
Preface

The book *Dynamic Tectonics and Karst* is designed for scientists, professionals, and students, working in the field of karst science, tectonics, geomorphology, and paleoseismology. It tries to systematize the gained knowledge about the relationship between karst and dynamic tectonics and to present new approaches to the study of this relationship.

The structure of the book is summarized in the following chapters:

- Chapter 1 is an introductory chapter. It outlines the history of the accomplished studies dealing with the relationship “karst and tectonics.” This relationship was mentioned even in the works of the first karstologists at the end of the nineteenth century. During the last three decades, the study of the dynamic tectonics and recent geodynamics in karst terrains was a theme of different publications but not systematized in a complete monograph. We hope that significant contributions to this field are referred, and especially the less known publications from East European authors will be of interest for the readers.
- Chapter 2 discusses the fundamental notions related to tectonic stress fields and the applicable methods for field studies of the relationship “tectonic stress → fracturing → karst process.” Basic theoretical information is given for the electrical anisotropy of rocks and for earthquake mechanisms in the Earth’s crust as phenomena that help a lot the correct organization in time and space of the reconstructed tectonic stress fields. The time sequence of the reconstructed stress fields is very important for the understanding of the evolution of the karst process and the correct assessment of the present-day situation in karst areas. A number of case studies from Bulgaria, Albania, Cuba, and France are presented. They give better knowledge of how stress fields control the drainage route of water and the formation of cavities and cave systems. One of the practical aspects of such studies is normally related to the hydrogeology and problems of water supply and water pollution. However, another practical issue in investigating karst systems (especially the active karst) is that it gives knowledge about the youngest, present-day stress field which could be offered as an intelligent and low-costing first approach for planning and control of artificial fracturing in oil and gas fields.
- Chapter 3 is dedicated to methods of study of remains of seismotectonic events in the caves. Karst systems provide a favorable environment to determine the geometrical and mechanical parameters and to date them. Methods of study of the recent geodynamics in karst terrains and the complex methodology are presented. They include analyses of the spatial orientation of deformed speleothems, instrumental measurements and monitoring, mechanical measurements and modeling, and absolute dating of the deformed speleothems. Case studies from

different karst regions in Bulgaria are presented. The important role of the movement itself of the tectonic block during the process of rupturing and displacement along an active fault is denoted. The practical aspects of paleoseismological investigations in the caves are closely related to the problems of seismic hazard evaluation. The number of records of strong earthquakes in the given area is not sufficient for creation of correct linear regression between the number N of earthquakes and their magnitudes M for the given time interval and area. In most cases, the assuring of regression for the strong events can be done only by using the paleoseismological data.

Many people have helped us in numerous ways during the long years of field-work. We are especially grateful to the speleologists of clubs “Akademik” and “Edelweiss” of Sofia, as well as from other Bulgarian caving clubs for their friendly support. Without their help in field studies, such a book could be hardly realized. Bulgarian Federation of Speleology initiated several expeditions in different countries and the participation of scientists was one important factor for the successful results. Some of these results are discussed in this book. The studies in France were supported by the speleological club of Saint Herblain.

We thank our colleagues from the Department of Seismotectonics, Department of Hydrogeology and Department of Geological Hazards of Geological Institute of Bulgarian Academy of Sciences for the perfect cooperation and help with valuable information or materials relating to their respective areas of expertise. The team of the Department of Seismology of Royal Observatory of Belgium has important role for initiating the study of paleo-earthquakes in Bulgaria. Especially we thank Serge Delaby from the University of Mons for the practical advices at the beginning of the paleoseismologic studies in the Bulgarian caves. Special thanks also due to Prof. Gyozo Szeidovitz and Dr. Katalin Gribovszki from the Seismological Observatory of the Geodetic and Geophysical Institute in Budapest for the common work in some of the karst areas in Bulgaria. We highly appreciate the comments of Prof. D.Sc. Christo Dabovski in Chaps. 1 and 2.

We express explicitly our appreciation to our families. Without their understanding during our long absences from home and the support when completing the manuscript, this book would not have been possible.

Within the frames of this monograph it is complicating to examine absolutely all the aspects of diversity in the complex relationship between dynamic tectonics and karst. Working on this book was difficult but always exciting for us. Stimulations for future studies are what we fervently hope our readers will gain from this modest effort.

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