VALORIFICARI 2014

1. Lucrari publicate sau trimise spre publicare:

A.O. Placinta, E. Popescu, M. Radulian, F. Borleanu, M. Diaconescu, M.Popa, Source parameters of the earthquake sequence occurred close to the BURAR array (Romania) between 24 June and 1 July 2011, trimisa spre publicare la Pure and Applied Geophysics.

2. Lucrari prezentate la conferinte nationale si internationale:

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Mihail Diaconescu, Angela Petruta Constantin, Iren Adelina Moldovan, Dragos Toma Danila Seismicity Of The Eastern Part Of The Moesian Platform

Angela Petruta Constantin, Mihail Diaconescu, Iren Adelina Moldovan, Macroseismic Study Of Major Transborder Historical Earthquake

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Iren-Adelina MOLDOVAN, Angela CONSTANTIN, Emilia POPESCU, Dragos TOMA-DANILA, Victorin Emilian TOADER, Traian MOLDOVEANU and Anica PLACINTA, Seismic hazard and risk studies for large Romanian dams situated on Bistrita and Siret rivers;

Angela Petruta CONSTANTIN, Iren-Adelina MOLDOVAN and Victorin Emilian TOADER Depth and magnitude estimation of the two strongest earthquakes occurred on the Romanian territory in 19^{th} century;

M. Radulian, E. Popescu, A.O. Placinta, F. Borleanu, Source scaling properties in the Carpathians area, Romania: crustal versus mantle earthquakes

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SEISMIC HAZARD AND RISC STUDIES FOR LARGE ROMANIAN DAMS SITUATED ON BISTRITA AND SIRET RIVERS

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The studies realized in this paper have as final goal to provide the local emergency services with warnings of a potential dam failure and ensuing flood as a result of an large earthquake occurrence, allowing further public training for evacuation.

Probabilistic seismic hazard (PSH), vulnerability and risk studies in 6 counties from Moldova region including Izvorul Muntelui Dam, down on Bistrita and following on Siret River and theirs affluent will be realized (Figure 1). A number of 5 large dams (the most vulnerable) will be studied in detail and flooding maps will be drawn to find the most exposed downstream localities both for risk assessment studies and warnings.

Besides periodical technical inspections, the monitoring and the surveillance of dams' related structures and infrastructures, there are some more seismic specific requirements towards dams' safety. The most important one is the seismic risk assessment that can be accomplished by rating the dams into seismic risk classes using the theory of Bureau and Ballentine (2002), and Bureau (2003), taking into account the maximum expected peak ground motions at the dams site (values obtained using probabilistic hazard assessment approaches (Moldovan et al., 2008), the structures vulnerability and the downstream risk characteristics (human, economical, historic and cultural heritage, etc) in the areas that might be flooded in the case of a dam failure.

In Romania, "*there are some flooding maps from the '70s, compiled on the basis of existing information in the field at that time, but these are exceeded because meanwhile river beds configuration has changed and there appeared new constructions on the watercourses*" (D. Radulescu, Director of the National Institute of Hydrology and Water Management - INHGA).

After the floods from 2005, in Romania begun a National Program for Flooding Effects Prevention and Mitigation, the implementation of specialized maps being also included in this program. The first nationwide stage was scheduled to end in August 2013, and thereafter, until the end of the year, the county councils have to prepare the flood risk maps. Between 2005 and 2013 there were several attempts to complete these maps, but their delivery deadlines have always been exceeded and flooding maps, even if they are mostly made, have not led yet to some hazard and risk flooding maps, are not public and can

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not be accessed online via free GIS portals, as they exist in other European countries (e.g. the Netherlands- http://nederland.risicokaart.nl/) or in all states from the USA http://gis.abag.ca.gov/Website/DamInundation/index.html). In addition, none of these projects finalized or in progress, does not clearly specify the development of flooding maps for the special case of rupture and draining of a large dam.

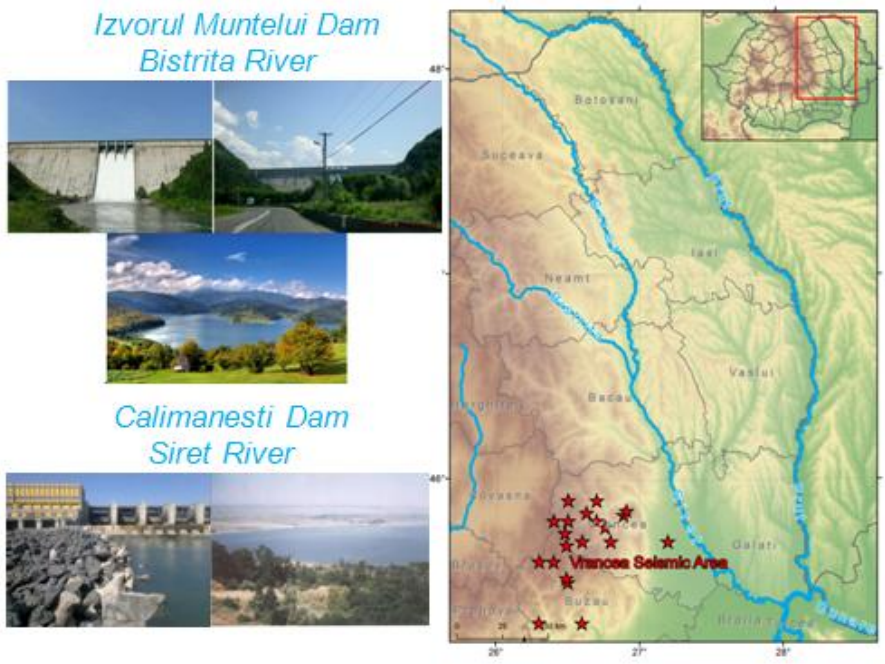

Figure 1. Dams from Siret and Bistrita Rivers that will be studied in this paper

And these maps are required for assessing the seismic risk and the rating of large dams into seismic risk classes (Bureau, 2003), in order to estimate the maximum potential of the human and economic damage and loss downstream of the dam. GIS maps that clearly indicate areas that are potentially flooded are enough for these studies, thus giving information on the number of inhabitants and goods that may be destroyed. Geospatial servers included topography is sufficient to achieve them, all other further studies are not necessary for risk downstream assessment.

That's why we will develop in Romania, **dam failure inundation maps using geographical information and topography principals** and we'll represent the best estimate of where the water would flow if the dam completely failed with a full reservoir. The inundation pathway will be based on completely emptying the reservoir and does not include run-off from storms.

For the analysis of the flooding, we will use state-of-art GIS procedures (Toma, 2012 and 2013) in order to generate inundation maps for each dam, and for a worst-case scenario. The procedures will rely on 3 dimensional flow simulation, for the maximum volume of water determined using the monitoring capabilities of this project and the one provided by the National Administration of Romanian Waters and taking into account the expected breaches in the dam and a high resolution Digital Elevation Model (DEM) of the area. We will rely on the Shuttle Radar Topography Mission data (SRTM), Farr et al. (2007) and georeferenced topographic maps at small scale. If the case, we will also analyze the impact of a dam failure to another dam located downstream. Emergency teams are most interested, when creating emergency evacuation plans, about the possible intervention time. We will provide estimated values, in order to facilitate the base-point for these plans. Thanks to the 3D GIS capabilities and for a greater impact on key-factors, animations of the possible failure are going to be created. Based on population data, gathered by the latest census in October 2011, estimates about the number of affected (in need of evacuation) people are going to be provided.

The results will consist of local and regional seismic information, dams specific characteristics and locations, seismic hazard maps and risk classes, for all dams sites (for more than 30 dams), inundation maps (for the most vulnerable 5 dams from the region) and possible affected localities. The maps will provide the best available estimate of the general location and extent of dam failure inundation areas and will tell if a specific location lies within a dam failure inundation zone.

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