This Week's Citation Classic

Talwani M, Windisch C C & Langseth M G, Jr. Reykjanes ridge crest: a detailed geophysical study. *J. Geophys. Res.* 76:473-517, 1971.
[Lamont-Doherty Geological Observatory, Columbia University, Palisades, NY]

Precise location using satellite navigation enabled us to make a detailed geophysical study of a mid-ocean ridge area and deduce the properties of crustal rocks in detail. This contrasted with earlier reconnaissance studies, but was a forerunner of future detailed ocean crust exploration. [The *SCI*® indicates that this paper has been cited over 330 times since 1971.]

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"The field program during which the experiments discussed in this paper were carried out took only 17 days. I have often wondered how we were able, in this short time, to obtain results which have obviously proved to be of considerable significance. There seem to have been four principal reasons. (1) The theory of seafloor spreading had just gained near universal acceptance and this was perhaps the first experiment which utilized the framework provided by the theory. (2) The experiment was concentrated in a specific area that was small enough to obtain details within the area, but large enough so that a complete geological 'province' could be studied. (3) All available geophysical methods were used rather than concentrating on a single method. The results obtained by the integration of information from different experiments greatly enhanced the value of results of the individual experiments. (4) Navigation by artificial satellite and use of an on board digital computer to compute the navigation fixes enabled us to achieve greatly improved spatial resolution and to accurately interrelate the results of different kinds of measurements made separately, but at the same location.

"A major problem in conducting the field program was with the weather. Forecasts were not very good in this area; they always seemed to predict the weather we had experienced on the previous day. We finally realized that there was only one ship in the area giving out weather information—our ship. The weather stations simply relayed our information back to us the next day. On at least a couple of occasions the weather changed suddenly during a coring station and we nearly lost the experimental equipment and almost had a couple of scientists washed overboard.

"I have always regretted canceling plans for a pre-meeting geological field trip in the high calcareous Alps to prepare the paper for an international conference in Zurich, in 1967, because not much attention was paid to the findings of the paper when it was delivered. Obviously, a large assortment of geophysical results, valuable in a written paper that can be studied at leisure, make little impact in a short oral presentation.

"The findings of this study were either important in their own right or pointed the way for investigations in the future. The unambiguous deduction from geophysical measurements that rocks in areas of positive magnetic strips are normally magnetized, and in areas of negative magnetic strips are reversely magnetized, provided strong support to the theory of seafloor spreading. The deduction on the basis of a variety of experiments that the magnetization in the oceanic crust was concentrated in a thin, highly magnetized layer—'layer 2A'—with low seismic velocity and high permeability has proved to be important. The deduction of convective flow near the ridge crest and the improvement of the magnetic reversal chronology also proved to be useful findings for later studies, e.g., those of K. Bram[1] and N.D. Watkins and G.P.L. Walker.[2]

"Thus a well-planned and executed experiment can, through careful analysis, yield results that are cited frequently."

1. **Bram K.** New heat flow observations on the Reykjanes ridge. *J. Geophysics* 47:86-90, 1980.
2. **Watkins N D & Walker G P L.** Magnetostratigraphy of eastern Iceland. *Amer. J. Sci.* 277:513-84, 1977.