, especially when there is no data recorded, one has to deal with a lot of NaNs which resulted in problems in the visualization.

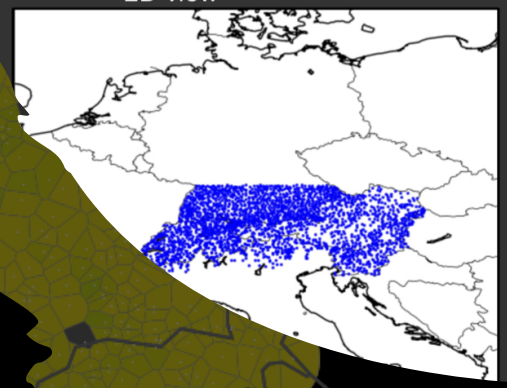
Changes

- We discarded the 3D view of the map due to lack of time, but instead provide an animated view through time with a slider to get a snapshot of the snow depth for all available stations.
- For the radar chart, we also discarded the 3D view as it does not add any new information



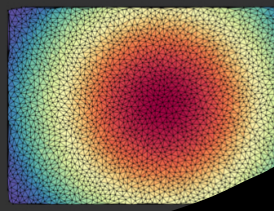
Switch between views

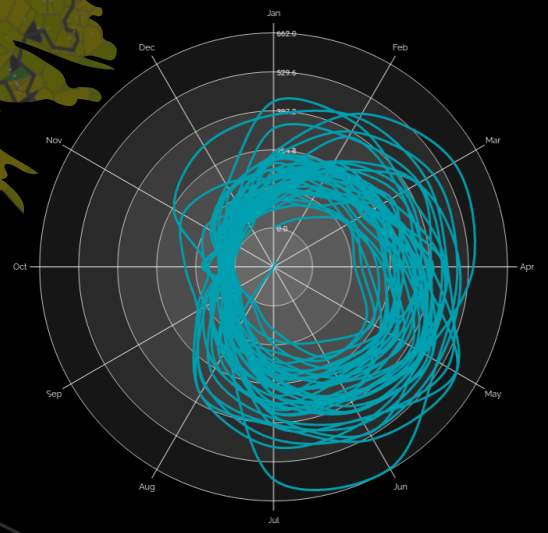
2D view

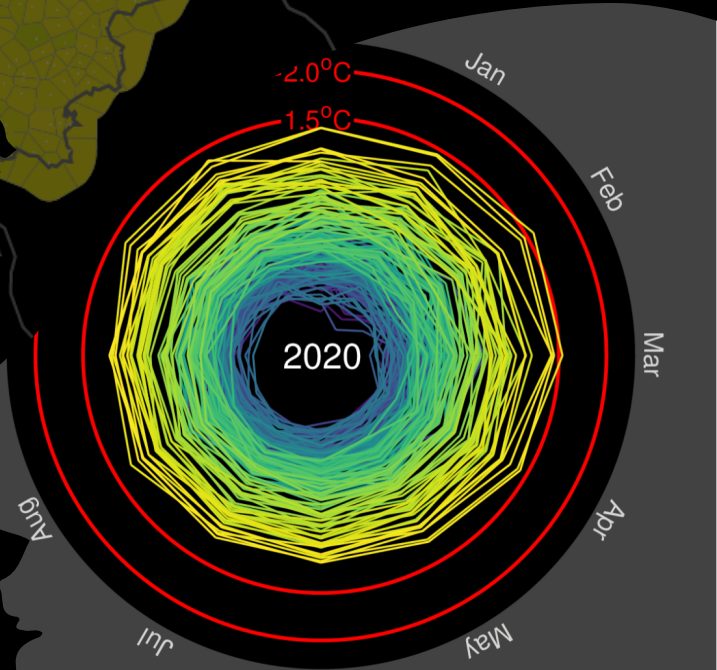


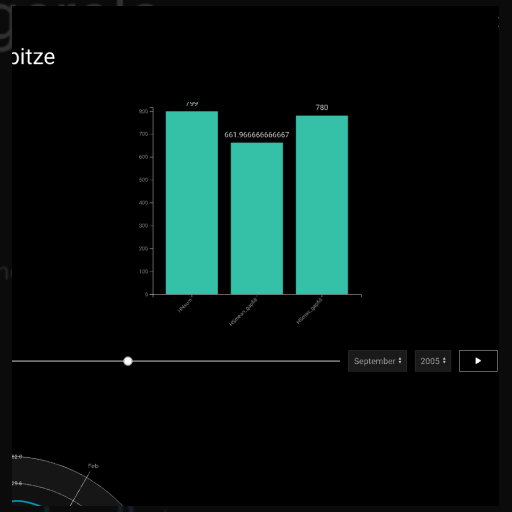
Features:

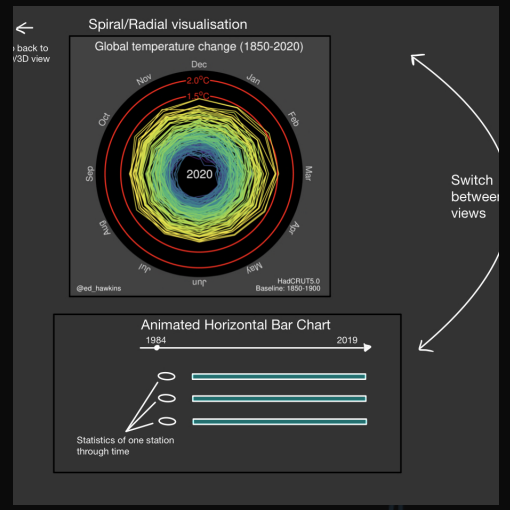
- Filters to select specific stations
- Delauny Triangulation











Changes

- Considering the provided suggestion in Milestone 2 of making a comparison between two stations, we decided to additionally create a double line plot to compare the mean snow depth of two arbitrary stations to give an insight into general developments.
- We decided not to animate the bar chart because there is no need to since the radar chart is already animated.
- We implemented a prototype of a height-line map to show the station's elevations, but we decided not to use it since it does not add any relevant information.

Peer assessment

We communicated extensively in the group and completed all milestones together.

Only the implementation of the single visualizations were split accordingly:

- David: Voronoi map, website skeleton, plugging the visualizations together, animating the visualizations
- Simone: Radar chart, landing page contents
- Jennifer: Bar chart, double line chart, process book design