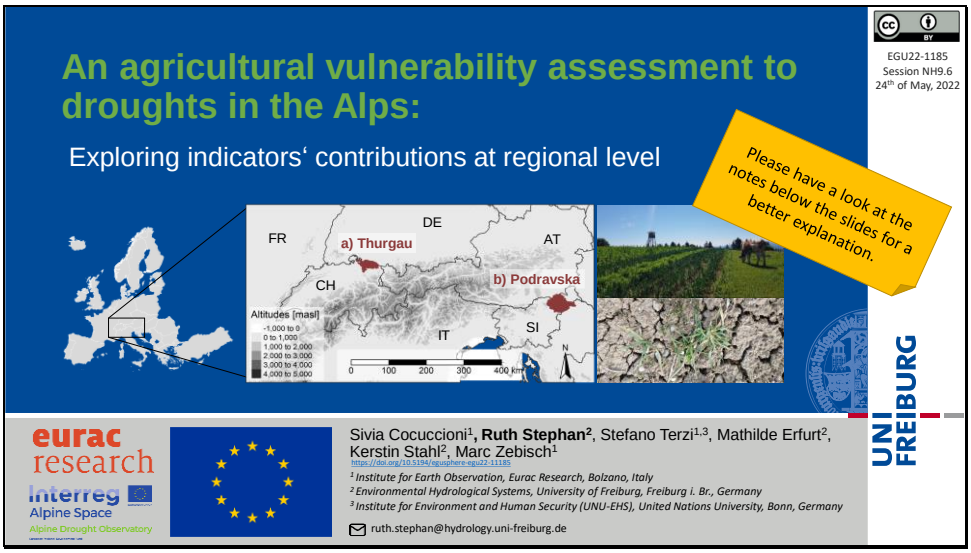
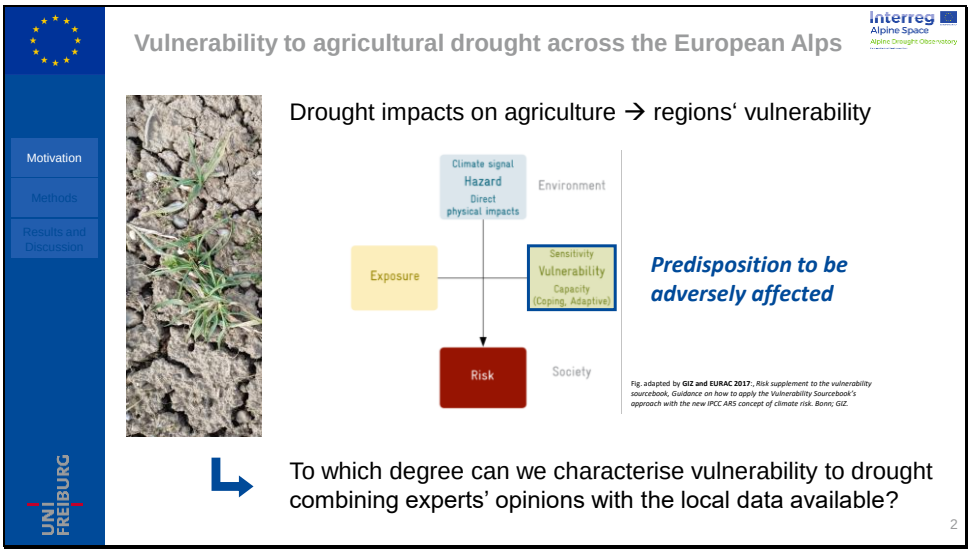
Slide 1




Welcome to this presentation about an agricultural vulnerability assessment to droughts in the Alps. The presented study aims to assess vulnerability with regional indicators in two case study regions.

Slide 2

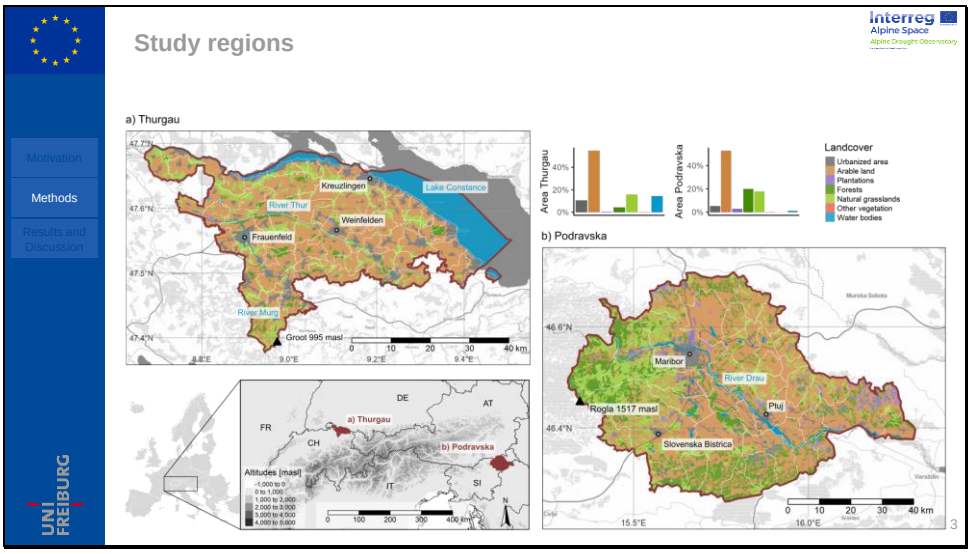



Despite the water-rich character of the European Alpine region, drought impacts are reported, especially on agriculture. This highlights the region's vulnerability to reduced water availability.

In this study we define vulnerability as one component besides exposure and hazard leading to the final risk of impacts. Here, vulnerability is the predisposition to be adversely affected. In most cases to identify the level of this predisposition (vulnerability) is the most challenging is risk assessments.

Our aim is to evaluate to which degree we can characterise vulnerability to drought at regional scale combining the opinion of experts and data availability.

Slide 3

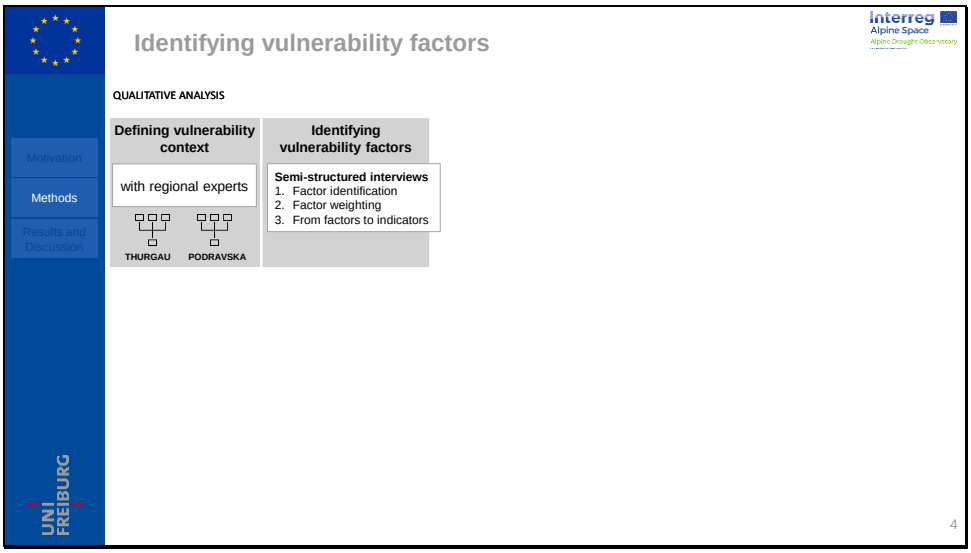



The study regions we look at are Thurgau in Switzerland and Podravska in Slovenia. Both are mostly covered by arable land.

In addition, we know that these regions have been vulnerable in the past, as the Alpine drought Impact report Inventory ($EDII_{ALPS}$) archives for both regions various reports on drought impact, such as yield losses or limited hay production.

The regions are located in the pre-Alps. However they have a rather high elevation range, with peaks up to almost 995 masl in Thurgau and up to 1517 masl in Podravska.
Thurgau is characterized by ist coastline to Lake constance and two large rivers, the river Thur and the river Murg.
Podraska displays the river Drau as the largest water body with a water flow following the elevation gradient from West to East.

Slide 4

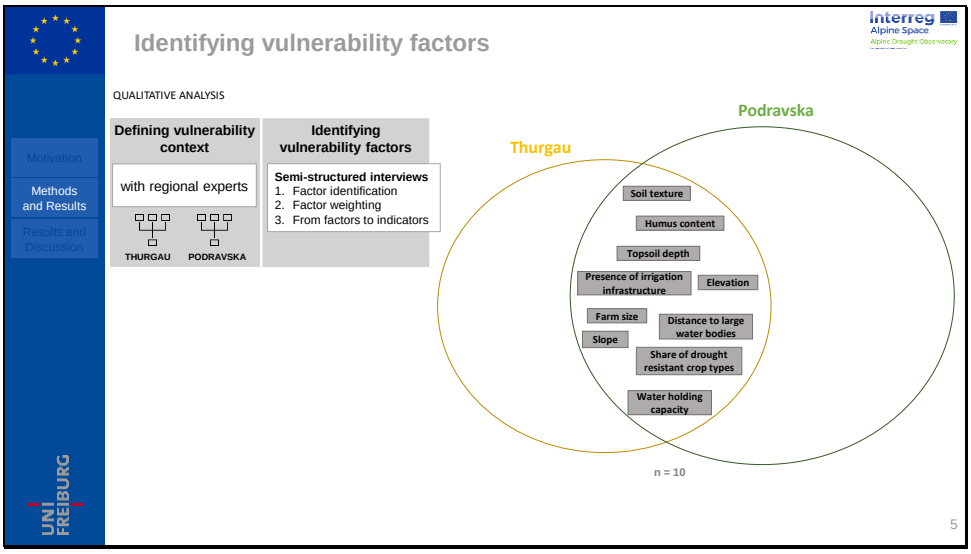



To assess the regions vulnerability we need to identify factors driving or mitigating the regions predisposition. Therefore, we asked regional experts to define regions vulnerability context.

Then, we followed a semi-structured interview to identify the region-specific factors and to rate the factors with an importance scale from low over medium to high.

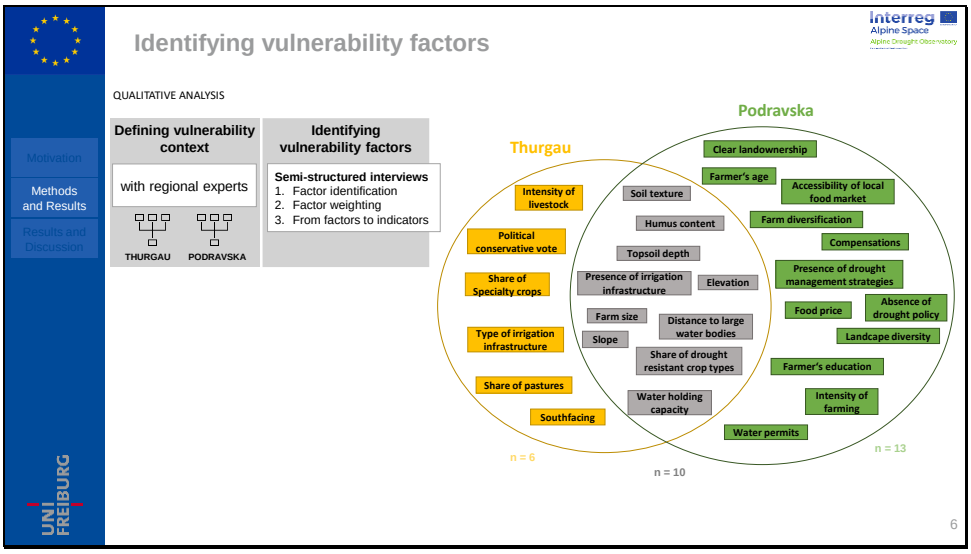
Finally, we identified indicators with whom we could support the factors with data. This way we want to combine the qualitative analysis with quantitative data.

Slide 5




The experts identified 10 common factor defining the regions‘ vulnerability independent from each other. E.g. *Soil texture*, *Elevation* or *Farm size*.

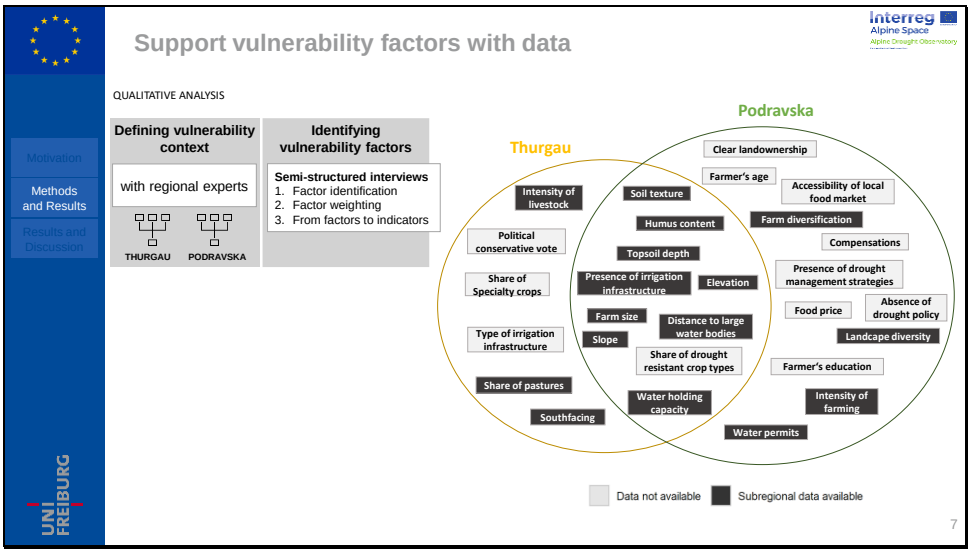
Slide 6




The experts identified 10 common factor defining the regions‘ vulnerability independent from each other, e.g. *Soil texture*, *Elevation* or *Farm size*.

In addition, they named 6 factors solely for Thurgau, such as *Intensity of livestock*, and 13 for Podravska, such as *Farmer‘s age*.

Slide 7

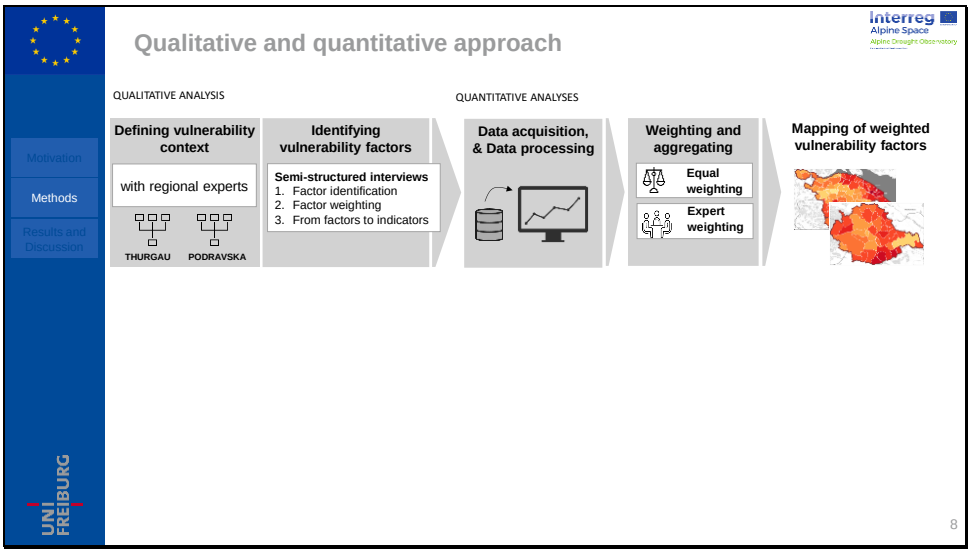



The experts identified 10 common factor defining the regions‘ vulnerability independent from each other, e.g. *Soil texture*, *Elevation* or *Farm size*.

In addition, they named 6 factors solely for Thurgau, such as *Intensity of livestock*, and 13 for Podravska, such as *Farmer‘s age*.

Regarding these factors, we could not support all with subregional data. For example, it was not possible for the factor *Share of drought resistant crop types*.

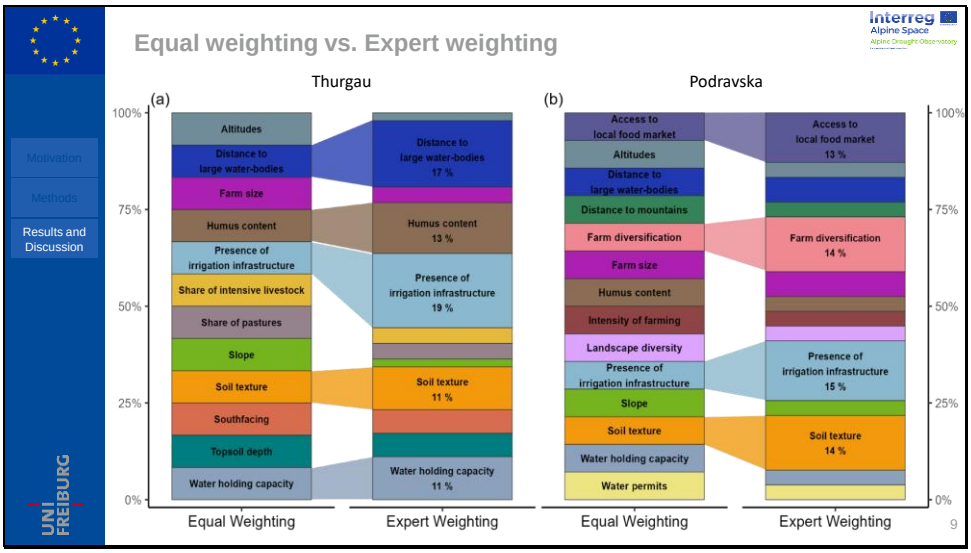
Slide 8




Here, we already stepped into the quantitative analyses with data aqcuistion. After processing the data (including normalising and directing the data), we weighted and aggregated the factors according to the equal and expert weighting methods

For the equal weighting method we combined all factors with the same weight and for the expert weighting method we combed all factors according to the experts importance rating. Afterwards, we finally plotted the vulnerability across the regions.

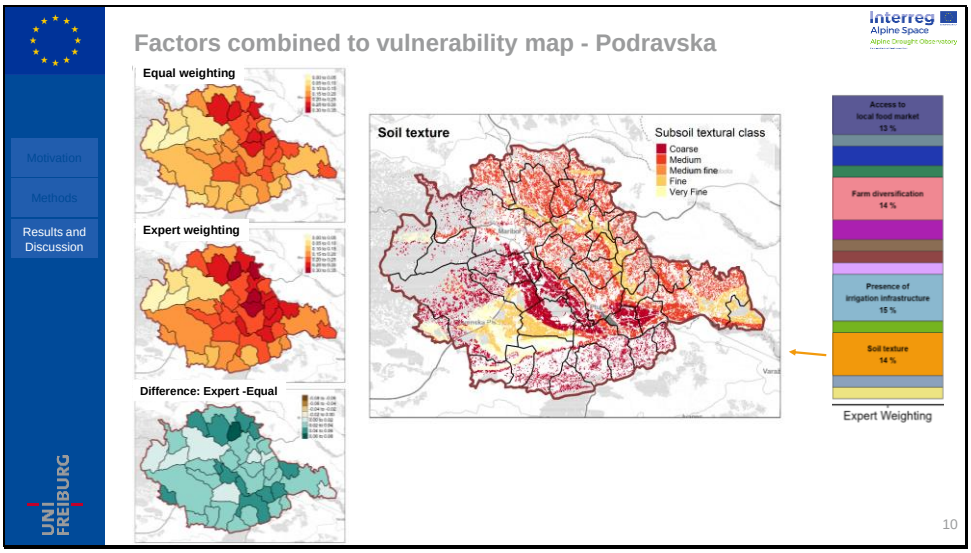
Slide 9




Here the weighting methods for Thurgau and Podravska are displayed - with greatest changes for the factor *Presence of irrigation infrastructure* in both regions. This is considered to be the most important factor.

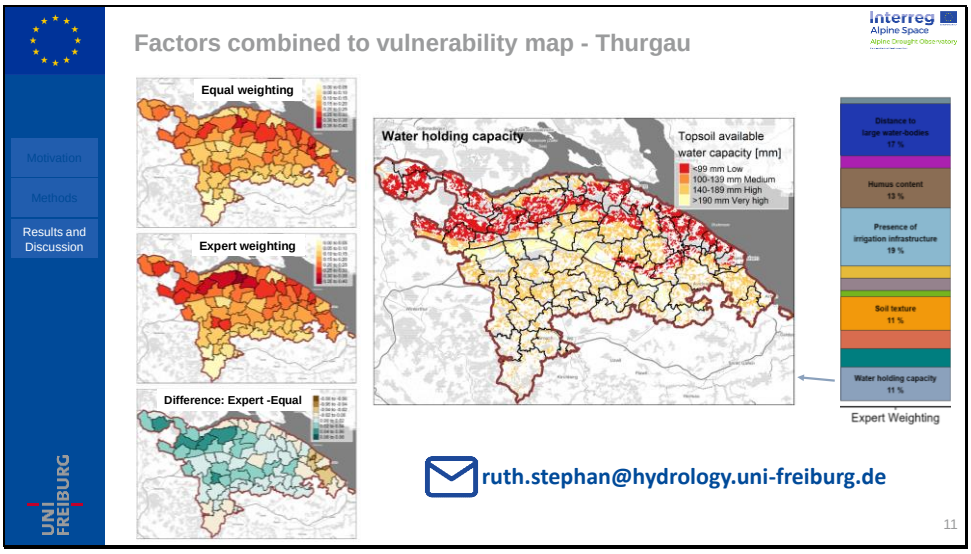
In Thurgau the factor *Distance to large water bodies* follows, and in Podravska the factors *Soil texture* and *Farm diversification*.

Slide 10




The final vulnerability map for Podravka shows differences between the equal weighting and the expert weighting. The difference map presents the expert weighting by higher vulnerability most in the northern and central parts of the region.
This relates among other factors to the factor *Soil texture*, with very coarse soils in the central part increasing the vulnerability.

Slide 11




The final vulnerability map for Thurgau shows differences between the equal and the expert weighting method row. The difference map presents the expert weighting with higher vulnerability in the Northwest and lower vulnerability in the East.

This is due to the most important factors, such as *Water Holding Capacity.* This factor presents the Northwest with low availabilty water capacity, but the East with high availabilty water capacity.

To conclude, despite restricted data availability, regional vulnerability can be assessed. Interpreting the results have to take into account the missing subregional data for several factors. However, in both regions the majority of the factors is quantfied and mapped. The differences between the equal and expert weighting method demonstrate the sensitivity of the here shown vulnerability towards different aggregation (weighting) methods. For any application, the benefits and drawbacks of each aggregation method have to be known. We recommend to apply different methods in order to include the vulnerabilities‘ sensitivity possibly leading to different adaptation strategies for practitioners.

For further details and feedback, please contact me per mail!