

# **MAN AND KARST 2017**

**INTERNATIONAL SCIENTIFIC MEETING**

**JUNE 26<sup>TH</sup> - 29<sup>TH</sup> ZADAR, CROATIA**

**ABSTRACTS AND GUIDEBOOK**



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## DAMS ON EVAPORITE ROCKS FOUNDATION

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The presence of evaporites in dam bases is one of the unfavorable conditions for their construction. This creates conditions for the development or intensification of karst and threatens the existence of structures. The practice of dam construction shows that even small amounts of gypsum or salts in case of dissolution can lead to extremely undesirable consequences. Thus, major accidents occurred on some dams, for example St. Francis dam (USA), where underestimation of rock lithology led to a catastrophe that resulted in the death of 400 people and large losses; Teton dam (USA), where mistakes in the design and construction led to collapse; Sen-Jan de Morien (France), Quail Creek (USA) and San Juan (Spain). Also, due to the presence of evaporites in the basements, the construction of the Rogunskaya, Nizhne-Kafirniganskaya (Tajikistan), Fatha (Iraq) dams was suspended.

Information on the presence of gypsum in the bases is also found in the dams of Birsfelden (Switzerland), Hesingheim (Germany), Alloz, San Loran, Caspe, Estremera, La Lotela (Spain), Mont Cenis (France), Djedra (Algeria), Casa de Piedra (Argentina), El Isiro (Venezuela), Peuble de Pava (Guatemala) and Poecos (Peru). Gypsum rocks are presented in the section of more than 20 US dams, also karst forms are noted in their areas. The consolidation of karst rocks can be carried out by carburizing, claying, silicification and other methods, the use of which ensures the successful operation of dams such as Kamskaya and Irganayskaya (Russia), Mingechaurskaya (Azerbaijan), Yerevanskaya (Armenia), Tbilisskaya (Georgia), Baypazinskaya and Nurekskaya (Tajikistan), Tannur (Jordan), Mosul and Hadita (Iraq), Houshipo (China), Farhad dam (Uzbekistan), etc. The above examples show that the presence of soluble rocks and the development of karst processes in the area of hydraulic structures create serious problems in their operation, significantly increase the cost of construction and repair, and in some cases can lead to accidents and the destruction of the dams. So, the cost of repair works related to the development of karst processes can be comparable with the cost of the structure. Errors in the exploration, construction and operation of hydraulic structures are largely due to the lack of generalization of the experience of dam construction on soluble rocks, and there are no clear methodological approaches to the quantitative assessment of karst processes in the dam impact zone.

Thus, an integrated approach to assessing the state of the base of dams on soluble rocks should include: 1) analysis of hydrochemical and hydrodynamic observations, 2) study of karst manifestations in the dam area; 3) laboratory studies of the mechanism of chemical and physico-chemical processes at the base; 4) mathematical modeling of filtration to reveal the change in the filtration parameters of rocks over time, which will allow us to evaluate the effectiveness of anti-filtration measures, to identify in a timely manner undesirable processes at the base of the dam and to develop measures to eliminate them. This work was financially supported by the Russian Foundation for Basic Research (project 16-35-00104 mol\_a).