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Activities in the Field of Marine Geology

Report by *H. M. Bolli**)

This report summarizes participation of scientists from Swiss institutions in the Deep Sea Drilling Project (DSDP) of the U.S. National Science Foundation, from its inception in 1968 until 1979. Following this report which represents by far the largest contributions during the period under review, a number of other activities by scientists from Switzerland on the geology of the oceans is added.

Micropaleontologists and sedimentologists from several Swiss institutions realized early the great potentials of the new exploration methods by drilling into the deep ocean floor to recover sediments and basement rocks from the still unexplored two thirds of the earth's surface covered by water. Their interest and willingness to participate in the 2-month cruises by the drilling ship «Glomar Challenger» followed by reporting on the results was honoured by repeated invitations to take part in such cruises.

The record on participation is as follows:

Ten micropaleontologists residing at the time in Switzerland have participated in 14 of the first 43 Legs of Phases 1–3, covering the Atlantic (including the Caribbean, Gulf of Mexico, the Mediterranean, the Black Sea and the Norwegian Sea), the Pacific, and the Indian Ocean. They are H. M. Bolli, Zürich (Legs 4, 15, 27, 40), P. Brönnimann, Genève (7), J.-P. Beckmann, Zürich (8, 14), W. Maync, Bern (13), P. H. Roth, Zürich (14), S. W. Wise, Zürich (18), H. R. Thierstein, Zürich (26), R. Herb, Bern (26), F. Rögl, Zürich (35), K. Perch-Nielsen, Zürich (39). In addition, the following Swiss micropaleontologists, residing at the time of their participation outside Switzerland, took part: H. P. Luterbacher, Bordeaux (11, 32), P. H. Roth, La Jolla, Californien (17, 24), K. Perch-Nielsen, Copenhagen (12, 29). All participated as foraminiferal paleontologists, except K. Perch-Nielsen, S. W. Wise and H. R. Thierstein, who did nannoplankton work.

The following 5 sedimentologists residing at the time in Switzerland participated in 9 out of 55 legs: K. Hsü, Zürich (3, 13, 42A and B), A. Matter, Bern (23,

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32), K. Kelts, Zürich (33, 51), D. Bernoulli, Basel (42A), and J. McKenzie, Zürich (55).

In addition to their activities as micropaleontologists or sedimentologists, participants from Switzerland were invited to act as co-chief-scientists on four occasions: K. Hsü, Zürich (Legs 13, 42A), H. M. Bolli, Zürich (40), and K. Perch-Nielsen, Zürich (39).

This high participation of scientists from Switzerland, in actual number second only to participants from the USA, came to an abrupt end with the internationalisation of the Project, called International Project Ocean Drilling (IPOD), which became effective as from Leg 45. Member countries of IPOD (France, Germany, Great Britain, Japan, USSR) demanded to have scientists represented on each Leg. With the limited number of scientists that find room on the «Glomar Challenger» and the number fixed by agreement for participants from the US, chances for scientists from other countries became strongly reduced. This is the reason for the sharp drop of scientists from Switzerland after Leg 44.

Space does not allow for a detailed review of the scientific results of the DSDP, in particular the contributions by scientists from Switzerland. Reference has therefore to be made to the Initial Reports of the Deep Sea Drilling Project, for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Volumes are published for each Leg and most of the contributions of the participants of a Leg are found in the respective volume. The reports from micropaleontologists mostly deal with the description and figuring of microfossils (mainly foraminifera, calcareous nanoplankton, silicoflagellates and calcisphaerulids), their application to the dating and subdivision of the cored sections and environmental interpretation of sediments. Those from sedimentologists are on various kinds of sediment investigations. For some of the Legs, papers by scientists from Switzerland have also been prepared on such subjects as general objectives, results, conclusions, biostratigraphic synthesis.

In some instances, scientists from Switzerland have contributed to volumes through so-called shore-based studies, that is, the individuals have not actually taken part in the cruises, but were subsequently invited to study certain aspects in the field of their speciality. Examples of micropaleontological/biostratigraphic contributors are e.g. J.-P. Beckmann, Zürich (Leg 33), M. Toumarkine, Zürich (Leg 40), H. M. Bolli, Zürich (Legs 44, 50, 51), for sedimentological studies D. Bernoulli, Basel (Leg 13).

It is regrettable that so far little has been carried out synthesizing the manifold results obtained from the individual oceans or parts of them through the drilling by «Glomar Challenger». An exception is the Indian Ocean. Here a group of scientists got together to write up the results obtained through the many boreholes. Contributors from Switzerland are H. M. Bolli, Zürich, R.

Herb, Bern, and J. B. Saunders, Basel. H. M. Bolli and J. B. Saunders were at the same time in charge of editing the biostratigraphic part of the volume, the title of which is «DSDP - Indian Ocean Geology, Biostratigraphy, and Synthesis», 1977, 616 pages, published by the American Geophysical Union, K Street, N. W. Washington, D.C. 20006.

Similar to the presentation in columnar sections of the ages of sediments recovered from the Indian Ocean DSDP sites in the above cited Indian Ocean volume, H. M. Bolli has also prepared reports on sediment ages from all Atlantic and Pacific sites, up to Leg 53. They will be included in the Initial Reports series, in volume 53 for the Atlantic (including the Gulf of Mexico, Caribbean, Mediterranean and Black Sea) and in volume 54 for the Pacific.

Long term planning for objectives, modes of operation etc. of the Deep Sea Drilling Project are being discussed and proposed by a number of problem-oriented panels set up by the Executive and Planning Committee of JOIDES. On several of them scientists from Switzerland have been invited to serve for a given term. They include D. Bernoulli, Basel, on the Passive Margin Panel, H. M. Bolli, Zürich, and K. Hsü, Zürich, on the Ocean Paleo-environment Panel (of which H. M. Bolli was chairman from 1964-1966), J. B. Saunders, Basel, and H. M. Bolli, Zürich, on the Stratigraphic Correlation Panel.

Three scientists from Switzerland (V. Dietrich, H. Oberhängli, R. Oberhängli, all from Zürich) undertook on the Russian vessel R/V Dimitry Mendeleev from June to August 1976 marine geological investigations in the western Pacific. The cruise was sponsored by the USSR Academy of Sciences, within the IGCP project on ophiolites. The purpose of the expedition was to investigate the structure and composition of the oceanic crust of the marginal basins, the remnant island arcs and the deep sea trenches. Publications that so far appeared by these participants or in co-authorship are as follows:

DIETRICH, V., R. EMMERMANN, R. OBERHÄNSLI, H. PUCHELT (1978): Geochemistry of basaltic and gabbroic rocks from the West-Mariana basin and the Mariana trench. *Earth and Planetary Science Letters*, 39, 127-144.

International working group on the IGCP Project «Ophiolites» (1977): Initial report of the geological study of oceanic crust of the Philippine sea floor. *Ophioliti*, 2/1, 137-168.

OBERHÄNSLI, R., V. DIETRICH & H. OBERHÄNSLI (1977): Marinegeologische Untersuchungen im Westpazifik. *Ecl. geol. Helv.* 70/2, 417-434.

In a current project samples and data from the Deep Sea Drilling Project are used for comparison in paleo-oceanographic studies in Mesozoic sediments of the Tethyan Ocean and for the reconstruction of the early history of now deformed Mesozoic continental margins and ocean basins in the Alpine-Mediterranean belt. Participants in this project are D. Bernoulli, Basel; R. Kocher, J. McKenzie, H. Weissert, all from Zürich.