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Decade of karst risk assessment

Vladimir Yolkin
Ph.D. (Engineering geology), eyolkin@mail.ru, Russia

Karst is one of the most hazardous processes on the Earth, at about 13% of the Russian area, including more than 300 towns and thousands of smaller settlements with 19% of the total population of Russia, are subject to karst deformations (Ragozin, 1994).

During the time period 2000-2004, regional karst hazard and risk assessment was developed as an example of the Tatarstan Republic (Ragozin and Yolkin, 2003). The published paper was the first Russian research paper dedicated the technique and cartographic examples of probabilistic-deterministic risk assessment from karst processes. At present time, the technique of assessment of karst risk is improved, as well as investigations with reference to various areal or linear recipients are performed. In particular, for the pipeline systems the assessment of karst economic risk adapts, according to two scenarios: the pessimistic one (the most adverse in consequences) and the most probable (Yolkin and Anikeev, 2007, Yolkin, 2008,2009).

By karst risk we mean the probabilistic index of hazard of karst and karst-suffosion sinkholes and surface settlements established for a certain object as it possible losses in various spheres for a given time period.

Quantitative karst-hazard and risk assessment is carried out on the basis of the analysis of geological structure of territory, hydrogeological and engineering-geological conditions of territory, identification and prediction of karst hazards in time and space, assessment of vulnerability of objects to karst hazards, ranking and mapping of karst hazards as well as karst economic, social risks of losses. The obtained values of economic or social risk are the basis for choosing engineering protection measures, alternative design solutions and for estimating service conditions.

It is necessary to mention that the procedure of vulnerability assessment is poorly developed with reference not only to karst sinkholes, but also to dangerous geological processes in general. For vulnerability determination, it is possible to use two groups of methods: 1) designed method based on performing of special modeling and calculations of building objects stability, and also 2) statistical method based on analysis of data about actual destructions of various objects and corresponding social, economic and ecological losses.