European Commission

Current status of the elaboration of maps for climatic and seismic actions in Serbia

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Overview

- *Progress in adoption*
- *Elaboration of maps for climatic actions*
- *Elaboration of maps for seismic actions*
- *Progres in the training*

Progress in adoption

Eurocode 1

naSRPS EN 1991-1-1/NA:2015
naSRPS EN 1991-1-7/NA:2015
naSRPS EN 1991-3/NA:2015
naSRPS EN 1991-4/NA:2015

**National annexes will be published by the end of November 2015.*

Progress in adoption

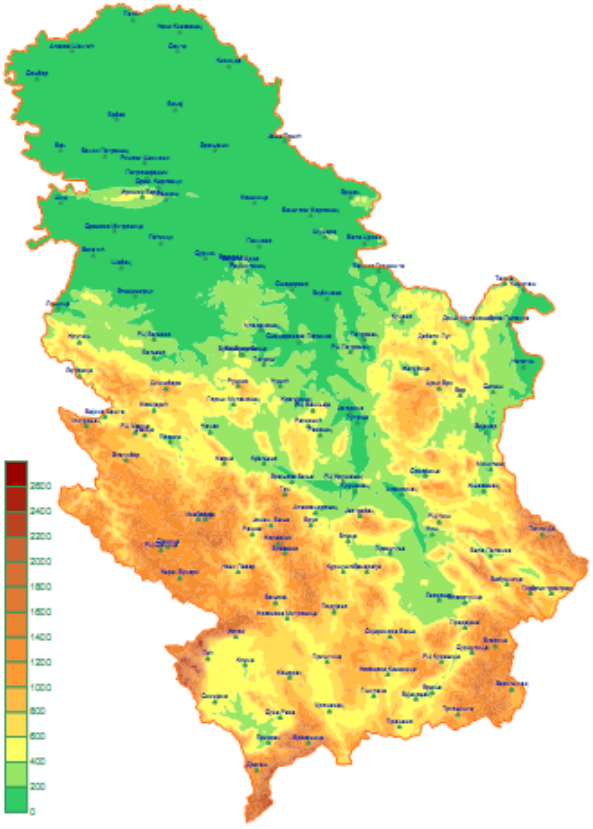
Eurocode 2 *COMPLETED*

**National annex for SRPS EN 1992-1-1:2015 will be published by the end of November 2015.*

Eurocode 4 *COMPLETED*

**National annex for SRPS EN 1994-2:2015 will be published by the end of November 2015.*

Elaboration of maps for climatic actions



- *Republic Hydrometeorological Service of Serbia*
- *Projection of 3D-model terrain of Serbia*
- *242 000 points*
- *significant influence of terrain orography*
- *27 main meteorological stations*

Elaboration of maps for climatic actions
Snow load

- *Only main meteorological stations measure density of snow (27 MMS)*
- *Series of maximum weights of snow was formed from data since 1975.– 2010.*
- *Dominant influence of altitude*
- *Terrain model with values of altitude in grid points on* 30”x 30” *latitude and longitude*
- *Limitations: number of stations and their distribution cannot meet complexity of orography; need for data exchange with the neighbour counties*

Elaboration of maps for climatic actions
Wind actions

- Only main meteorological stations measure wind direction and wind velocity (27 MMS)

- Analysys of data for period from 1981.– 2010.

- Altitude don't have main inffluence; area with strong east and south-east wind

- Choice between Gumbel model with Kriging geostatic metod and non-hydostatic meso model (some values are significantly different)

- Modified map is expected

Elaboration of maps for climatic actions
Thermal actions

- Annual minimum and annual maximum shade air temperatures are for return period of 50 years

- 68 meteorogical stations

- Period 1981-2010

- Gumbel distribution

- Linear correlation minimum temperature – altitude: 0-400m, 400-800m, over 800m

- Orography influence taken in acount

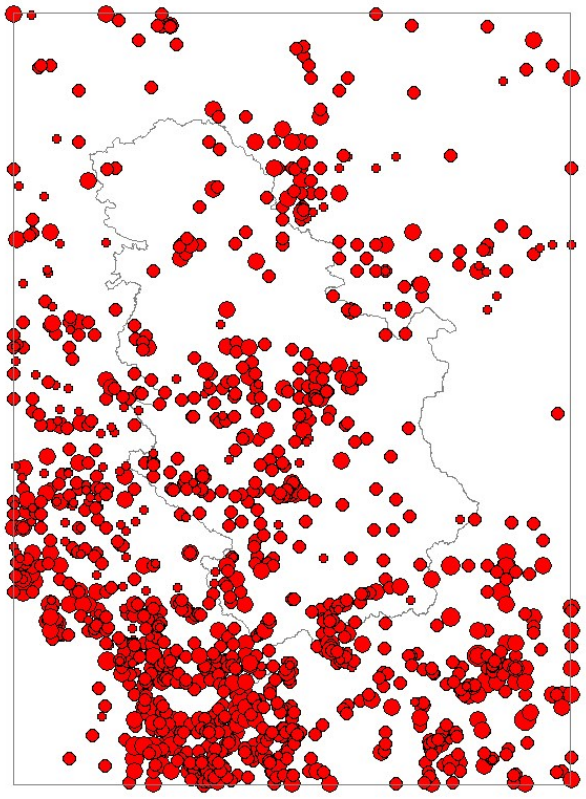
Elaboration of maps for seismic hazard

- Maps are prepared for ground acceleration on type A ground, for return periods of 95, 475 and 975 years

- Compilation of Catalog:

- *Reimpretation of historical earthquakes M ≥ 3.5*
- *Magnitude unification*
- *Defining levels and periods of completing catalog*
- *Catalog declasterisation*

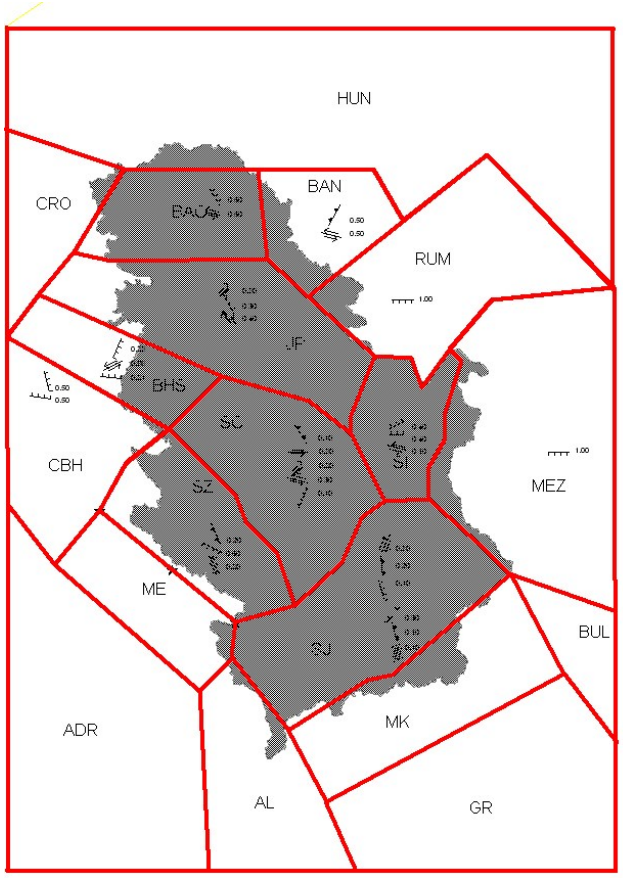
Elaboration of maps for seismic hazard



Area with influence on seismic hazard in Serbia

- *1208 earthquake M ≥ 3.5 independet events*
- *For period 1456-2010, recognised 605 earthquakes in Serbia, 306 are independet events*

Elaboration of maps for seismic hazard



Seismic zones

19 seismic zones based on seismotectinic characteristics:

- ***dominant eartquake mechanism***
- ***fault planes azimuth***
- ***max Magnitude***
- ***earthquake repitability parameter "b"***

Elaboration of maps for seismic hazard

Numerical hazard values calculations

- *Hazard is based on the mean value of area*
- *Averaging is based on eliptic area with given dimensions*
- *max and min magnitudes are given*
- *Given grid dimensions for calculations*

Elaboration of maps for seismic hazard

Limitations

- *Maps are based on earthquake events only*

- *There is not enough data about faults slip rate*

- *There is not adequate fault map*

Progress in the training

Activities:

- The introduction of the Eurocodes in civil engineering - Design of concrete structures according to Eurocode 2 (accredited course for professors in secondary schools)

- Serbian Chamber of Engineers organize webinars in english and lectures by local professors

- Faculty of Civil Engineering prepares study program for Eurocode 2 with accompanying literature

- Study program for Eurocode 3 is active

- Handbook for Eurocode 3 is published

Thank You for attention