

THE REPORT ON THE FIFTH MULTIDISCIPLINARY CONFERENCE ON SINKHOLES AND THE ENGINEERING AND ENVIRONMENTAL IMPACTS OF KARST (GATLINBURG/TENNESSEE, 2-5 APRIL, 1995)

Between March 31 and April 17, 1995 I took part in the International Conference on Sinkholes and the Engineering and Environmental Impacts of Karst in USA. The main organizer of the meeting was B.F. Beck, sponsored by P.E. LaMoreaux & Associates, Inc. (P.E.L.A.).

This symposium was the fifth in a series which has been organized at intervals since 1984. The papers presented at the Conference were published at the same time. This year's publication is entitled *Karst Geohazards* (Beck 1995), 66 papers are presented in 581 pages. Like all the previous volumes, it was published by Dutch Publishing House A.A. Balkema.

The Conference was held in a tourist town Gatlinburg, south of Knoxville which was celebrating its 50th anniversary. This is a typical American tourist place with a large catering industry, and selling a lot of souvenirs. The town developed at the northern foot of the Great Smoky Mountains National Park.

The official opening of the Conference was on Sunday, April 2, 1995.

The first day excursion showed some examples of sudden sinkholes and water hazards near Knoxville. At first we stopped a little out of Pigeon Forge in the Vulcan Materials Quarry (Sevierville Quarry) of Lower Ordovician dolomites, and Middle Ordovician limestones. At the bottom of the quarry is a permanent lake caused by collapse and later filled by water. The water does not come from the nearby river Little Pigeon Forge but from other sources, including groundwater; this is proved by the differences in temperature, conductivity and other parameters. In two years the water level has not changed, so that this collapse must contain a spring to compensate for evaporation.

In Kodak Community we visited by bus sinkholes and collapse dolines that are typical of this country and which frequently present a hazard by sudden subsidence even close to houses.

Nearby the motorway at Knoxville we visited a sinkhole that opened above a cave.

We also visited Cherokee Cavern. Recently a caver has become involved and slowly he is making the pathways and he displays the cave to tourists. The cave is electrically illuminated and it was a show cave already in the past. It developed in Upper Cambrian Copper Ridge dolomite with layers of cherts along the fissures. Three levels may be distinguished in the cave. The passages are 230 m in length but, they suppose that they may be connected with other caves, 16 km away.

In September 1994, 6,829 caves were already registered in Tennessee; their average length is 222 m, 161 caves are longer than 1,6 km, and 25 caves are

entered by a shaft of more than 100 m (Moore 1995).

West from Knoxville we stopped at Tuckaleechee Cove; this is a geological window where limestones (Cambrian - Ordovician) are exposed. These limestones are very karstified and there are a lot of caves in them (30 caves are known). The most famous are Tuckaleechee Caverns developed in Paleozoic limestones (Cambrian - Mississippian). The tourists may visit 800 m. The largest chamber is 30 x 48 m, and 20 m in height.

We also visited the outcrop of Pre-Ordovician shales (at Road 321 near Great Smoky Mountains) that are folded in smaller (about 2 m wide) synclines and anticlines. This is a nappe (about 300 m of overthrust) on younger Middle Ordovician limestones.

On Monday, April 3 the three days of Symposium papers started. The introductory lectures were given by the organizer, B.F. Beck and by P.E.L.A. director P. LaMoreaux. The first paper, Geotechnical Aspects of the Design and Construction of Dams and Pressure Tunnels in Soluble Rocks was presented by A.H. Merritt. Out of about 200 participants, a little more than 50 presented papers orally or by the 16 posters.

The morning lectures were related to the topic Karst Geology - Surficial Processes and Sinkholes and the afternoon ones to Karst Hydrology. It was a great honour for me to be co-chair of the afternoon lectures together with Dr. W.B. White. The lectures ended at 5 p.m.

On Tuesday, April 4 we continued with lectures. The morning topic was Karst Geohazard - Stormwater Drainage and Flooding Problems and Transport of Groundwater Contamination in a Karst Aquifer. After lunch the lectures related to the topic Foundation Considerations and Improvements in Karst, and Investigating Karst with Geophysics followed.

In the evening, about 7.30 p.m. a social meeting was guided by A.H. Merritt. The young Ernst H. Kass Kastning III got a silver medal for Boy Scouts in conservation. Then we looked at some cave slides commented on by A.H. Merritt.

On the last day of the Conference, Wednesday April 5, 1995 the lecture topics in the morning were Government Regulations for Karst Areas, Karst Geohazards - Groundwater Contamination Through Sinkholes and the Karst Surface, and in the afternoon Karst Geohazards - Case Studies on Engineering Sinkholes in Planning and Investigation for Engineering in Karst. In the last section I presented my paper The Problems of Constructions on Karst: the Examples from Slovenia with co-author Andrej Mihevc. It deals with karst phenomena discovered during the motorway construction over the Classical Karst in the years 1994 and 1995. The vertical shafts and horizontal caves discovered during the motorway preparation are an obstacle that needs reliable sanitation.

Only two papers from Europe were presented at the Conference, one from Belgium and ours from Slovenia. Our country received special attention and

interest as the country of the Classical Karst. I met many American karstologists, as Dr. Quinlan, Dr. Beck, Dr. White and his wife Elisabeth, Dr. Mylroie. It was pleasant to see that they know Slovene karst as almost all of them have visited the more characteristic caves and terrains years ago.

The International Conference was attended by numerous representatives of American private firms dealing with hydrogeological and geophysical problems of karst terranes. By such a way they got acquainted with concrete solutions of the engineering problems; some of them accomplished by sponsorship.

After the Conference I remained for another 10 days in the United States and, guided by people I had met, I visited karst regions and the most important caves of Tennessee, Kentucky (Stephen Capps, Chris Groves) and West Virginia (Roy Jameson).

My participation at the Conference was made possible by the Karst Research Institute ZRC SAZU, Ministry of Science and Technology of the Republic of Slovenia, and Open Society Fund. Without their help my active participation at this important Conference would not have been possible.

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