THE HYDROGEOLOGICAL MAP OF EUROPE

by

H. Karrenberg and W. Struckmeier

With seven sheets printed and seven more awaiting publication, the International Hydrogeological Map of Europe, 1:1 500 000, stands as an excellent model for similar small scale map projects in other parts of the world. This article traces the history of the project and specifies its usefulness, both in terms of the cooperative work that has gone into it and the feasibility of representing a variety of hydrogeological features on maps.

How the project developed

The International Association of Hydrogeologists (IAH), an organization currently affiliated with IUGS, set up in 1959 a Commission for Hydrogeological Maps to coordinate some of the Association's key activities. As Chairman of this Commission, Professor H. Karrenberg was charged with the task of preparing an International Hydrogeological Map of Europe. The regularly revised International Geological Map of Europe at the scale of 1:1 500 000 was selected as the most appropriate base map for this project.

Although large scale hydrogeological maps for certain areas were in existence before 1960, the proposed Map of Europe was the first small scale hydrogeological map planned to cover a large region. Careful preparation was necessary to ensure uniformity and to harmonize the representation across all of the European countries. Each sheet was to be accompanied by 'Explanatory Notes' to provide additional hydrogeological data which could not be represented on the map itself; it was hoped that each sheet and its Explanatory Notes would be published simultaneously.

Towards this end, representatives of IAH and IAHS (the International Association of Hydrological Sciences), supported by UNESCO, prepared in March 1962 an International Legend for Hydrogeological Maps for both large and small scales; this was used in four map models of half of the sheet C5-Bern (see box on Map Sheets). Prepared, printed and discussed in the years that followed, the fourth of these models was accepted on February 26, 1966 by IAH, IAHS, the U.N. Food and Agriculture Organization (FAO) and UNESCO, and subsequently by the Commission for the Geological Map of the World (CGMW) and the Co-ordinating Council for the International Hydrological Decade (IHD). Most of the costs involved at this stage were borne by the Deutsche Forschungsgemeinschaft and the Bundesanstalt für Bodenforschung of the Federal Republic of Germany.

The project's progress from initial plans through to the publication of the first sheet in 1970, with its corresponding Explanatory Notes coming out in 1974, has been described in a report to the General Assembly of IAH held in Montreal in 1972 (Bull. d'Information, 1972).

It became apparent from the beginning that close collaboration with the European Geological Surveys would be essential. The IAH, therefore, addressed the President of CGMW with a request that a Sub-Commission for Hydrogeological Maps be set up to facilitate such contact; this was done and the Sub-Commission cooperated with the IAH Commission from 1969 onward. The Chairman of the latter Commission called upon many other institutes, officers and experts all over Europe for hydrogeological, geographical and meteorological contributions. UNESCO agreed to provide financial support for the project. A Committee of Scientific Editors for the International Hydrogeological Map of Europe (under the chairmanship of Professor Karrenberg) was set up

to deal with the problem of coordinating the preparatory work. Since 1976, effective regional editorial meetings have been held in several countries — in Stockholm, Lisbon, Budapest and Ankara (1976), in Madrid, Rome, Leningrad and Birmingham (1977) and in Vienna, Budapest and Athens (1978).

Present status

Once the first sheet (C5-Bern) was printed in 1970, compilation of the map sheets in the European countries began. At present, seven sheets are printed (see box); sheets B4, B5, C4 and C5 were available for sale by the end of 1978.* Seven sheets are currently being prepared for printing: A5-La Coruna, B2-Iceland, B3-Edinburgh, C6-Roma, D3-Stockholm, D4-Warszawa and E3-Moskva. The remaining map manuscripts should be ready by the end of 1980 (see Fig. 1).

The Explanatory Notes to sheets C4 and C5 are published and those of B4 and B5 are in press (Fig. 2). Notes to many of the other sheets are either already compiled or nearing completion, but some of them still have to be translated into English and French, which causes delays.

Purpose and Usefulness of the Map

The map has proved useful in many respects:

- a) It serves as a basis for multi-purpose scientific investigations and three-dimensional representation (such as, for example, extension, depth, thickness, facies and structural situation of aquifers).
- b) The small scale representation highlights, and in some instances, discovers the many relations that exist between aquifer systems, and their connection with other reservoirs, especially across geographical and political boundaries.
- c) The small scale synopsis facilitates the choice of areas for new hydrogeological research projects.
- d) The information pertaining to aquifer exploitation and water management assists in the estimation of future utilization of groundwater resources. The map may serve, therefore, as a basis for preparing interpretation maps, especially for planning purposes. It should be noted, however, that the map itself is not considered to be a planning map: members of the IAH Commission felt that it was not advisable to present hydrogeological data such as well yield, specific yield, productivity and transmissivity on maps of such a small scale.
- e) The map has revealed gaps in hydrogeological knowledge and, as a result, hydrogeological research is being intensified in many European countries. (Hydrogeological knowledge is sparse in some countries, and not always

* These Maps and Explanatory Notes may be purchased from: Geo-Center, Postfach 800 830, D-700 Stuttgart 80, Federal Republic of Germany, or UNESCO, 7, Place de Fontenoy, F-75700 Paris, France. (Sheet C5 with Explanatory Notes: 65 French francs; Sheet C4 with Explanatory Notes: 65 French francs).

International Hydrogeological Map of Europe 1:1500 000

International Association of Hydrogeologists Commission for the Geological Map of the World
Published by Bundesanstalt für Geowissenschaften und Rohstoffe and UNESCO

Figure 1.

Figure 2.

comparable over large regions.)

- f) The map may be used as a model for national small scale maps. Indeed, in many countries the task of compiling the International Hydrogeological Map of Europe as a national contribution to the IAH project has stimulated the preparation of national hydrogeological maps at other scales.
- g) The areas of Europe and parts of the Near East which are on the map include almost all hydrogeological features, from permafrost to arid conditions, from Precambrian shields to active volcanic zones, as well as many sedimentary basins. The map proves the feasibility of representing all kinds of hydrogeological situations, and in this respect, can be used as a model for similar small scale map projects in other parts of the world (such as, for example, the Near East, Africa and South America).
- h) Work on the map has fostered intensive cooperation amongst more than 100 hydrogeologists from European countries and many experts from other countries, which in turn has led to a wealth of scientific discussions and international collaboration in exploration.
- i) The Map and the corresponding Explanatory Notes have proven to be useful teaching and training tools at all levels in academic institutions.

These are probably the more practical and positive benefits of the undertaking, recognized with the help of hindsight and after some years of experience. Many of these were not anticipated at the start of the project, although the original aims, explained in several publications (Karrenberg and Deutloff, 1973) have also been realized. The many close personal contacts established between the scientists involved is by no means the least of the advantages gained in this worthwhile cooperative effort.

References

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- International Legend for Hydrogeological Maps 1970: UNESCO/IASH/IAH/Inst. Geol. Sci., London, 101 p.
- Karrenberg, H., 1973, La Carte Hydrologique Internationale de l'Europe: Bull. d'Information (Intern. Assoc. Hydrogeol.), Paris, 15/16, p. 53-57.
- Karrenberg, H. and Deutloff O., 1973, Directions for the construction of the International Hydrogeological Map of Europe 1:1 500 000: Bull. d'Information (Intern. Assoc. Hydrogeol.), Paris, 15/16, p. 58-63.

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MAP SHEETS

INTERNATIONAL HYDROGEOLOGICAL MAP OF EUROPE

1:1 500 000; Bundesanst. für Geowiss. und Rohstoffe / UNESCO (Ed.), Hannover/Paris.

- , Sheet B 4 London (Sci. Ed. H. Karrenberg, S. Buchan and J.B.W. Day), 1976.
- , Sheet B 5 Paris-Sud (Sci. Ed. H. Karrenberg and O. Deutloff), 1975.
- , Sheet C 4 Berlin (Sci. Ed. H. Karrenberg and W. Struckmeier), 1977.
- , Sheet C 5 Bern (Sci. Ed. H. Karrenberg), 1970.

EXPLANATORY NOTES

Explanatory Notes for the International Hydrogeological Map of Europe 1:1 500 000, Bundesanst. für Geowiss. und Rohstoffe/UNESCO (Ed.), Hannover/Paris.

- , Sheet B 4 London, by C.R. Aldwell, J.B.W. Day and W. Struckmeier, (in press).
- , Sheet C 5 Bern, by O. Deutloff and others (English translation), 1974; UNESCO doc. SC/WS/580, Paris.

Notice explicative de la Carte Hydrogéologique Internationale de l'Europe à l'échelle de 1:1 500 000, Bundesanst. für Geowiss. und Rohstoffe/UNESCO (Ed.), Hannover/Paris.

- , Feuille B 5 Paris-Sud, par M.A. de San José et W. Struckmeier, avec contributions de A. de Galvez-Canero, C. Kaiser et U. Streit (in press).
- , Feuille C 4 Berlin, par W. Struckmeier, avec contributions de L.J. Anderson, R. Apel, W. Carlé, G. Castany, J. De Geer, O. Deutloff, G. Diederich, H. Frank, H. Gerhardy, H. Glander, W. Grimmelmann, E. Groba, M. Gulinck, B. Hanle, J. Hahn, G. Heizmann, A. Hornsten S. Jeltersma, J. Jetel, A. Johannsen, H. Karrenberg, N. Kelstrup, C. Kolago, H. Lebkuchner, E. Lohnert, M. Mohr, K. Sauer, P.C. Scherler, C.v. Stempel, E. Villinger et J. Zieschang, 1977; 105 p.
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Professor Herbert Karrenberg, Chairman of the IAH Commission for Hydrogeological Maps since 1960, is also Chairman of the Editorial Committee of the Hydrogeological Map of Europe. A specialist in hydrogeology and engineering geology, Professor Karrenberg is former President of the Geologisches Landesamt Nordrhein-Westfalen in Krefeld (until 1974) and Professor at the Geological Institute, University of Bonn, Federal Republic of Germany.