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Danube Region Environmental Geology Programme DANREG — Explanatory Notes | Editor: G. Császár

Introduction

The Danube is the second largest river in Europe and a very important historical, political and economic feature of Central and Southeast Europe. It is 2850 km long and drains an area of about 816 000 km^2. The Danube begins in the Black Forest Mountains in Germany and passes the Jura Mountain Range, the Bohemian Forest, the Eastern Alps, the Western and Southern Carpathians as well as main European lowlands. So the Danube and its tributaries cut or pass the main geological and geographical features of Central and Southeast Europe. The Danube is also a very important traffic route (it is navigable for small vessels from Ulm and for bigger ones from Regensburg in Germany) and links many peoples and countries. It passes densely populated and highly industrialised regions (*e.g.* the regions of Vienna, Bratislava and Budapest) as well as regions very important for the agricultural potential (*e.g.* Vienna Basin with the March Lowland, the Danube Lowland east of Bratislava or the Little and Great Hungarian Plain (Kisalföld, Alföld) or for recreation for local people and tourists (*e.g.* Wachau, the Danube–March river forests in Austria, Dunajská Streda, ˇtúrovo and Kováèovské kopce Hills in Slovakia and the Szigetköz, Gerecse Hills, Danube Bend and Börzsöny Mountain north of Budapest and Gemenc in Hungary). In many countries and especially in Austria it contributes to the production of electricity due to a number of dams and hydropower stations. The Danube and its attendant groundwater flow represent one of the largest freshwater resources in Europe.

The number of natural and man-induced environmental effects of the region and the awareness of the population for environmental protection increased dramatically in the past decades. Consequently conflicts of land use show an increasing importance.

Intensive agricultural production (the Danube Lowland is the most important agricultural area in Slovakia), large industrial cities (*e.g.* Vienna, Bratislava, Budapest), increased bottom erosion of the Danube provoked by dams are only some examples which effect the natural conditions of the fragile environment.

The region of the DANREG programme is divided by state borders into three independent states but the geoscientific questions of the region can not be solved in isolation. The cross-border geological and geophysical maps prepared before this programme were full of contradictions as it is illustrated by two examples. The pre-Tertiary basement maps of Hungary and Slovakia were published in 1987. On these maps neither the formation boundaries nor the tectonic and contour lines of the basement were continuous across the state border. The reason was basically the lack of data, insufficiency of wells and geophysical investigations, and negligence of the synthesis of geological and geophysical results. The outcome was very similar at the geophysical maps. In spite of the almost equal station density, in the magnetic maps lack of connection between the reference levels, adjustment of airborne and ground measurements caused differences even within the same country. All these questions including conflicts of land use, mitigation of geohazards and sustainable development of the region need multinational co-operation.

The DANREG (DANube Regional Environmental Geology) Programme was launched in 1989, originally on bilateral (Hungarian–Slovak) basis (Császár *et al.* 1997, Császár *et al.* 2000). In 1990, after the fundamental political changes in Central and Eastern Europe, Austria also joined and the representatives of the national geological surveys of Austria (Geologische Bundesanstalt), Hungary (Magyar Állami Földtani Intézet) and Slovakia (Geologick˝ Ústav Dion˝za ˇtúra) signed the agreement. Since then work has been going on in 14

working groups. Results and things to be done are reviewed by a Co-ordinating Board which held its meetings every 3–4 months. The basic objective of this co-operative effort was to integrate the existing knowledge which was inadequate along the borders and especially in the deep geological basins and which should have been completed with new investigations. The extension of the study area is about 20 000 km^2. The aim was to establish a common "geological language" on national data basis different in system, approaches and detailedness, and to compile a set of maps assisted by GIS with explanatory notes, studies and common geophysical and geological cross sections.

Due to eminent importance of basic geological information it was decided to complete the surface geological map, as well as the map of environmental geohazards in the scale of 1:100 000, for all other thematic maps the scale of 1: 200 000 or 1:500 000 respectively seemed to be sufficient. In the framework of the programme the following maps (and cross sections) have been completed in 1999:

Surface Geological Map,
Map of the Genetic Types and Thickness of Quaternary Sediments,
Lithofacies and Thickness Map of the Pontian and the Pliocene,
Lithofacies and Thickness Map of the Pannonian,
Map of the pre-Tertiary Basement,
Tectonic Map,
Neotectonic Map,
Hydrogeological Map,
Engineering Geological Map,
Geothermal Potential Map,
Geological Cross-Sections,
Bouguer Anomaly Map,
Stripped Gravity Anomaly Map,
Magnetic DT Anomaly Map,
Gravity Lineament Map,
Results of the Magnetotelluric Measurements,
Contour Map of the Pre-Tertiary Basements,
Contour Map of the Pannonian Basement,
Thickness of the Quaternary Sediments (based on Schlumberger DC soundings),
Apparent Resistivity Map AB = 200 m,
Map of Environmental Geohazards.

In addition to the printed version the maps and cross sections are also available on CD-ROM.

This volume consists of the explanatory notes of the maps and cross sections listed above and includes additionally a study on water quality of the region.

The co-operative work of the Programme lasted a bit longer than a decade and many dozens of scientists and stuff members contributed in it by collecting data in archives, mapping and measuring in the field, interpreting the data, digitising maps and using other GIS techniques (*e.g.* converting ArcInfo into Intergraph) and editing and preparing the explanatory text for printing. The authors of the maps and explanatory notes are indicated either in the map and/or in this volume but many of other contributors' names to whom we are grateful are found nowhere. As a minimum the names of the collaborating institutions are listed below: Geologische Bundesanstalt (GBA), Institute of Meteorology and Geophysics of University of Vienna, OMV, Státny Geologick˝ ústav Dion˝za ˇtúra (SGÚDˇ), GEOCOMPLEX a.s. Bratislava, Magyar Állami Földtani Intézet (MÁFI), Magyar Állami Eötvös Loránd Geofizikai Intézet (ELGI), Magyar Geológiai Szolgálat (MGSZ). Several colleagues who contributed in the programme passed away during this long period. These were: Tomás Korán (director of GÚDˇ), Elemér Nagy (Hungarian member of the Board), Mária Darida-Tichy (Hungary — Surface Geological Map, Environmental Geohazards Map) and Günter Pascher (Austria — GIS)

The scientific research and creation of maps during the entire DANREG programme period were financially covered by the participating institutions and the respective ministries. The financial background for preparation and printing of the map set and the explanatory notes was assured by the Austrian Federal Ministry of Science and Transport (now: Federal Ministry of Education, Science and Culture) for which the institutions and the authors of the maps and explanatory notes are indebted.

All the data of the DANREG programme collected and condensed in the map set, cross sections and their explanatory notes and studies are offered to planning and deciding authorities in the communities, in the districts and the states of the member countries of the programme. All collaborators of the programme hope that the information collected and elaborated will contribute to increase the quality of life of the population. DANREG programme can serve as an example for other regions to solve their problems.

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References

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