



Aalto University
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Combining Two Datasets into a Single Map Animation

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Motivation

Project with real-time meteorological data streams

- No possibility for complex pre-processing

Aim: to study the effect of animated display for bivariate visualization

- Colour design based on previous knowledge of bivariate visualization

Analysis tasks of two spatio-temporal datasets

- Anomalies: where the datasets do not match
 - One phenomenon twice (e.g. model and observations)
- Correlation (instant or lagged)
 - Two separate phenomena

Testing the combination visualizations

Two animated maps with different combinations

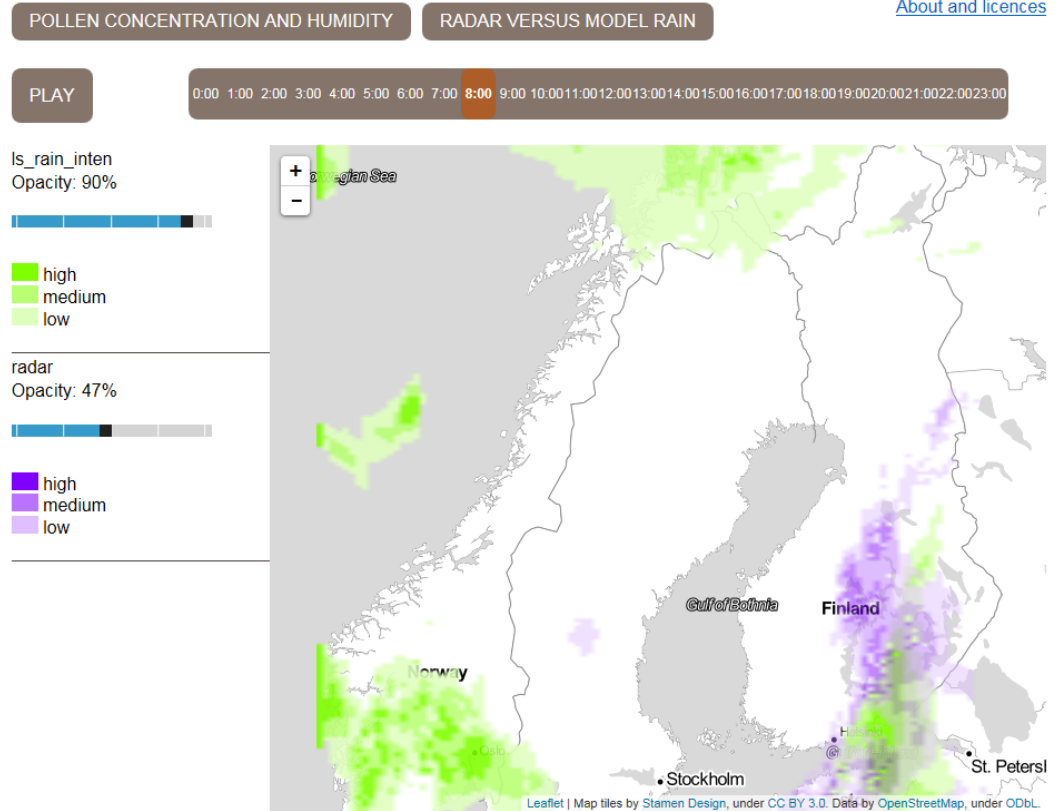
- Different datasets
- Different analysis tasks
 - Different tasks demand different colour design

Group interviews to evaluate the success of the visualizations

Rain example

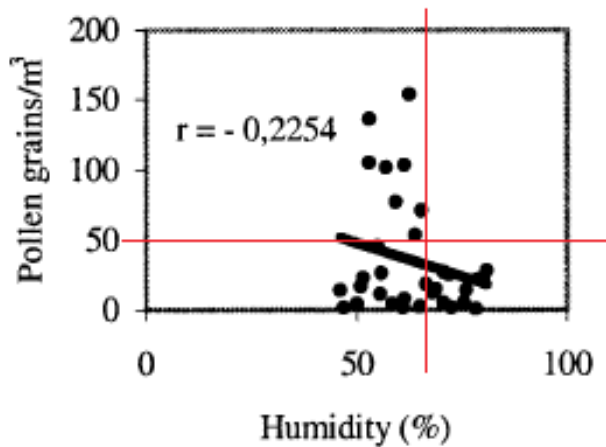
<http://ankka.github.io/psychic-nemesis/examples/9a.html>

RADAR VERSUS MODEL RAIN ON 7TH MAY 2015



Causality between two phenomena – Pollen example

Assumption: high relative **air humidity** ($> 70\%$) **removes** high birch pollen concentrations (> 50 grains/m³)



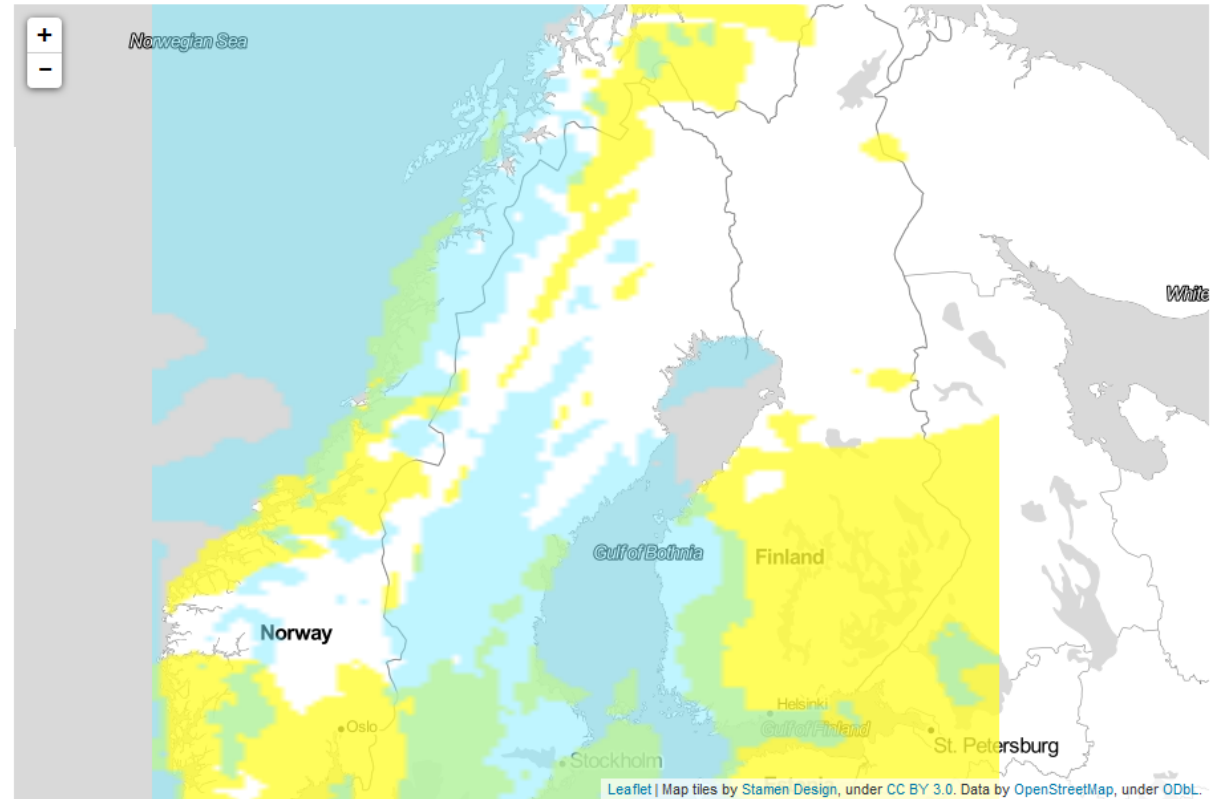
Bartková-Ščevková, J. "The influence of temperature, relative humidity and rainfall on the occurrence of pollen allergens (Betula, Poaceae, Ambrosia artemisiifolia) in the atmosphere of Bratislava (Slovakia)." *International Journal of Biometeorology* 48.1 (2003): 1-5.

- Visualization considerations:
 - Two colours which together form a third, easily separable colour
 - No classification, only binary values



Pollen example

<http://ankka.github.io/psychic-nemesis/examples/9b.html>



Evaluation of the visualizations

Three group interviews with 4-5 participants:

1) students, 2) GIS experts, and 3) professionals in meteorology

The groups were asked to give their *opinions* about:

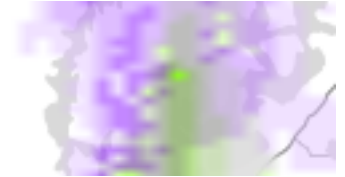
- Used colours and their suitability for the task
- Classification
- Background map

Concerns that arose from all three groups (or from two of the groups, without differing opinion in the third group) were analysed

Results from the interviews

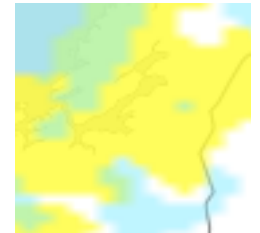
The tasks and potential users were not defined clearly enough

- "Anomalies" or "correlation" was not enough
- Typical problem with web-based applications
- The importance and visualization of blue humidity layer was questioned
 - Yellow pollen and green union would be enough



The effect of geometry and movement

- Neutral grey combination (rain example) was easily missed or mixed with other light, greyish values
 - Caused by the geometry of the radar images
 - Grey is sensitive for the neighbour colours
- Green combination of the datasets (pollen example) was seen as a third, separate phenomenon
 - The datasets did not move logically in relation to each other



Conclusions

The results of the interviews indicate that our visualizations did not work satisfyingly

- False interpretations and associations are possible

Colour use guidelines designed for static bivariate maps do not seem to work well with moving phenomena

- The characteristics of the datasets have a great effect
 - Geometry (dappled vs. solid)
 - Behaviour (movement, coverage)
 - Correspondence of the model