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11–15 SEPTEMBER 2022
Warsaw, Poland

Volunteering for the future – Geospatial excellence for a better living

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Mapping Tranquil Landscapes with Social Media Data.
A Case Study in the Context of Sustainable Transformation

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Germany

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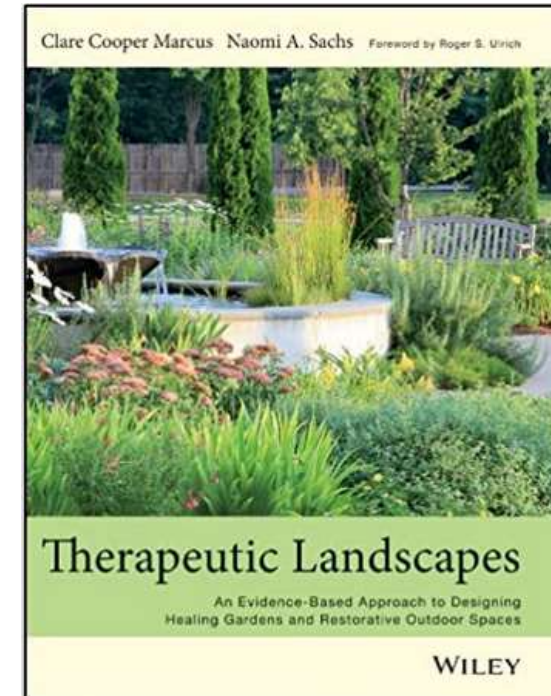
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Trimble.

Agenda

- **Introduction**

- **Methodology**

- **Results**

- **Discussion**

Agenda

- **Introduction:** Tranquility, Transformation & Spatial Data Innovations

- **Methodology:** Social Media Data (Flickr-Tags), Tranquility-Keywords

- **Results:** cost-effective complement to offical data, filling data gaps

- **Discussion:** Several limitations → but clear pathways to improve approach,
  Spatial data & Sustainable Transformation

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Tranquility, Transformation & Spatial Data Innovations

- Landscapes offer many values. Among others, they can have a therapeutic effect supporting the mental and physical well-being

- The therapeutic effect can be based, among other things, on the tranquillity landscapes offer

- This leads to demands for instruments to protect tranquil places and go beyond the legally regulated noise control

- If tranquil places are to be protected, one must know where they are located

- Information for this purpose mostly is collected through direct surveys, such as interviews. This is cost-prohibitive when investigating large areas

→ Therefore, you cannot expect data on tranquility to exist in the area of your interest

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Tranquility, **Transformation** & Spatial Data Innovations

- In recent decades, wind farms have significantly changed the appearance of low mountain ranges in Rhineland-Palatinate, such as the Hunsrück.

- As a UNSECO biosphere reserve, the Pfälzerwald has so far been excluded from the construction of wind farms.

- To push energy transition, Rhineland-Palatinate new coalition agreement (2021-2026) changed this situation: it rules out wind farms in the inner forest area, but not on the periphery of the Pfälzerwald

- the National Committee for the UNESCO MAB has expressed concern on the plans. In the state parliament it is debated highly emotionally

Windenergie
Rheinland-Pfalz baut Windkraft im Wald

Die Mittelgebirgslandschaft in Hunsrück ist eine wald- und windreiche Gegend. (Foto: Giggel auf Wikimedia / CC BY 3.0)

https://www.energiezukunft.eu/erneuerbare-energien/wind/rheinland-pfalz-baut-windkraft-im-wald/

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Tranquility, Transformation & **Spatial Data Innovations**

- Good Spatial Planning (and Wind farm siting) leads to convincing decisions. To be convincing, a variety of interest has to be balanced

- To balance interests you need to know about them, you need data

- There is a general lack of attention paid to recreational demands in the expansion of renewable energies in Germany (Grebe 2019: 84).

- Wind farms have an negative impact on tranquility perception (Watts, & Phaesant 2015)

- Acceptance suffers if substantial values (recreation, tranquility) that society receives from the landscape are not appropriately taken into account

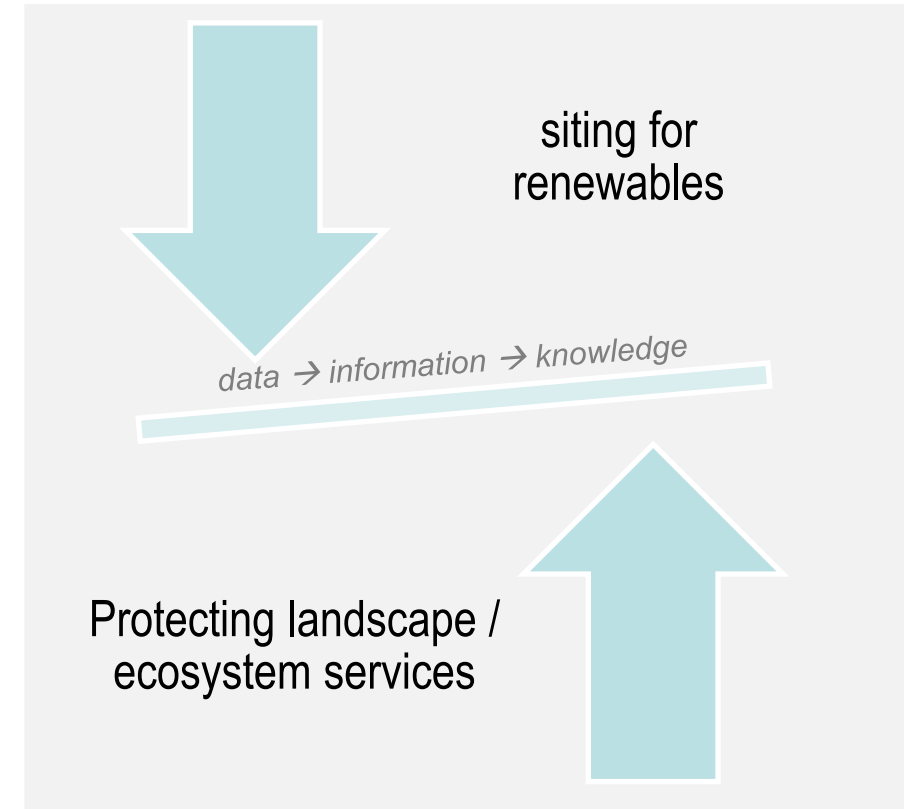

Windenergie

Rheinland-Pfalz baut Windkraft im Wald

Die Mittelgebirgslandschaft im Hunsrück ist eine wald- und windreiche Gegend. (Foto: Giggel auf Wikimedia / CC BY 3.0)
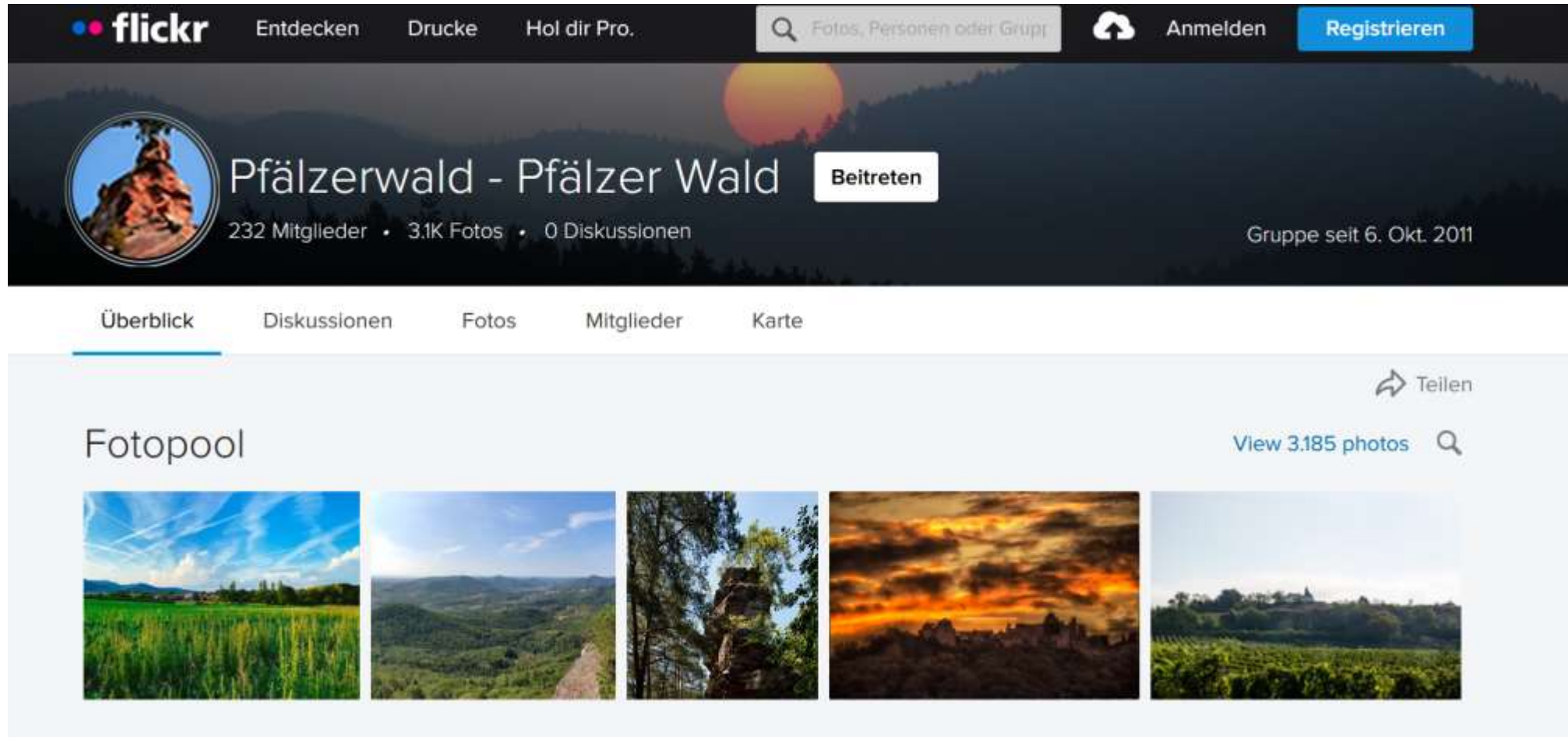
https://www.energiezukunft.eu/erneuerbare-energien/wind/rheinland-pfalz-baut-windkraft-im-wald/

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Tranquility, Transformation & Spatial Data Innovations

- Research question: Can one use geocoded data (tags) from social media, to find out where tranquility is perceived?

- a spatial data innovation to fill the data gap? Despite tranquillity perception being highly subjective? Is that possible?

siting for renewables

data → information → knowledge

Protecting landscape / ecosystem services

https://www.energiezukunft.eu/erneuerbare-energien/wind/rheinland-pfalz-baut-windkraft-im-wald/

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We used data from the photo sharing platform Flickr

https://www.flickr.com/

We analyse the tags
(not the image itself)

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Methodology

- The methodology we employ is inspired by Wartmann et al. (2019) and Wartmann & Mackaness (2020), who examined tranquility landscapes in Scotland

- We adopted it for two regions in Germany, Pfälzerwald & Nagelfluhkette

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Methodology – main steps

- Download Flickr Photographs (via Flickr API)

- Deleting Bulk Uploads

- Key Word Filtering

- Analyzing (Chi expectation) & vizualising the data

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Key Word Filtering

- Basic idea: matching photo tags to words known to be related to tranquility
- These key words stem from earlier studies including interviews in Scotland
- We provided German synonyms, added a few terms (hiking, summit, chamois), skipped others (loch, tide)

Key words of Wartmann & Mackaness (2020: 671)

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Chi-expectation

- It is not sufficient to create a density map of locations tagged with relevant terms. That only creates a map that mirrors those places most frequently visited and photographed

- Therefore, we applied chi-expectation as a correction method

- Chi (x)-expectation represents how unexpected an observed distribution (obs) of images is – in this study these were photographs with tranquillity-related tags – compared to all photographs of a sample (the expected distribution, exp).
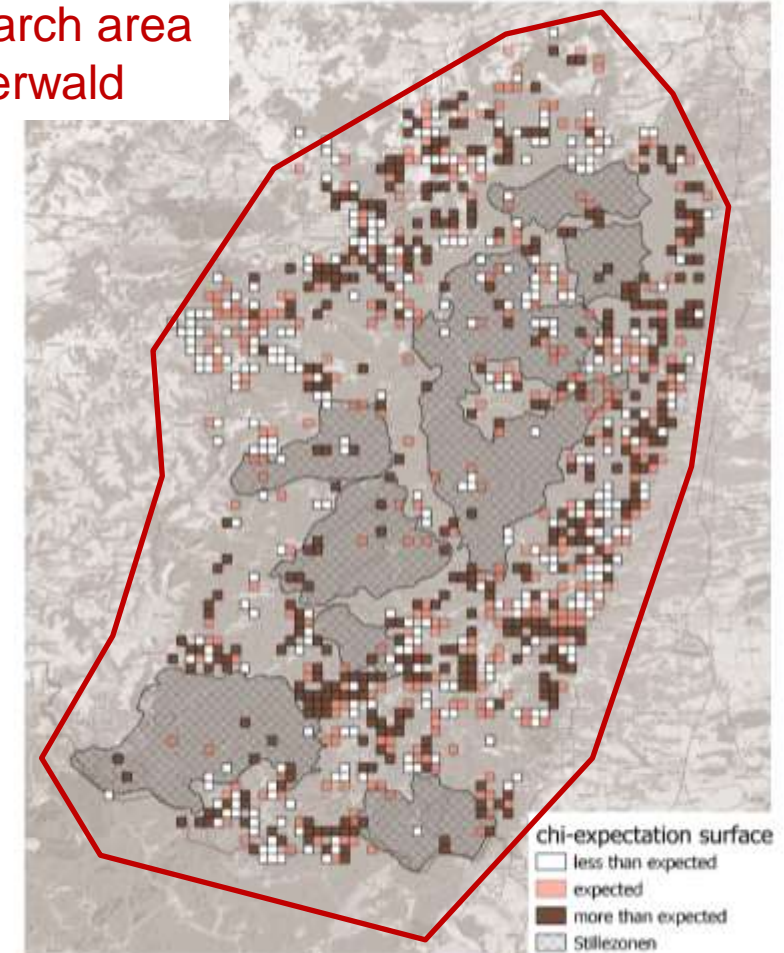
$$x = \frac{(obs - exp)}{\sqrt{exp}}$$

![FIG WARSAW CONGRESS 2022] XXVII FIG CONGRESS
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Results – Flickr data shows where tranquility is consumed

- The uppermost layer shows the chi (x)-expectation for 100x100m grid cell (outside of the cells, no photos were uploaded)

- A high density of tags related to tranquility are found in the periphery. Such areas are close to the surrounding cities (Mannheim, Karslruhe, Kaiserslautern), making the periphery accessible for many people.

- → It is the periphery where people consume tranquility. But it is also here where future wind farms may be build.

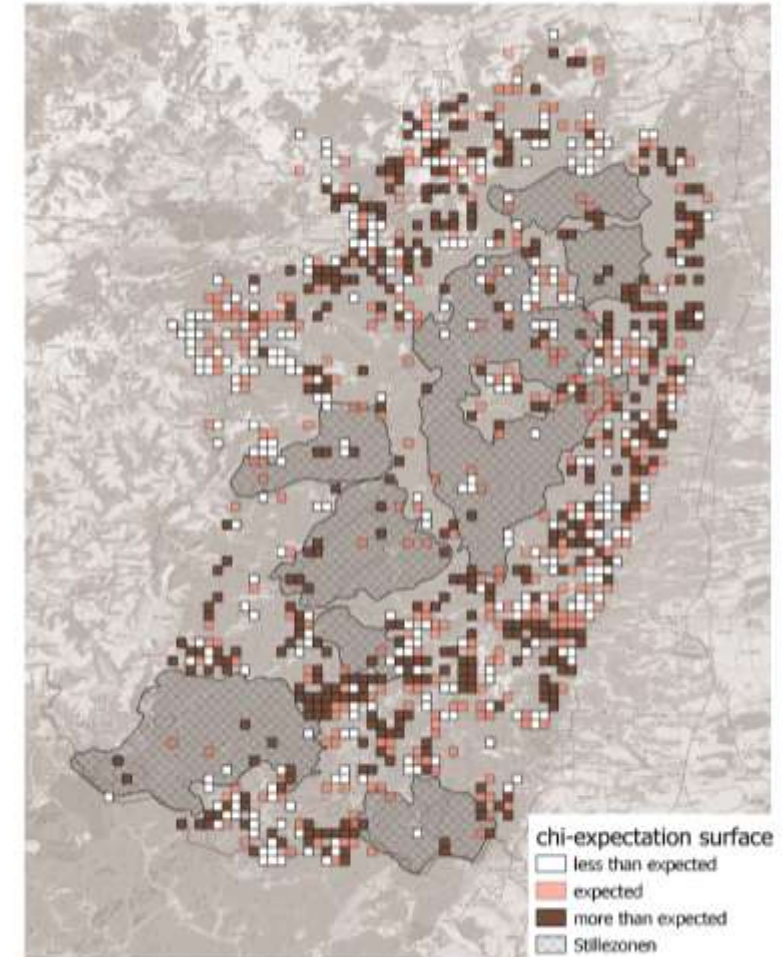**Tranquillity Places in Pfälzerwald**

Research area
Pfälzerwald

chi-expectation surface
☐ less than expected
☐ expected
■ more than expected
▩ Stillezonen

Background Maps:
1.) Quietness Suitability Index Values, https://www.eea.europa.eu
https://www.eea.europa.eu, 50% transparency
2.) © OpenStreetMap Contributors, www.openstreetmap.org

0   5   10 km

Results – Flickr tranquility data can spatially complement official data

- In Pfälzerwald Stillezonen areas of quiteness („Stillezonen") have been designated by administration (here quiteness can be found without doubt)

- The availability of official zones representing low-noise areas makes this region particularly interesting for the evaluation of our method

- → Flickr data (periphery) spatially complement Stillezonen (core)

Tranquillity Places in Pfälzerwald

chi-expectation surface
- less than expected
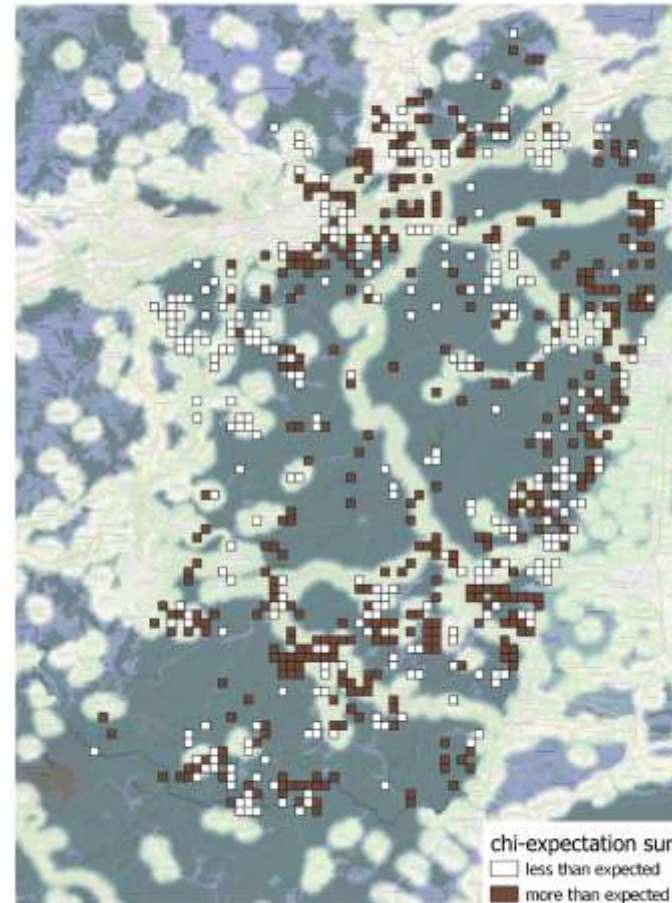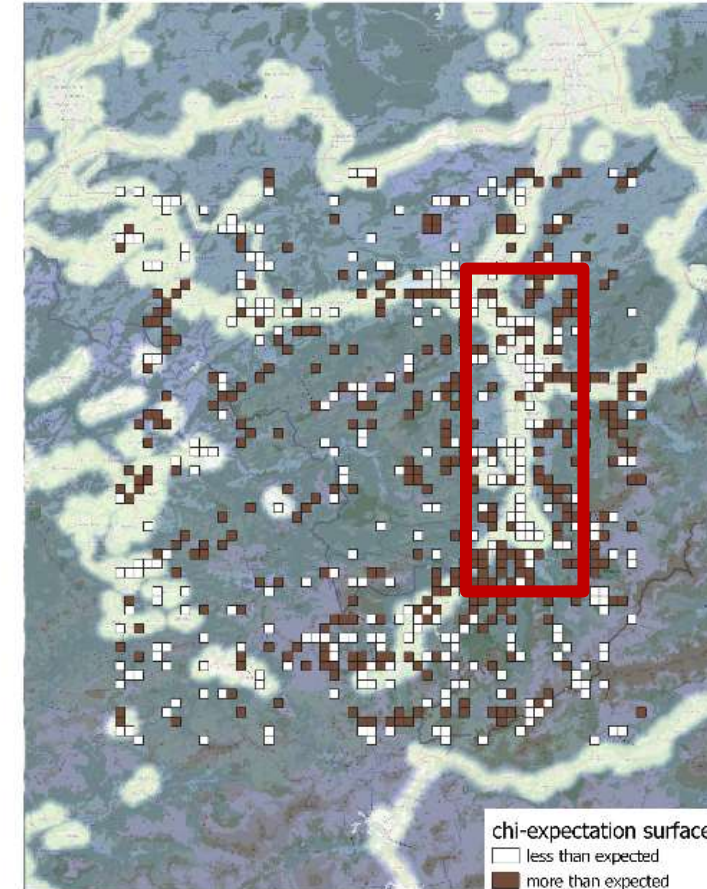- expected
- more than expected
- Stillezonen

0   5   10 km

Correlation of Flickr tranquility and EU official noise map

- Background map is an official noise map

- Non tranquil cells (our results) are mainly located in areas with higher noise (official map)

- Tranquility can also be found in settelements

Tranquillity Places in Nagelfluhkette

Challenges – despite promising results, the method is not yet fully mature

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Challenge: Tranquil landscape tagged with „non-tranquil" words (hidden for us)
Solution: Combine method with Image analysis

Key words of Wartmann & Mackaness (2020: 671)

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Challenge: Some key words are not always suitable
Solution: Integrate context information (e.g. proximity)

- Example is a tag saying *flowers*

- flower is a key word in our list (Scottisch interviewees related them to tranquility)

- The map reveals that these flowers, which were captured at the location of the red dot in the picture (right), grow in the immediate vicinity of the federal highway 19.

Flowers near a road. Tranquility or coincident?

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Challenge: Some key words (hiking) cause unforeseen problems
Solution: Use more focussed terms only

- On the right you see locations where photos were taken in an hiking hot spot in Nagelfluhkette

- Yellow dots show photos tagged with the wors hiking

- Some hikers post many photos on the same tour → bias

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Can one use geocoded data (tags) from social media, to find out where tranquility is perceived? Yes, but improvement needed and some limitations have to be accepted

Results:

- cost-effective complement to offical data, filling data gaps on recreational values of landscapes

Discussion:

- Several limitations → but clear pathways to improve approach
- We believe, this data innovation can (some day) support spatial planning in the context of energy transfomation

Thank you for your attention

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literature cited in the presentation

- Grebe, C., 2019, Windkraftanlagen und ihre Auswirkungen auf das Erholungserlebnis. Universität Kassel Fachbereich 6 Architektur Stadtplanung Landschaftsplanung, 75-87.

- Wartmann, F. M., Tieskens, K. F., van Zanten, B. T., & Verburg, P. H., 2019, Exploring tranquillity experienced in landscapes based on social media. *Applied Geography*, *113*, 102112. https://doi.org/10.1016/j.apgeog.2019.102112, *1-16*.

- Wartmann, F. M., & Mackaness, W. A., 2020, Describing and mapping where people experience tranquillity. An exploration based on interviews and Flickr photographs. Landscape Research, 45(5), 662-681.

- Watts, G.R. & Phaesant R.J., 2015, Identifying tranquil environments and quantifying impacts. Applied acoustics. 89, 122-127. 10.1016/j.apacoust.2014.09.015