

2023 Visual Resource Stewardship Conference, Argonne, November 13, 2023

Estimating the Temporality of Landscape Scenic Resources resources from user-contributed geodata

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Web Slides:

<https://tud.link/zfpz>

(Press  for slide notes)

Motivation

Hull & McCarthy (1987).
Change in the Landscape.
Landscape and Urban Planning 15 (3–4): 265–78.
DOI

Types of changes (p. 266f):

slow (gentrification of neighborhoods, growth of vegetation)

sudden (weather fluctuations)

regular (seasonal in plants, animal migration, sunrises)

frequent (presence of wildlife, wind, sounds)

infrequent (fire, floods)

long duration (buildings, roads, consequences of natural disasters)

medium duration (harvesting of trees, seasons)

ephemeral-periodic (wildlife, weather, hiking, evidence of other hikers)

...

User-contributed geodata & social media

A complementary data source for assessing subjective landscape values

Dunkel (2015). [DOI](#)

Preprocessing steps:

- query data from Application Programming Interfaces (APIs)
- data cleansing, transformation into a common data scheme,



LBSN Structure [↗](#)

- privacy-preserving & ethical data processing, Dunkel et al. (2020). [DOI](#)
- aggregation, visualization

Dunkel et al. (2023).

From Sunrise to Sunset: Exploring Landscape Preference through Global Reactions to Ephemeral Events Captured in Georeferenced Social Media.

PLOS ONE 18 (2): e0280423.

[DOI.](#)

Reliably identify landscape values,
independent of overall visitation frequency?

Signed Chi

$$chi_t = \frac{((obs_t * norm) - exp_t)}{\sqrt{exp_t}} \quad norm = \frac{\Sigma_{exp}}{\Sigma_{obs}}$$

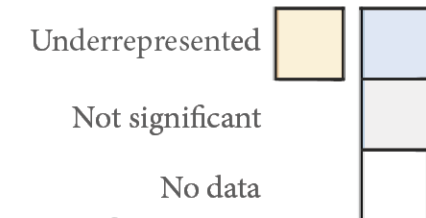
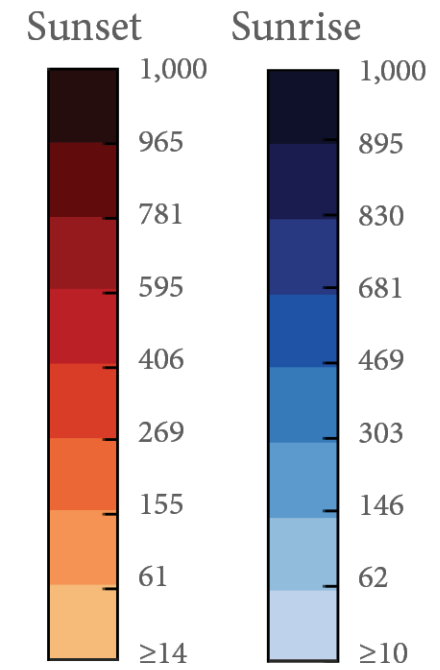
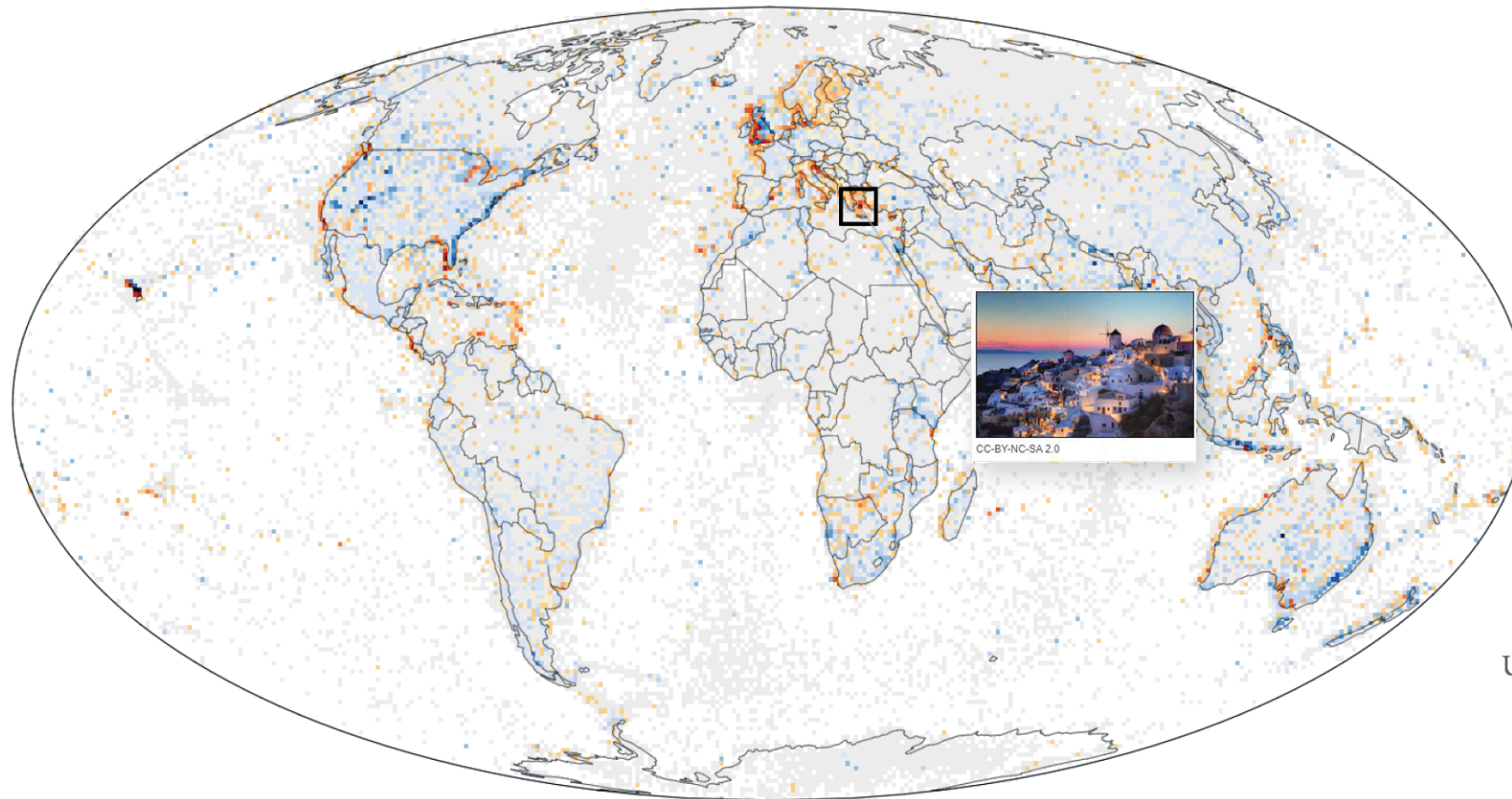
1. A generic query (expected; e.g. all Flickr images)
2. A specific query (observed; e.g. "sunset"-reactions)

Visvalingam (1978). The Signed Chi-Square Measure for Mapping.
Cartographic Journal 15: 93–98. [DOI](#)



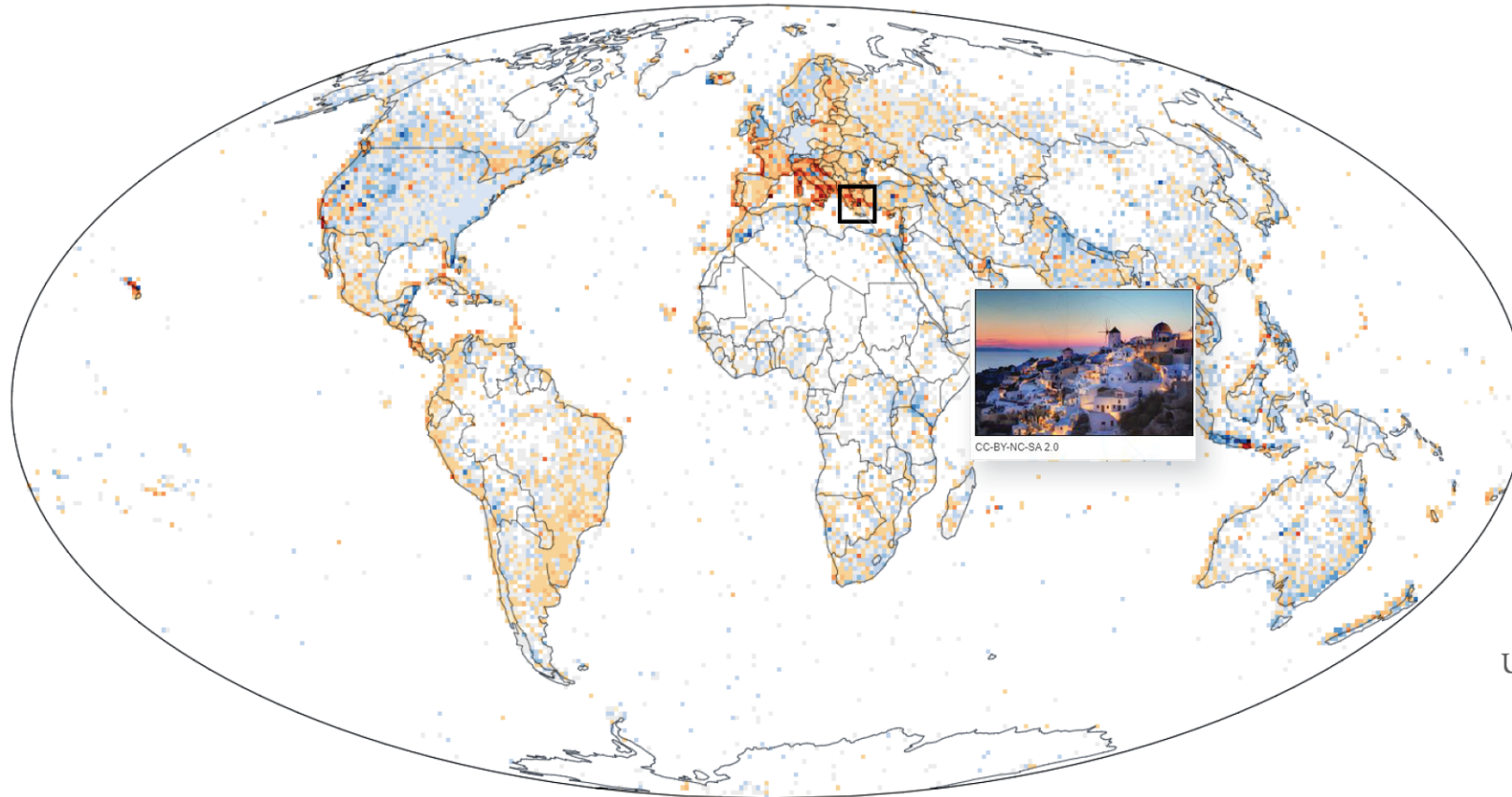
Sunset in Oia, Santorini
CC BY-SA 2.0 Pedro Szekely/Wikipedia

3.3 Million (obs) : 375 Million (exp) Flickr Images



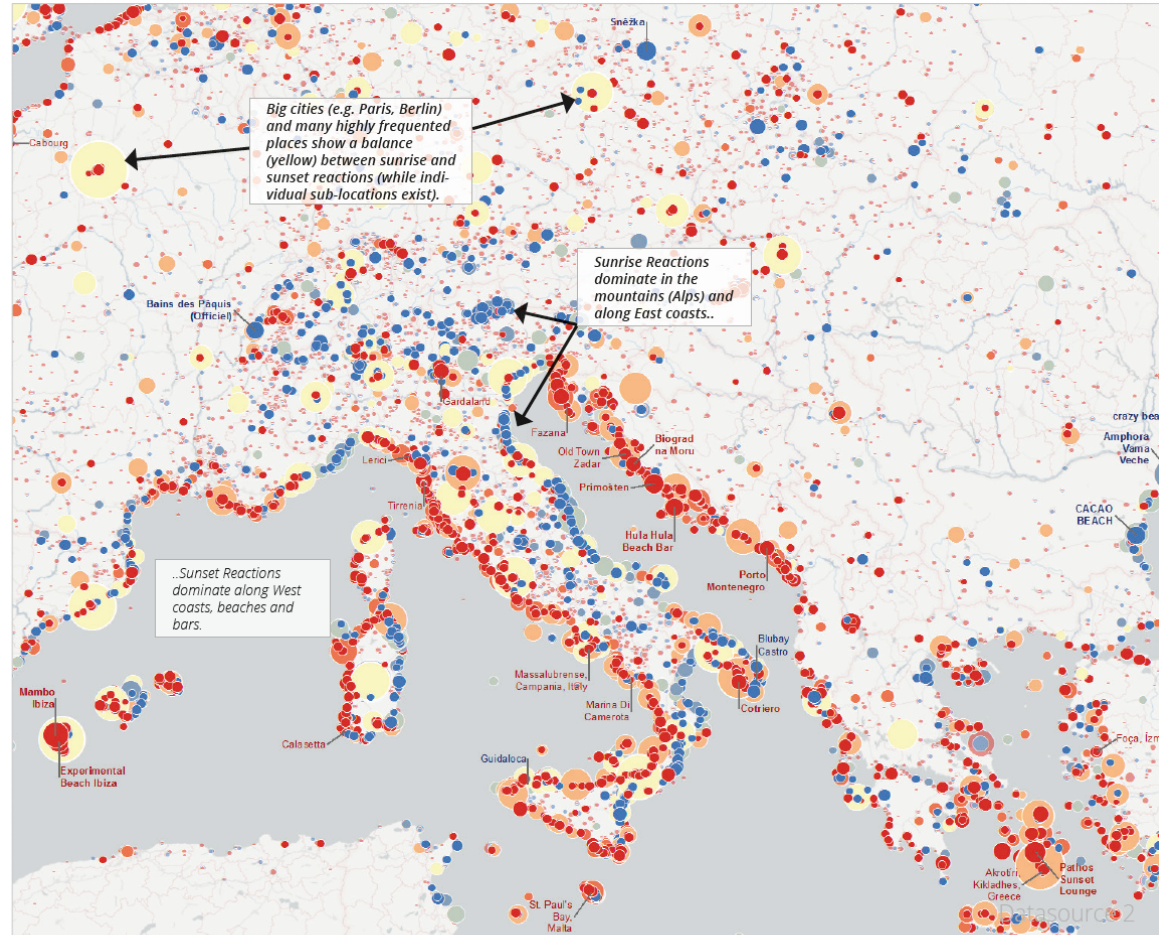
► consensus among the top-ranked 20% of choices

21 Million (obs) : ~random 20 Million (exp) Instagram



► consensus among the top-ranked 20% of choices





LEGEND

Size

- 0.04 %
- 0.2 %
- 2 % of all reactions in dataset

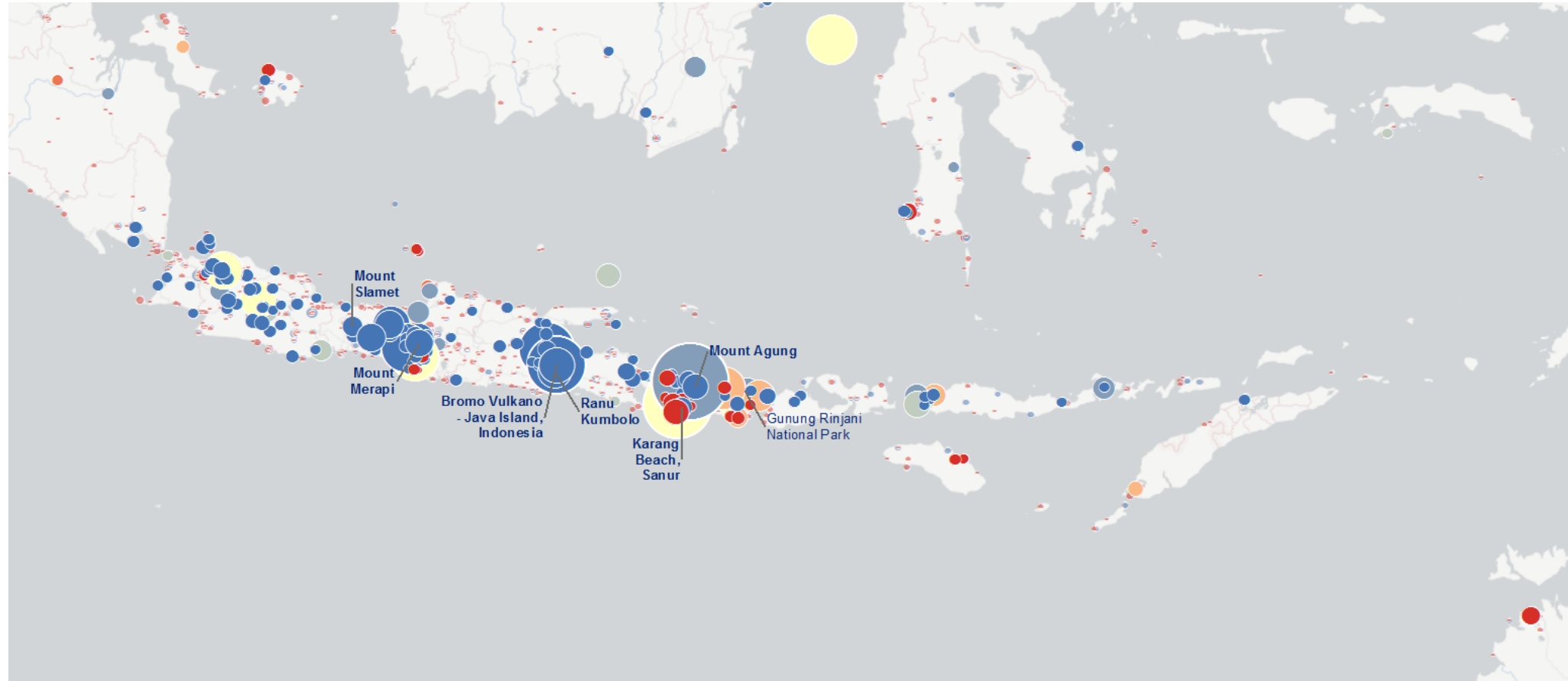
Color

- Sunrise reactions only
- ↕ Tendency towards Sunrise
- Balance Sunrise/Sunset
- ↕ Tendency towards Sunset
- Sunset reactions only
- Small databasis

Relative ranking of places (sunset and sunrise) for Central Europe.

Source: Instagram





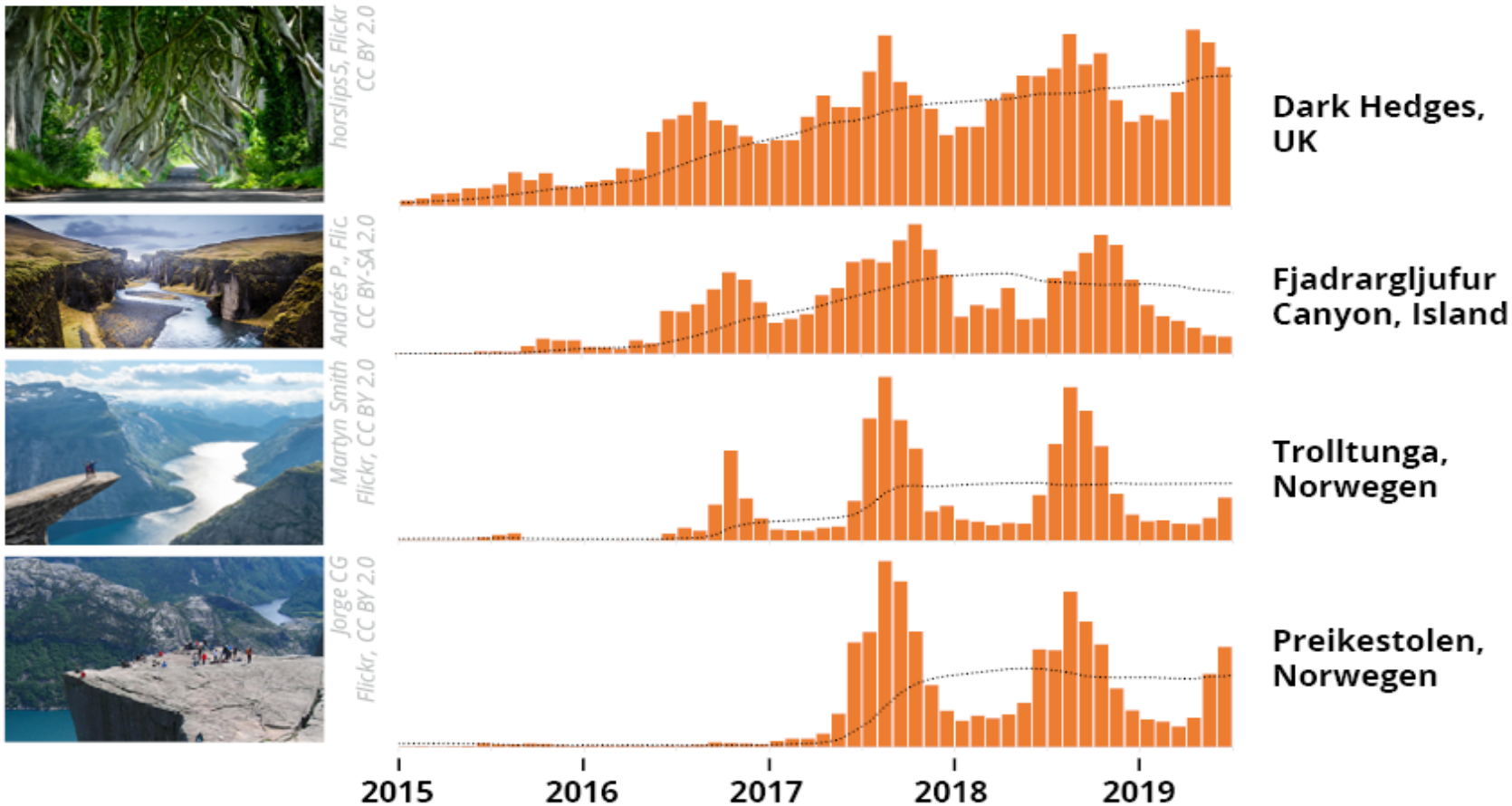
Relative ranking of places (sunset and sunrise) for Indonesia.
 Source: Instagram



"Sunrise Watchers, Mount Batur, Bali"
Howard Somerville/Flickr

Global Spread of Information

Instagram "Mass invasions", Øian et al. (2018), p.1229 [↗](#)



Frequentation of popular vantage points in Europe from Instagram data
 Claudia Tautenhahn,
 Master thesis, TUD 2019/20

(Claudia Tautenhahn, Masterarbeit Wintersemester 2019/20)

Event Inventories?

Catalog events and temporal valuation patterns
for places and regions

Two key tasks:

1. Reduce **bias** in the data to increase representativeness
2. Increase **precision**, to derive more reliable and useful inferences

Rapacciuolo et al. (2021), p.1229 [↗](#)

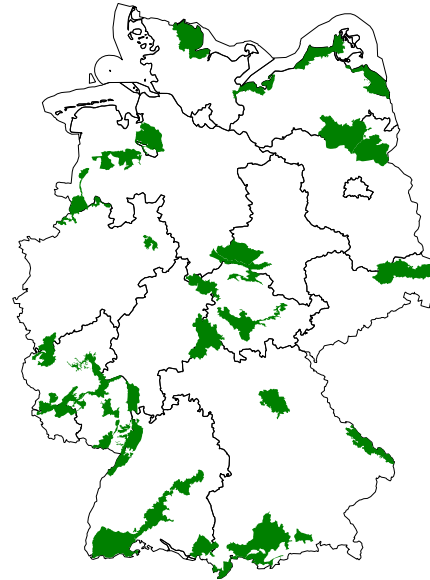
Reduce bias:

- through aggregation
- for example, by sampling from a larger, more representative number of observers and by integrating data from different platforms

Increase precision:

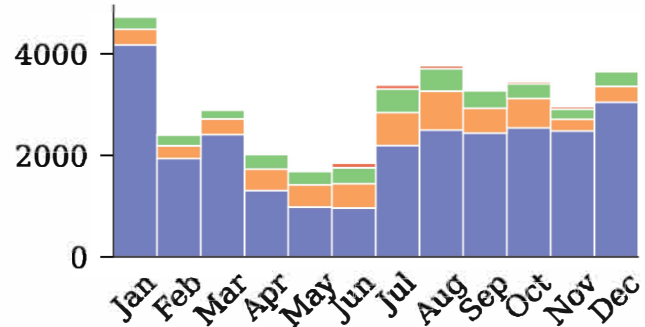
- through filtering
- for example, by querying based on time, space and semantics

Study 1 [↗](#)

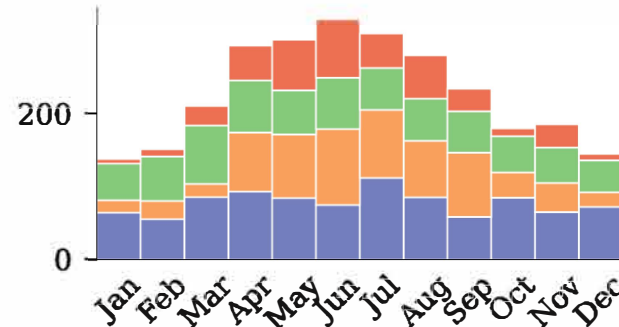


30 Biodiversity Hotspots in Germany

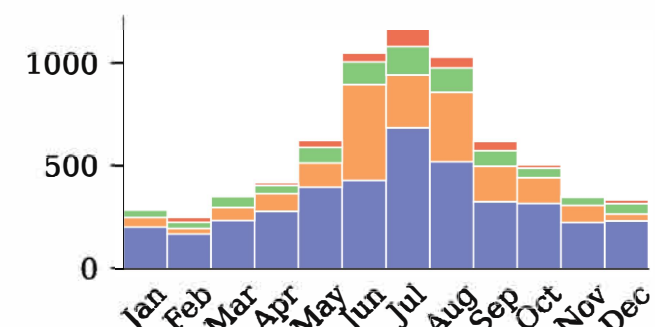
Data Source: Instagram, Flickr, Twitter, iNaturalist



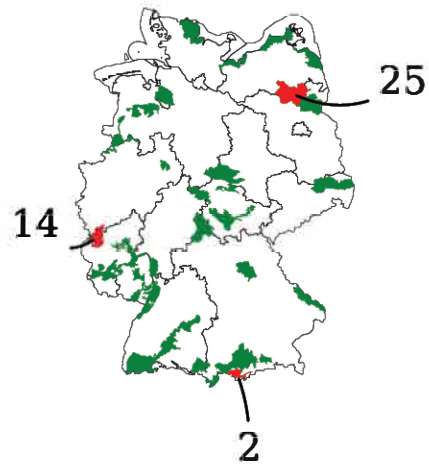
2: Ammergebirge, Niederwerdenfelser Land und Obere Isar



14: Kalk- und Vulkaneifel



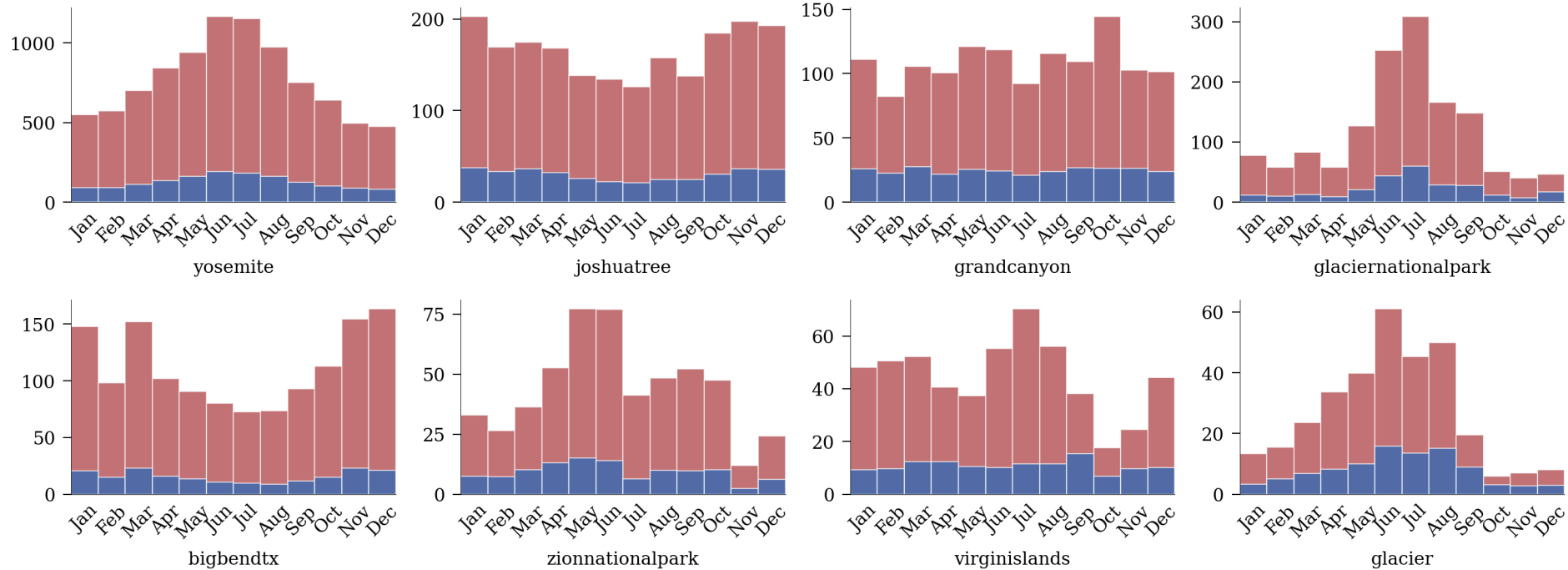
25: Mecklenburgisch-Brandenburgisches Kleinseenland



Postcount
Average 2007-2023

- Instagram
- Flickr
- Twitter
- iNaturalist

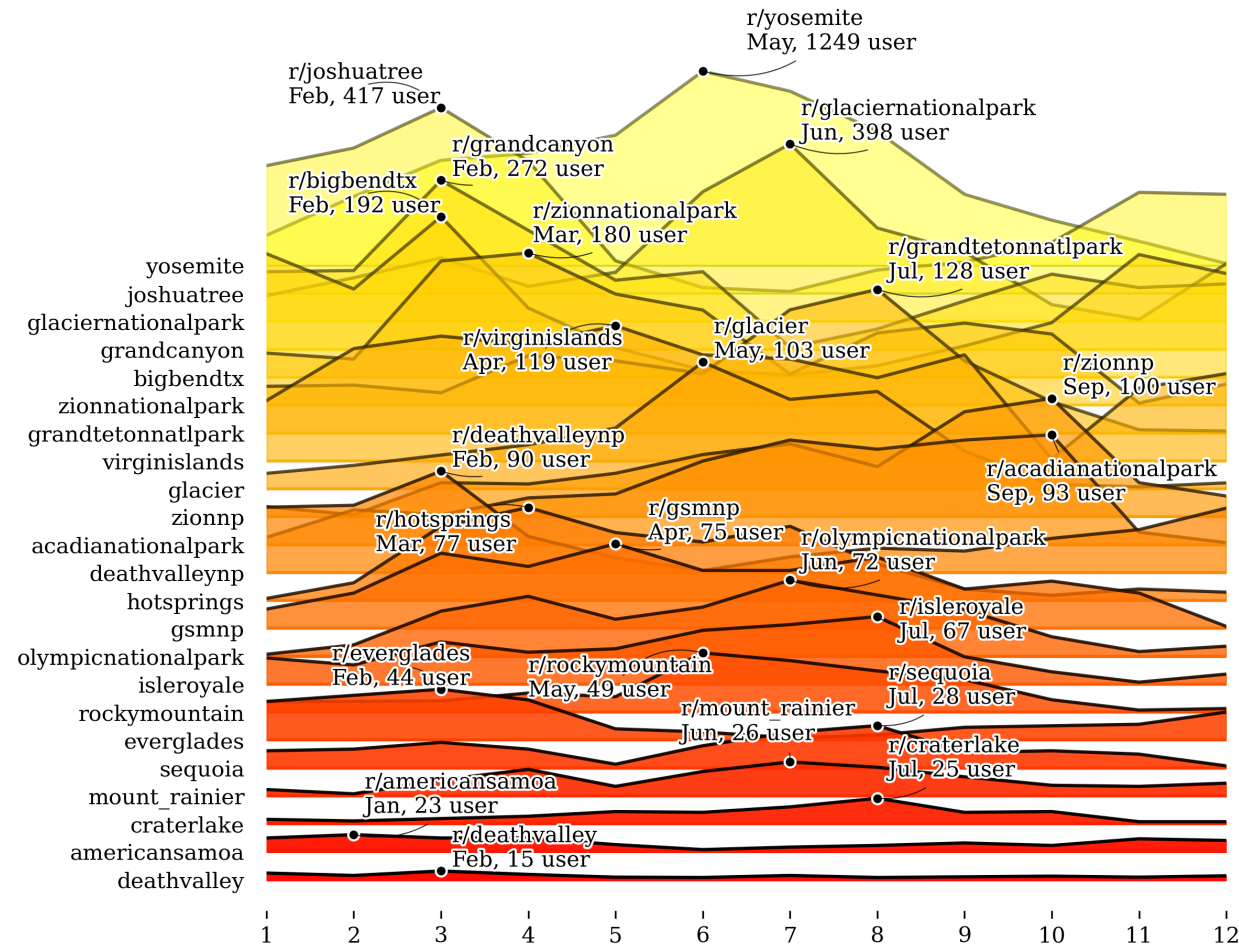
Study 2 [↗](#)



20 US Nationalparks
Data Source: Reddit

Comments (red) & submissions (blue)

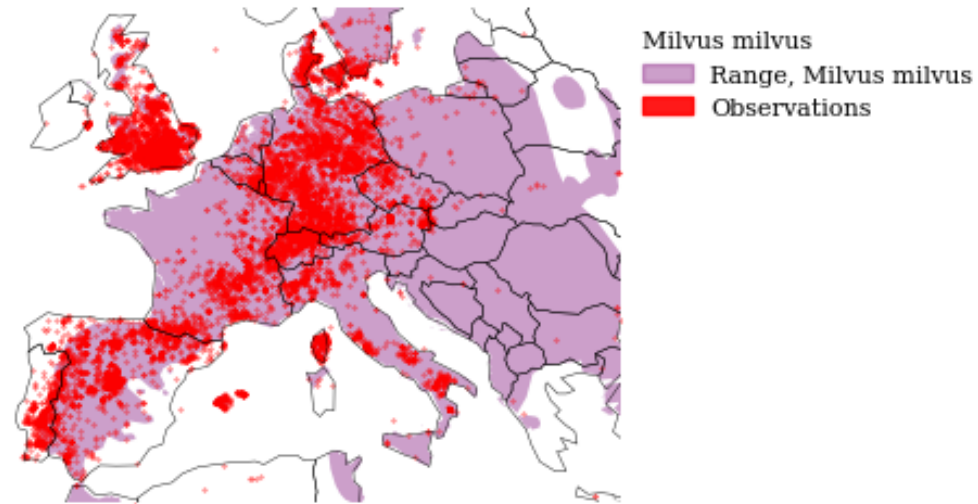




Relative seasonal communication patterns (Joyplot)

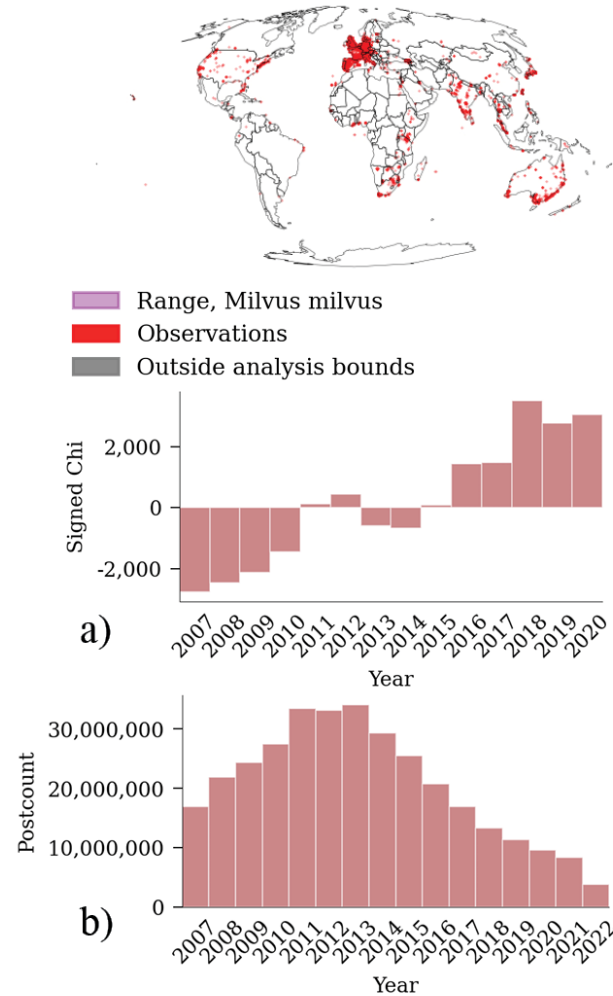


Study 3 [↗](#)

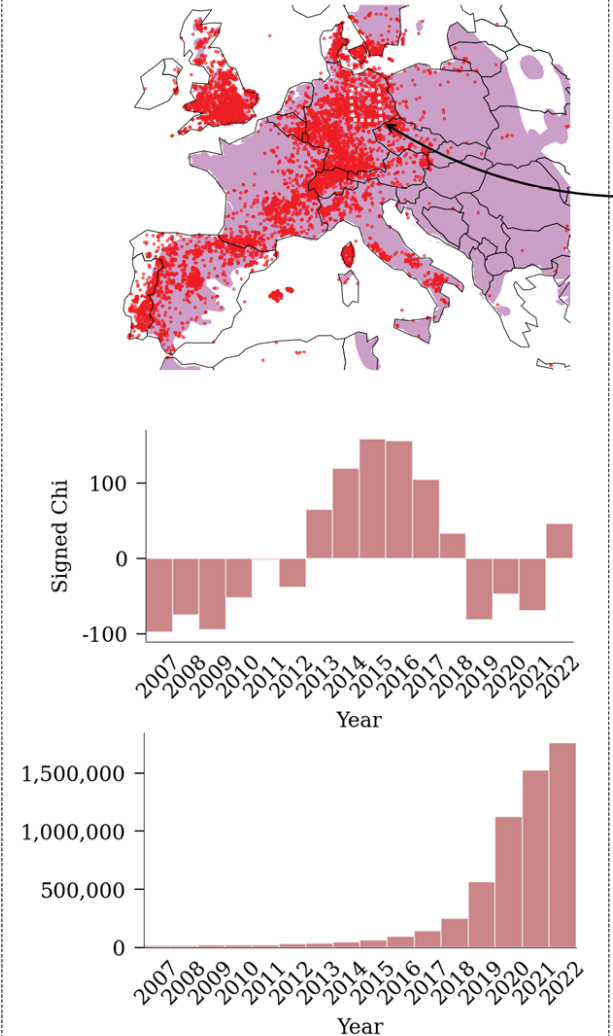


Observations of the red kite (*Milvus milvus*) in Europe
Data Source: iNaturalist
2007-2022

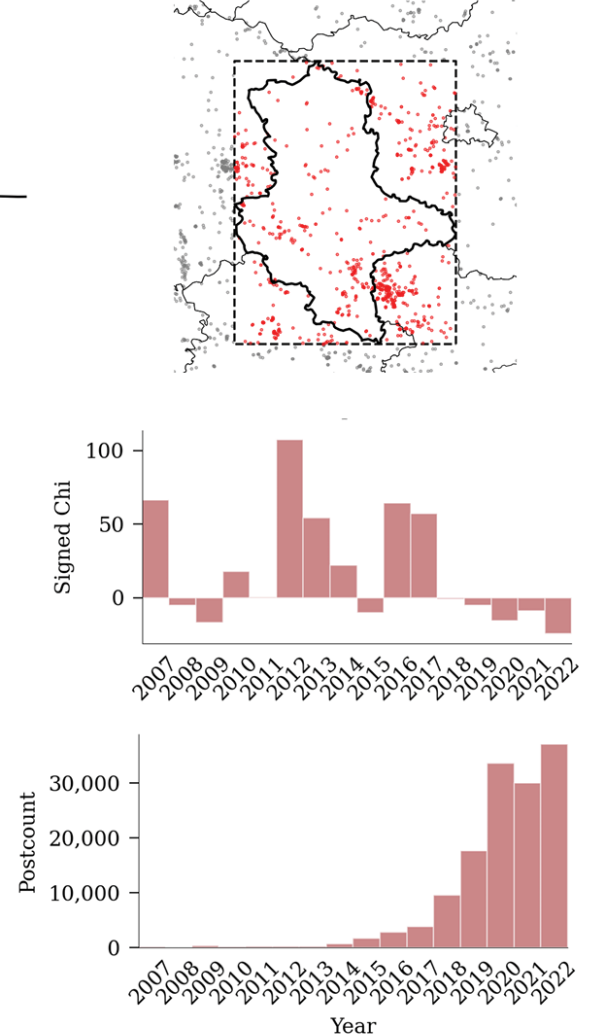
Flickr (World)



iNaturalist (Europe)



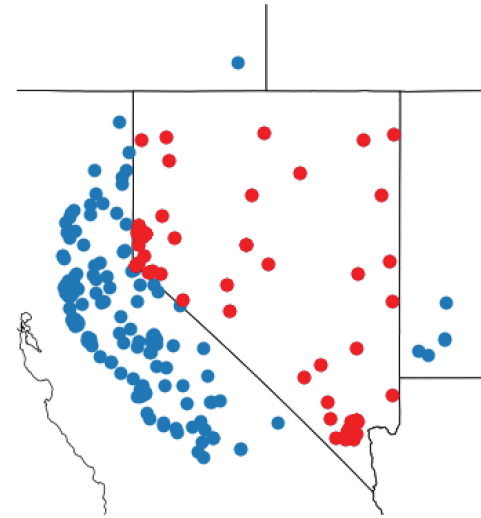
iNaturalist (Focus Region)



Temporal signed-chi evaluation for three regions



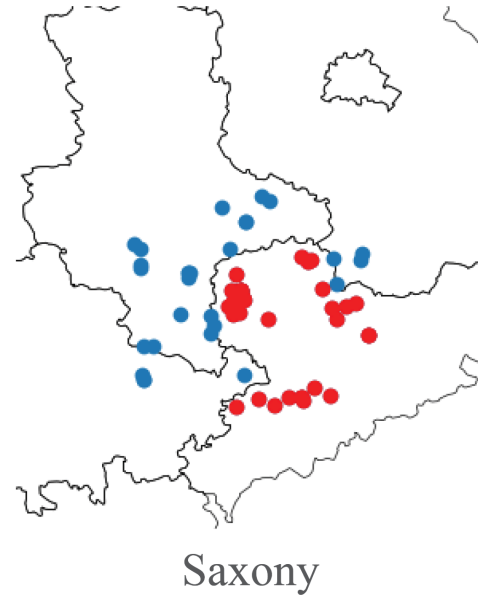
Outlook: Towards *Event Inventories*



Nevada

Wikidata SPARQL Query: Events [↗](#)

Outlook: Towards *Event Inventories*



Wikidata SPARQL Query: Events [↗](#)

Outlook: Towards *Event Inventories*

Challenges

- varying specificity as a key challenge in capturing landscape change through user-generated content
- fluctuating users and platform incentives
- data retrieval, API access

Thank You