

Definitions of Features on the Deep-Sea Floor

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Summary—The work of the International Committee on the Nomenclature of Ocean Bottom Features, and that of various national groups, is described. A list of approved terms of deep-sea features and their definitions is given. In order to avoid confusion, it is hoped that these terms will be used as widely as possible.

INTRODUCTION

AT the VIIIth Assembly of the International Union of Geodesy and Geophysics at Oslo in 1948, the Association of Physical Oceanography established an international committee, under the chairmanship of J. D. H. WISEMAN, to define as concisely as possible morphological features of the deep-sea floor. It was thought necessary and timely that an international standard of nomenclature should be clearly stated in view of the rapid evolution of deep-sea research resulting from recent developments in practical methods of sounding and of obtaining long cores of the floor, and of geophysical advances in studying the morphological disposition and constitution of rock-layers and geological features at depth. J. D. NARES, formerly the Director of the International Hydrographic Bureau, agreed to act as Secretary and other members were K. O. EMERY (U.S.A.), H. H. HESS (U.S.A.), Ph. H. KUENEN (Holland) and HANS PETTERSSON (Sweden).

THE BRITISH NATIONAL COMMITTEE

A British National Committee was established with the following members:— J. N. CARRUTHERS* (Hydrographic Department of the Admiralty), L. H. N. COOPER (Plymouth Marine Biological Laboratory), H. F. P. HERDMAN (*Discovery Committee*)[†], W. B. R. KING (Professor of Geology, Cambridge), R. B. SEYMOUR SEWELL (Department of Zoology, Cambridge), J. A. STEERS (Professor of Geography, Cambridge), J. D. H. WISEMAN (Chairman; British Museum (Natural History)) and C. D. OVEY (Secretary; British Museum (Natural History)).[‡]

The first meeting was held in the Board Room of the British Museum (Natural History) on 28 January 1949, by kind permission of the Director and Trustees but, by the end of the year, the newly established British National Committee on the Nomenclature of Ocean Bottom Features became a sub-committee of the Royal Society Oceanography Sub-committee of the National Committee of Geodesy and Geophysics.

* On being transferred to the National Institute of Oceanography, DR. CARRUTHERS was replaced on the Committee by Commander G. S. RITCHIE.

† The *Discovery Committee* has now been incorporated as part of the National Institute of Oceanography.

‡ Appointed to the Department of Geography, Cambridge, as from 1 October, 1953.

Many documents and two reports have been issued by the British Committee. These have been circulated to the members of the International Committee and to other groups and individual scientists with a request for constructive criticisms. It was the policy of the British Committee to welcome constructive criticism because no satisfactory solution to the problems of deep-sea nomenclature could be found unless there was a free interchange of ideas.

PRELIMINARY WORK OF THE BRITISH COMMITTEE

The Committee began its work by considering the physiographical features of the deep-sea floor as listed and defined by G. W. L. LITTLEHALES in "The Configuration of the Ocean Basins" (1932), and the preliminary findings were presented to the International Committee at Brussels during the IXth Assembly of the International Union of Geodesy and Geophysics in 1951 (see below).

Much revision of LITTLEHALES' definitions was found necessary. Some of his little-used terms have been omitted whilst others have been added for newly discovered features. No attempt has been made to define continental-shelf features, apart from 'Submarine Canyon,' as the work of the Committee is primarily concerned with those features found in open oceans.

Owing to the limited knowledge of the origin of oceanic features, the Committee considered it desirable, as a general principle, to avoid implications in the definitions about origin. In addition it was felt that the definitions should be brief, readily translatable into languages of maritime nations and, in consequence, lengthy explanations have been avoided.

MEETING OF THE INTERNATIONAL COMMITTEE AT BRUSSELS, 1951

At the IXth Assembly of the International Union of Geodesy and Geophysics in August 1951, the International Committee gave consideration to the work of the British National Committee. At this Assembly two meetings were held. Unfortunately both H. H. HESS and K. O. EMERY were unable to leave the U.S.A., but their representatives, G. LIEFSON (U.S. Navy Hydrographic Department) and R. DIETZ (U.S. Navy Electronics Laboratory, San Diego) were present.

With the object of consolidating national opinion the committee proposed that national groups should be established. Unfortunately both in Holland and in Scandinavia this was not possible. In the U.S.A. a loosely co-ordinated group, consisting of H. H. HESS, K. O. EMERY, F. P. SHEPARD, R. DIETZ, R. H. FLEMING and the Directors of the U.S. Coast and Geodetic Survey, had been already established.

In the British Committee's Report to the International Committee, definitions were given to the terms which were considered necessary for the description of submarine topography. The International Committee noted with great satisfaction that there was, in general, agreement about the definitions among those whom the British Committee had consulted in other nations, but it considered that a few of these terms required improvement (WISEMAN, 1952, p. 71).

MEETING OF THE INTERNATIONAL COMMITTEE AT MONACO, 1952

After the British National Committee in consultation with other national groups

had reconsidered the definitions laid before the International Committee in August 1951, the final form of the definitions was drafted at Monaco by the International Committee. The meeting was held in the International Hydrographic Bureau by kind permission of the Directors immediately preceding the meeting of the Joint Commission on Oceanography. C. D. OVEY, Secretary of the British Committee, was elected Joint-Secretary of the International Committee with J. D. NARES. H. H. HESS and K. O. EMERY were again unable to be present but were represented by MARY SEARS and R. REVELLE. Others co-opted were H. L. BENCKER, F. KOCZY and A. VIGLIERI.

The minutes of this meeting were circulated and later confirmed by post and the whole will be printed in due course by the International Hydrographic Bureau.

FINAL AGREED PRINCIPLES GOVERNING NOMENCLATURE

A. *Selection of new terms*

(a) *For major features*

- (1) Terms should be simple, unambiguous and, if possible, descriptive. This not only facilitates scientific discussion, but would encourage mariners to investigate deep-sea topography.
- (2) As knowledge of deep-sea topography is rapidly expanding terms which imply origin should not be used, because even the best genetical theories frequently change with time.
- (3) Terms, which have a confusing double meaning, should be avoided.
- (4) Terms should, if possible, be readily translatable into the languages of maritime nations.
- (5) It is desirable for any author or chart-making authority, before proposing a new term for an oceanic feature outside the 100-fathom or 200-metre line, first to consult a national group.

(b) *For secondary features*

- (1) The general principles given in para (a) should apply.
- (2) The International Committee considers that there is an undoubted case for the systematic development of a new terminology for secondary features, and recommends that a start should be made for those off Southern California. A group of Californian Submarine Geologists will look into this question.

B. *Definitions*

- (1) All definitions should be brief, simple and unambiguous.
- (2) Although implications about origin should be avoided, the aim of definitions should be to facilitate genetical discussions.
- (3) In any one definition no previously undefined term should be used.

- (4) They should be readily translatable into the languages of maritime nations.

FINAL AGREED DEFINITIONS

1. *Continental Shelf, Shelf Edge and Borderland*
The zone around the continent, extending from the low-water line to the depth at which there is a marked increase of slope to greater depth. Where this increase occurs the term shelf edge is appropriate. Conventionally its edge is taken at 100 fathoms (or 200 metres) but instances are known where the increase of slope occurs at more than 200 or less than 65 fathoms. When the zone below the low water line is highly irregular, and includes depths well in excess of those typical of continental shelves, the term Continental Borderland is appropriate.
2. *Continental Slope*
The declivity from the outer edge of the continental shelf or continental borderland into great depths.
3. *Borderland Slope*
The declivity which marks the landward margin of the continental borderland.
4. *Continental Terrace*
The zone around the continents, extending from low-water line, to the base of the continental slope.
5. *Island Shelf*
The zone around an island or island group, extending from the low-water line to the depths at which there is a marked increase of slope to greater depths. Conventionally its edge is taken at 100 fathoms (or 200 metres).
6. *Island Slope*
The declivity from the outer edge of an island shelf into great depths.
7. *Basin*
A depression of the deep-sea floor more or less equidimensional in form, but not necessarily large and pronounced.
8. *Trench*
A long but narrow depression of the deep-sea floor having relatively steep sides.
9. *Submarine Canyon and Valley*
An elongated steep-walled cleft running across or partially across the continental shelf, the continental borderland and/or slope, the bottom of which grades continually downwards. When the sides have a more gentle slope the term submarine valley is more appropriate.
10. *Depth*
A term which may be used for a few of the deepest soundings.
11. *Deep*
The well-defined deepest area of a depression of the deep-sea floor conventionally applied where soundings definitely exceed 3,000 fathoms.

12. *Rise*
A long and broad elevation of the deep-sea floor which rises gently and smoothly.
13. *Ridge*
A long elevation of the deep-sea floor having steeper sides and less regular topography than a rise.
14. *Seascarp*
An elongated and comparatively steep slope of the sea floor.
15. *Gap*
A steep-sided furrow which cuts transversely across a ridge or rise.
16. *Sill and Sill Depth*
A submarine ridge or rise separating partially closed basins from one another or from the adjacent Ocean. The greatest depth over the sill is commonly known as the sill depth.
17. *Plateau*
A very extensive but ill-defined elevation of the deep-sea floor, the top of which may be diversified by lesser features of elevation and depression.
18. *Seahigh*
An elevation of the deep-sea floor of approximately 3,000 feet or more, the morphology of which is insufficiently well known to be covered by a more precise definition.
19. *Seamount*
An isolated or comparatively isolated elevation of the deep-sea floor of approximately 3,000 feet or more.
20. *Tablemount (or Guyot) and Oceanic Bank*
A seamount (roughly circular or elliptical in plan) generally deeper than 100 fathoms, the top of which is a comparatively smooth platform. When the platform has a depth of less than 100 fathoms the term oceanic bank is appropriate.
21. *Seapeak*
A seamount (roughly circular or elliptical in plan) with a pointed top.
22. *Seaknoll*
A submarine hill or elevation of the deep-sea floor less prominent than seamount. (This term should only be used if the feature has been adequately surveyed, and the terms seamount, tablemount or guyot, and seapeak should be used if the elevation exceeds approximately 3,000 feet, above the surrounding floor.)
23. *Deep-sea Terrace*
A bench-like feature bordering an elevation of the deep-sea floor at depths generally greater than 300 fathoms.

NAMING OF DEEP-SEA FEATURES

The British Committee is at present revising the names of deep-sea features in the

light of modern requirements. The International Committee have asked the British Committee to publish their proposed names of features in the different oceans, so that these can receive wide publicity before decisions are taken by the International Committee.

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REFERENCES

- LITTLEHALES, G. W. (1932), Chap. 2 of *Physics of the Earth*, 5, 18 *et-seq.*
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