MACROSEISMIC OBSERVATIONS AS GEOGRAPHIICAL INFORMATION

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MACROSEISMIC OBSERVATIONS-PROJECT

- In cooperation with the institute of seismology
  - Päivi Mäntyniemi
- Objectives
  - Renew the questionnaire
  - Visualizing the results automatically
  - Automatic intensity calculation
  - Making it easier to publish result
  - Tools for future research
- Case Liminka

MACROSEISMIC OBSERVATIONS

- Observing earthquakes with documents and different sources
- Interest in the effects of earthquakes
- Questionnaires, interviews
  - Desciptive, specified questions
- Research since 1880 in Finland
  - Topics asked in the questionnaires: destruction caused, sounds, length of the earthquake, changes in ground/soil,
- A good tool to describe the scope of the earthquake

METHODS

- E-lomake
- ArcGis
- GeoServer
- WMS

THE QUESTIONNAIRE

- E-lomake
  - Clickable map for coordinates
  - Weighted values in the results
    - Intensity
  - CSV-file
  - ArcGis import
- Kyselylomake (the form)

ARCGIS

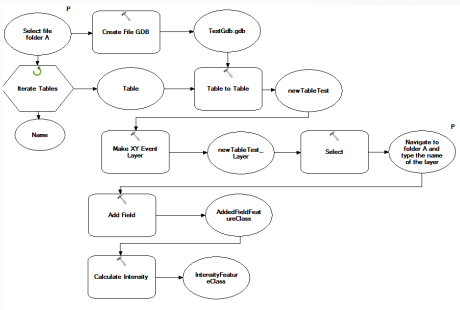
- Editing and observing the results
- Model builder
  - Intensity calculation
  - Visualizing the results
  - Quick to use

E-LOMAKE TO MAP

- Objective
  - A table from E-lomake to ArcGis
  - Calculating intensity in a new column
  - Creating a georeferenced shapefile from the table
    - Saving the shapefile to GeoServer
    - Publish it in WMS-interface (Suomi.fi)

E-LOMAKE TO MAP

- Implementation
  - The model imports the csv-file to an ArcMap geodatabase
  - Georeferencing from xy-coordinate fields



E-LOMAKE TO MAP

- Calculating the intensity
  - ”Unable to say” =1
  - ”No effect” = 0
  - ”Little”, ”A lot” = According to the classification by European Seismological Commission

➡ Sum

EMS intensity	Definition (Description of typical observed effects (abstracted))
I Not felt	Not felt.
II Scarcely felt	Felt only by very few individual people at rest in houses.
III Weak	Felt indoors by a few people. People at rest feel a swaying or light trembling.
IV Largely observed	Felt indoors by many people, outdoors by very few. A few people are awakened. Windows, doors and dishes rattle.
V Strong	Felt indoors by most, outdoors by few. Many sleeping people awake. A few are frightened. Buildings tremble throughout. Hanging objects swing considerably. Small objects are shifted. Doors and windows swing open or shut.
VI Slightly damaging	Many people are frightened and run outdoors. Some objects fall. Some houses suffer slight non-structural damage like hair-line cracks and fall of small pieces of plaster.
VII Damaging	Most people are frightened and run outdoors. Furniture is shifted and objects fall from shelves in large numbers. Many well built ordinary buildings suffer moderate damage: small cracks in walls, fall of plaster, parts of chimneys fall down; older buildings may show large cracks in walls and failure of fill-in walls.

VISUALIZING WITH DIFFERENT ZOOM LEVELS

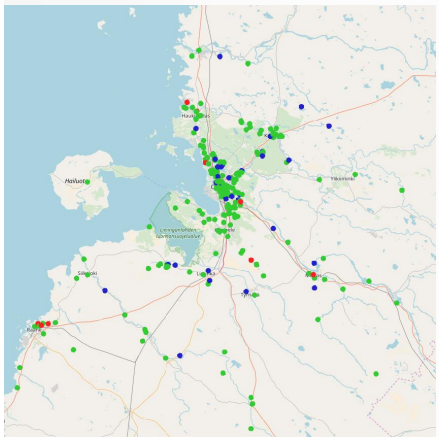
- Goal
  - Zoomed close: objects are precise
  - Zoomed far: objects are grouped
- Implementation:
  - Aggregation to 20km x 20km fishnet with spatial join
  - Centroids, count

LIMINKA

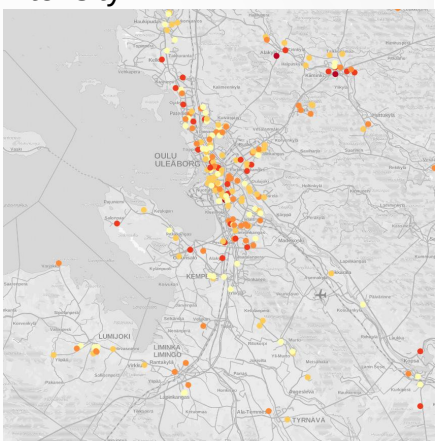
- Example data for our project
- Earthquake in 2017 in Liminka
  - 590 observations

LIMINKA OBSERVATIONS

Observations



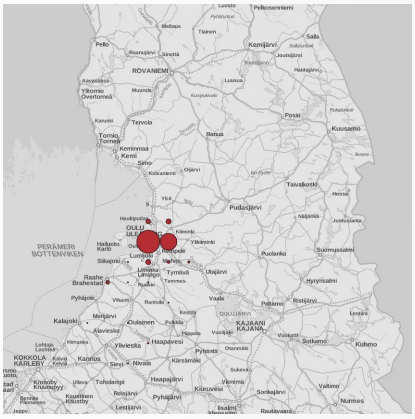
Intensity



LIMINKA OBSERVATIONS

Cluster

Cluster



RESULTS

- A new questionnaire
- Automatical visualization of the data
  - Intensity calclulation
- Instructions for future
  - Publishing

DISCUSSION

- Challenges with E-lomake
  - Stiffness
  - Clickable map embedding is challenging
  - Oskari/ rpc-interface with location
- ArcGis vs Qgis
- Data collection
  - Manual work still required
  - Importing results to the model
  - Privacy issues
  - Data filtering before ArcGis

FUTURE OF THE PROJECT

- Rights to use the questionnaire to the institute of seismology
  - Further development of the questionnaire form
  - Using a different form?
- Creating the GeoServer
- Publishing in the WMS-interface
- Editing the model for different visualizations

KIITOS!