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November 21, 2014

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email <mhuet@ihb.mo>

Re: Seamounts in the Fogo Seamount Group and one in the Orphan Seamount Group

Cher M. Huet,

I enclose here a letter that I sent to a rather general address on September 30, 2014. I do not believe that I have had any response, or an acknowledgment. Could I please request that your office check that it has arrived and is the line for a response?

I have requested of the Canadian Hydrographic Service some explanation of who submitted the approved names for the seamounts in the Fogo Seamount Group on behalf of C.H.S. – hence who reduced five of the six "Seamounts" to a "Knoll". C.H.S. has indicated that they do not know how such a change occurred, or why. They almost seem to want to put the responsibility for the change on Monaco. Could this be so? Clearly I do not know, and nor does it matter if the matter can be resolved directly with the I.H.O. and Monaco.

Yesterday I attended a 'Science Hour' talk at the Bedford Institute of Oceanography here in Dartmouth, Nova Scotia, Canada. Dr. Calvin Campbell of the Geological Survey of Canada was presenting a review of the sub-bottom geology from the United States east coast north to the Labrador. Dr. Campbell presented one profile that ran approximately SW to NE across a portion of the Newfoundland Ridge. It presented a quite striking profile across two of the seamounts in the Fogo Seamount Group. A glance at the profile will speak to you in a word – "seamounts", not "knolls".

Dr. Campbell has been kind enough to share the profile and the track map with me, and I enclose a copy here to bolster my initial 1991-92 argument that these features are 'seamounts' – not 'knolls'. I trust that this small amount of additional data will assist the I.H.B. to restore the designation of 'Seamount' to the *Titanic* vessel-themed names of several of the Fogo Seamount Group – in this case 'Mackay-Bennett Seamount' and 'Carpathia Seamount'?

In the enclosed letter I also indicated that our process of assessing nominated names for marine topographic features has in effect ground to a halt in Canada – hard aground on some unnamed shoal that is of a making that I do not understand.

Mr. Shawn Meredyk and I have had a nomination for a large seamount in to the Geographical Names Board of Canada (GNBC) for almost three years, and there has been no progress because the Canadians have no advisory body on marine names to refer it to. We once did have the Associate Committee on Names for Undersea and Marine Features (ACNUMF), but for reasons I do not know it was disbanded in ca. 1995. The seamount we propose to name as Orphan Seamount is centred at 50°05'11"N, 45°21'39"W, and lies close to, but further offshore of, the southeast end of Orphan Knoll. I think that this seamount, which is about 550 km to the northeast of the nearest land on the Island of Newfoundland, is one that the I.H.O. could legitimately evaluate and approve its name since it is off the continental shelf and lies in abyssal depths. We would then withdraw our nomination to the non-functioning Canadian bureaucracy.

If we do this and send in our formal nomination to the I.H.O., will you then consider the merit of the name nomination for Orphan Seamount that stands over 2,040 m above the surrounding abyssal seafloor; this seamount is in what we propose be called the Orphan Seamount Group; it is the most prominent of a group of as many as eight volcanic seamounts.

I would welcome your encouragement to take this route for Orphan Seamount, sir. If you agree, we will nominate Orphan Seamount using the framework of the Undersea Feature Name Proposal form you have on the internet.

*Enclose for
pages 5-7
The July-Aug
KNORR sum
in 2014 at
found in
To P.P. Leg
342.
Alan R.*

Regards,



Alan Ruffman, M.Sc., P.Geo.
President
Geomarine Associates Ltd. email <aruffman@dal.ca>

Honourary Research Associate
Department of Earth Sciences
Dalhousie University
Halifax, Nova Scotia, Canada

(Please return postal mail to the Geomarine Associates address at top, not to Dalhousie University.)

encl. GEBCO Map of Fogo Seamount Group
 Notice of possible publication ~~for~~ IHO library

Origin of the Name Orphan Knoll

The scientific paper finally published in 1973:

Ruffman, Alan and Jan E. van Hinte.

1973: Orphan Knoll - A "Chip" off the North American "Plate". *in* Peter J. Hood, N.J. McMillan and B.R. Pelletier, editors, Earth Science Symposium on Offshore Eastern Canada; Proceedings of a Symposium sponsored by the National Advisory Committee on Research in the Geological Sciences and the National Research Council Associate Committee on Geodesy and Geophysics, February 22-24, 1971, Ottawa, Ontario, Geological Survey of Canada, Paper 71-23, Paper No. 27, pp. [407]-449; Bedford Institute [of Oceanography] Contribution No. 297 *in* Collected Contributions of the Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada/Revue des Travaux de l'Institut Océanographique de Bedford, Dartmouth, Nouvelle-Ecosse, Canada. Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Vol. 6, 1973, pp. 79-121.

contained a section on p. 409 detailing the "Derivation of the name Orphan Knoll" as below:

Derivation of the name "Orphan Knoll"

There was considerable controversy over the name "Orphan Knoll" in September 1970 shortly after the completion of Leg 12. Indeed the final publication of the Canadian Hydrographic Service's (1970) Chart 802 was delayed by a few days until the Canadian Permanent Committee on Geographical Names settled the matter. One of the authors (A.R.) had formally proposed the name "Orphan Knoll" to the Committee in March 1970 as an appropriate name for such a small continental remnant lying isolated from its parent continental mass and being a generally neglected feature over the last 50 years of oceanographic exploration. In mid-summer 1970, A.C. Grant submitted the name "Sackville Knoll" to the Permanent Committee in the belief that CNAV SACKVILLE was the first research ship to do scientific work over the feature. In late August 1970, before the drilling results were known, the Permanent Committee had the name "Sackville Knoll" recommended to it by its Sub-committee on Undersea Features Terminology and the original colour proof of Chart 802 was made up with the then recommended name. Upon returning from Leg 12, one of the authors (A.R.) successfully challenged the name and Chart 802 finally appeared with the name "Orphan Knoll" as did Chart 800A (Canadian Hydrographic Service, 1971). The results of the drilling establishing the Knoll's continental nature, the prior publication of the name in the *Toronto Globe and Mail*, the use of the name in two scientific meetings and earlier research by at least four American oceanographic vessels over the feature were some of the factors in the Permanent Committee's final decision to accept the first-proposed name.*

*There was also a Russian vessel and a British vessel that had gathered bathymetry over Orphan Knoll long before any Canadian vessel had been out to the area.

Discovery of the Undersea Feature Orphan Knoll

Discovery is perhaps not the correct word. I would prefer to use the "Recognition of the Undersea Feature Orphan Knoll". The feature's first appearance was a single 970 fm sounding in 1917 on the British Admiralty Chart 2060A. Over time various NE-SW trending trans-Atlantic GEBCO lines of bathymetry were added (*Deut. Hydro. Inst.*, 1964). The 1964 compilation is essentially raw data with no attempt to eliminate bad data, or flagrant crossover errors. The contours are wildly inaccurate. Until the publication of the bathymetry map of Figure 1 (see attached pages from JOIDES, 1972), the U.S. Hydrographic Office Chart BC0510N in 1965 was the most accurately contoured map of this feature.

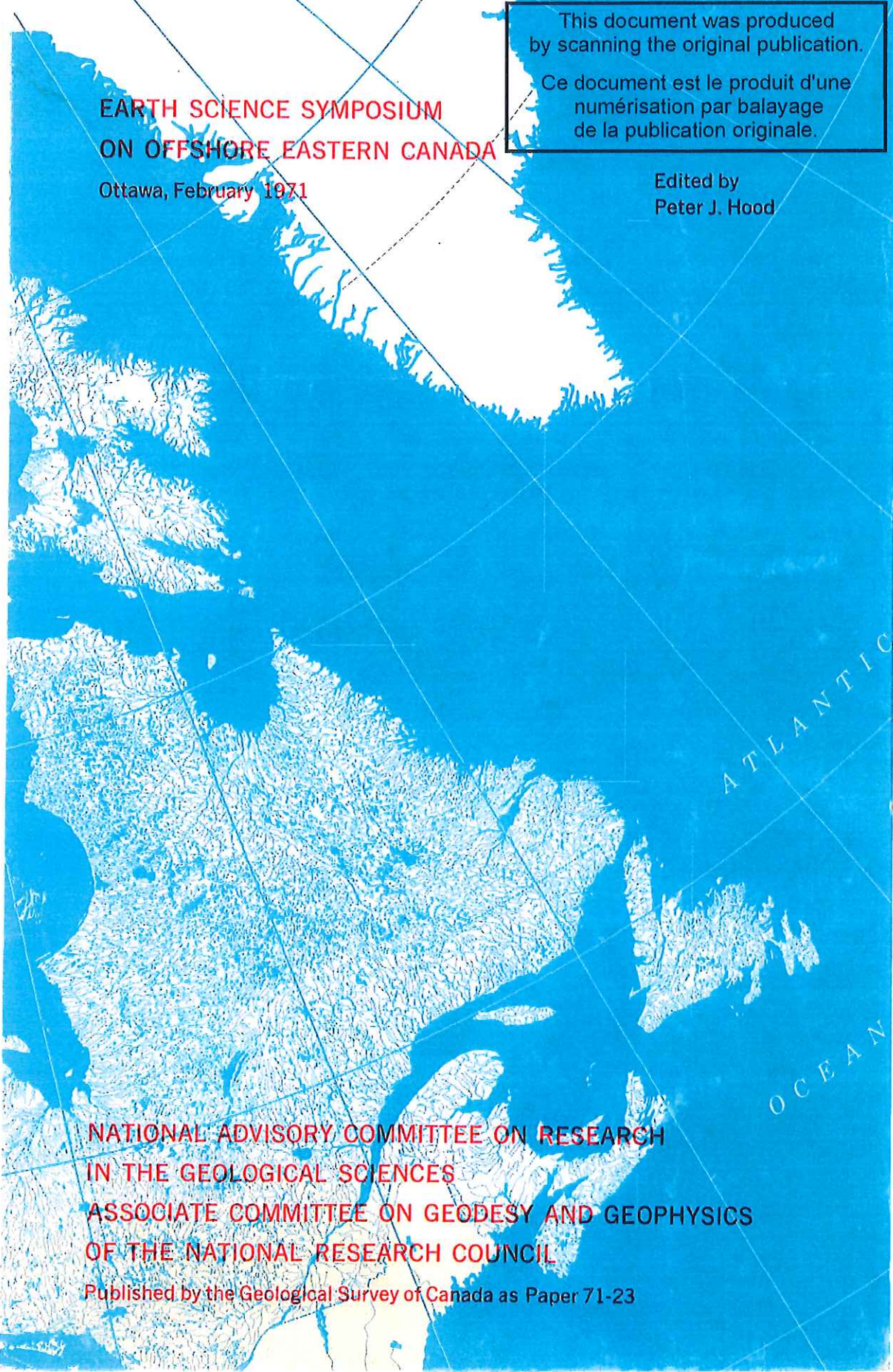
In the Fall of 1969 Alan Ruffman, as a Ph.D. graduate student, found himself observing Mr. David Monahan, as a junior student doing contract drafting work for Professor Rudi Gees of the Dalhousie University Department of Geology. Mr. Monahan was using a pantograph type of a drafting tool to manually trace the bathymetry contours from published bathymetry maps to produce an oblique view looking shoreward to the west of the whole of eastern North America from southern Florida to 50°N. There were no published bathymetry contours north of Grand Bank and Flemish Cap, and David Monahan was forced to use the GEBCO bathymetry data found on GEBCO sheet No. 27. Between the erratic uncorrected bathymetry data and his inexperience in contouring raw bathymetric data, the initial shape of the feature we now call Orphan

Knoll was unrealistic, and was highly lineated by NE-SW trending contours that were being overly affected by the orientation of the majority of the vessel tracks.

It was here that Mr. Ruffman stepped in and assisted to smooth the contours to produce a more realistic contoured shape to the feature which he had begun to think of as a possible continental fragment that had been left behind as Europe moved away from Labrador at the beginning of the continental rifting process that led to the formation of the North Atlantic Ocean; the name Orphan Knoll was an outgrowth of this thinking.

Thus no one person "discovered" Orphan Knoll, but it is fair to say that Alan Ruffman and David Monahan were the first to recognise it as a large and significant seafloor feature, and were the first to hypothesize that it might be a continental fragment of North America. Alan Ruffman nominated it as a Deep Sea Drilling Project to the Atlantic Advisory Panel of JOIDES in February 1970; it was drilled in early July 1970, and proved to be a continental fragment that had been above sea level in the Bajocian of the Jurassic Period. (See attached pages from Ruffman and van Hinte, 1973.)

Alan Ruffman
September 30, 2014



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27.

ORPHAN KNOLL - A "CHIP" OFF THE
NORTH AMERICAN "PLATE"

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Calgary, Alberta

Abstract

In June 1970 the Research Vessel GLOMAR CHALLENGER surveyed and drilled a seamount off the Labrador shelf: Orphan Knoll. The relatively flat upper surface of the 100 km-diameter mount lies at about 1800 m water-depth and rises 1000 to 2400 m above the surrounding seafloor. The drill-site at 50° 25.57'N, 46° 22.05'W is Site 111 of the JOIDES Deep Sea Drilling Project and was the first to be drilled during Leg 12. This paper presents a summary of the bathymetric, seismic, magnetic and stratigraphic information collected from the Knoll and interpretations of the data are given.

The mount is a continental high at the margin of the North American plate. It has sunk about 2050 m since Jurassic time, whereas the submerged areas to the south and west may have gone down about 3500 m if the conclusion about their continental nature is correct. Paleontological-sedimentological paleo-waterdepth interpretations suggest that the main subsidence took place during the earliest Tertiary. Seismostratic units are dealt with independently from lithostratic, biostratic and chronostratic units, and the Mesozoic-Cenozoic history of Orphan Knoll has been summarized. The Mesozoic sediments, fauna, and flora are directly comparable with those found in NW Europe. Glaciation began in the Pliocene about 3 million years ago.

The data also inspired conclusions and speculations of wider regional impact. Diapirs seem to be absent from the deeper water north of the Grand Bank-Flemish Cap, suggesting that the Atlantic no longer was an evaporite basin by the time the Labrador Sea began to open. This is consistent with a presented revision of the Bullard *et al.* computer fit of Europe and North America. The revision had to be made in order to account for the continental nature of Orphan Knoll and the area to its west and south.

INTRODUCTION

This paper is intended to give interested Canadian earth scientists an opportunity to learn about Orphan Knoll, which was Site 111 (50° 25.57'N, 46° 22.05'W) of Leg 12 of the JOIDES Deep Sea Drilling Project (DSDP), in an inexpensive and readily accessible Canadian publication. The paper is, in part, a condensed version of Chapter 3 of the Initial Report of Leg 12 (JOIDES, 1972), however, the section on stratigraphy has been expanded beyond the above mentioned initial report and more is now known about the pronounced

* Formerly of Bedford Institute, Dartmouth, Nova Scotia.

bathymetric highs that mark the upper surface of Orphan Knoll. In addition, some detailed description is given about the initial site proposal and selection in an effort to encourage other Canadian earth scientists to consider submitting drilling site proposals to the various Advisory Panels of the DSDP and hopefully to promote further scientific drilling off Canada's continental margins. The Leg 12 site proposals were made by scientists of at least 5 countries and the scientific team which manned Leg 12 represented 7 nationalities. It is apparent that the Deep Sea Drilling Project will welcome the suggestions and the participation of Canadian earth scientists. Finally, the article includes a brief sidelight on the naming of Orphan Knoll.

The Deep Sea Drilling Project is managed by a consortium of 5 oceanographic institutions known as the Joint Oceanographic Institutions for Deep Earth Sampling (JOIDES); one member of the consortium, Scripps Oceanographic Institution, administers the Project. The U.S. National Science Foundation has fully funded the Project through the initial phase and two successive extensions and is investing about one million dollars per month. Drilling is done from the dynamically positioned D.V. GLOMAR CHALLENGER operated under contract by Global Marine Inc. of Los Angeles. The GLOMAR CHALLENGER can maintain position over a beacon on the seafloor to within 200 feet in winds of 35 knots and currents of several knots. Drilling is done with a single pipe and seawater is used as the drilling fluid; there is no return circulation to the ship, thus samples are only obtained when a 9 m core barrel is inserted in the drill stem. Recently a re-entry capability has been achieved, but during Leg 12 it was not yet operative and a hole had to be abandoned when the drill bit was worn.

Location and Background Information for Site 111

Initial Site Selection

In late 1969, the first extension of the DSDP was announced and one of the authors (A.R.) while still at Dalhousie University wrote to the Project tentatively proposing Flemish Cap as a drilling site to settle the question of its oceanic or continental nature. A reply in January 1970 encouraged a more detailed proposal. By that time it was realized that the Bedford Institute did have reasonable proof of the Cap's continental nature (Pelletier, 1969, 1971) and that Flemish Cap did not have the prerequisite 100 m of soft sediment cover generally required to let the drill's bottom hole assembly become firmly embedded before penetrating solid rock.

Thus, in February 1970, a proposal for drilling a seafloor knoll some 350 km north of Flemish Cap and 550 km northeast of Newfoundland (Fig. 3) was submitted to the Atlantic Advisory Panel of JOIDES. At the time, little was known about the feature; only very approximate bathymetric contours could be estimated and no seismic profiles were available. The possibility of the knoll being a continental fragment was advanced in the proposal and the name "Orphan Knoll" tentatively applied. Later, in late March 1970, Xavier LePichon of the French oceanographic institution CNEXO also proposed the Knoll as a drilling site and supported it with a Flexotir continuous seismic profile of CHARCOT 5. The site was selected by the Advisory Panel at about this time on the basis of the CHARCOT record which indicated sufficient sediment cover and that solid geology was within reach of the drill string under the sediment cover (DSDP would prefer targets within 1 km of the mudline). Later, in May 1970 a seismic profile of SACKVILLE 69-041 was made available to the Leg 12 scientific team by Alan Grant of Bedford Institute.

Derivation of the name "Orphan Knoll"

There was considerable controversy over the name "Orphan Knoll" in September 1970 shortly after the completion of Leg 12. Indeed the final publication of the Canadian Hydrographic Service's (1970) Chart 802 was delayed by a few days until the Canadian Permanent Committee on Geographical Names settled the matter. One of the authors (A. R.) had formally proposed the name "Orphan Knoll" to the Committee in March 1970 as an appropriate name for such a small continental remnant lying isolated from its parent continental mass and being a generally neglected feature over the last 50 years of oceanographic exploration. In mid-summer 1970, A. C. Grant submitted the name "Sackville Knoll" to the Permanent Committee in the belief that CNAV SACKVILLE was the first research ship to do scientific work over the feature. In late August 1970, before the drilling results were known, the Permanent Committee had the name "Sackville Knoll" recommended to it by its Sub-committee on Underseas Features Terminology and the original colour proof of Chart 802 was made up with the then recommended name. Upon returning from Leg 12, one of the authors (A. R.) successfully challenged the name and Chart 802 finally appeared with the name "Orphan Knoll" as did Chart 800A (Canadian Hydrographic Service, 1971). The results of the drilling establishing the Knoll's continental nature, the prior publication of the name in the Toronto Globe and Mail, the use of the name in two scientific meetings and earlier research by at least four American oceanographic vessels over the feature were some of the factors in the Permanent Committee's final decision to accept the first-proposed name.

Bathymetry of Orphan Knoll

Orphan Knoll was noted as a single 970 fm sounding in 1917 on the British Admiralty Chart 2060A. The more recent GEBCO sounding sheet No. 27 (Deut. Hydro. Inst., 1964) shows a contoured version of the feature but it is distorted by the inclusion of inaccurate data. Until the publication of the chart of Figure 1 (JOIDES, 1972) the U.S. Hydrographic Office, Chart BC0510N (1965) was the most accurately contoured chart for the feature.

The Knoll appears to be separated into two parts (Fig. 1); the larger southern part rises to depths of less than 1800 m while the smaller northern extension only rises to depths of slightly less than 2400 m. The northeast margin falls directly to the abyssal plain at 4000 m and the feature is separated from the Labrador and Flemish Cap shelves by water 2800 m to 3400 m deep. The northeast side has steep slopes of 30 to 40 degrees; whereas the southwest slopes are more gentle, being in the range of 5 to 10 degrees. The northeast margin is quite linear except for the southern extension where a very steep offshore seamount stands slightly seaward of the main body. It is not known if this peak is composed of the same continental material as the main feature. The western margins of the Knoll are broadly semicircular in outline with a canyon-like feature incised into the southern flank (Fig. 1). The full extent of the Knoll to the northwest and to the southeast is unknown.

Almost every traverse across the Knoll shows a series of pronounced bathymetric highs which interrupt the smooth flat top surface of the Knoll (Fig. 4). These have been interpreted (Fig. 1) to form a series of continuous ridges lying subparallel to the linear northeast margin of the main southern part of the Knoll. The narrow ridge features rise in place to 498 m. Devonian limestone was obtained by dredging across these features (Ruffman and van Hinte, in press).

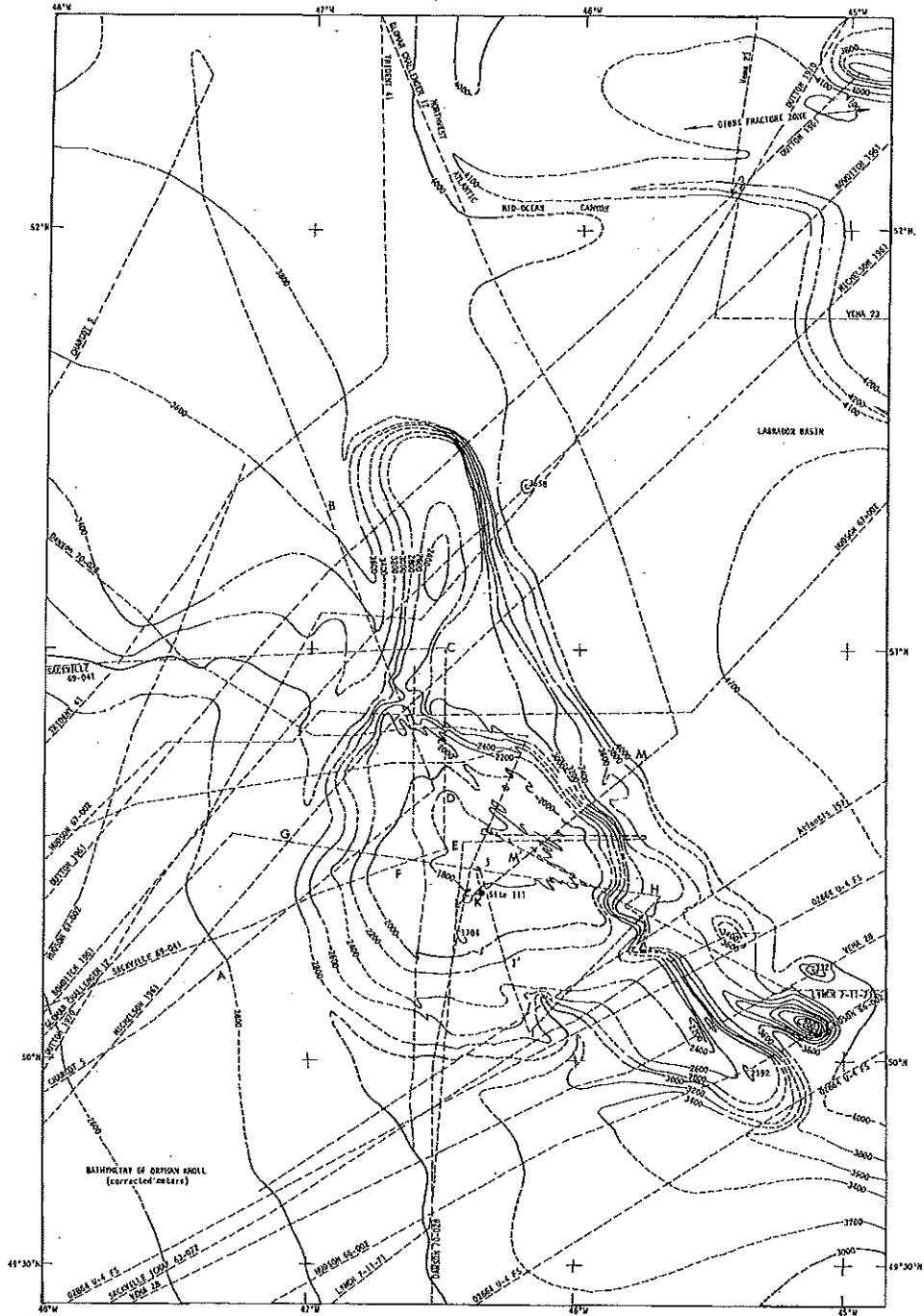


Figure 1.

The bathymetric map also shows a portion of the Northwest Atlantic Mid-ocean Canyon (Fig. 1). It is located on the basis of reliable data and its position indicates more detail than the map of Heezen et al. (1969).

Magnetic Surveys of Orphan Knoll

A preliminary total magnetic intensity map of the Orphan Knoll area has been prepared (Fig. 2); no secular or diurnal corrections have been applied to the data. The map indicates a linear positive magnetic anomaly lying along the northeast margin of the Knoll and over the small northern extension. However, the southwest margin of the Knoll is not indicated in either the contoured total magnetic intensity map (Fig. 2) or in any individual magnetic profiles that pass over the margin (Fig. 4). The lack of any indication of bottom topography along the southwest margin of the Knoll suggests that there is little contrast in magnetic susceptibility between the main body of the Knoll and the buried seafloor to the west and south. There also seems to be a distinct lack of the oceanic type of magnetic anomalies over the area south and west of the Knoll on the three southernmost aeromagnetic profiles of Hood and Bower (1971) and on the magnetic profiles of ELTANIN 2 (Kroenke and Wollard, 1968). All of the above data strongly suggest that the seafloor between Orphan Knoll and the Labrador Shelf, Newfoundland, Grand Banks and probably Flemish Cap is not oceanic in nature but is rather a continental type of crust.

Related Scientific Work in Area

The ATLANTIS in 1949 appears to have been the first scientific ship to obtain a bathymetric profile across the Orphan Knoll (Heezen et al., 1959). In 1961 the U. S. Naval Oceanographic Office (USNOO) obtained bathymetric and magnetic profiles across the feature using the (Avery, 1963). In 1963, DUTTON, BOWDITCH and MICHELSON the SACKVILLE 63-072 cruise (Int. Comm. NW. Atl. Fish, 1968) crossed Orphan Knoll twice in carrying out bathymetric surveys as did HUDSON 66-002 and HUDSON 67-002 cruises in 1966 and 1967 respectively.

There was no further survey work over the Knoll until 1969 when SACKVILLE 69-041 cruise (Grant, 1971) and CHARCOT 5 cruise (Olivet et al., 1970a; LePichon et al., 1971) carried out magnetic and continuous seismic reflection traverses across the feature. LePichon et al. (1971) interpreted the area south of the westernmost extension of the Charlie Gibbs Fracture Zone* (Fig. 1) as foundered continent and Olivet et al. (1970a) noted the Knoll's apparent fault-bounded margins.

Figure 1. Bathymetry of Orphan Knoll in corrected metres. Contour interval is 200 m except over the Labrador Basin where the interval is 100 m. Solid contours indicate that the contour is defined while presumed contours are shown as broken lines. The sources of information are indicated by ship's tracks (thin dashed lines). The exact northwest and southeast extension of the feature is unknown. The minimum soundings to the top of some of the more pronounced peaks are indicated. Letters shown refer to profiles referenced in the text and in the following figures (figure from JOIDES, 1972).

*The use of this name follows the suggestion of Laughton (in JOIDES, 1972).

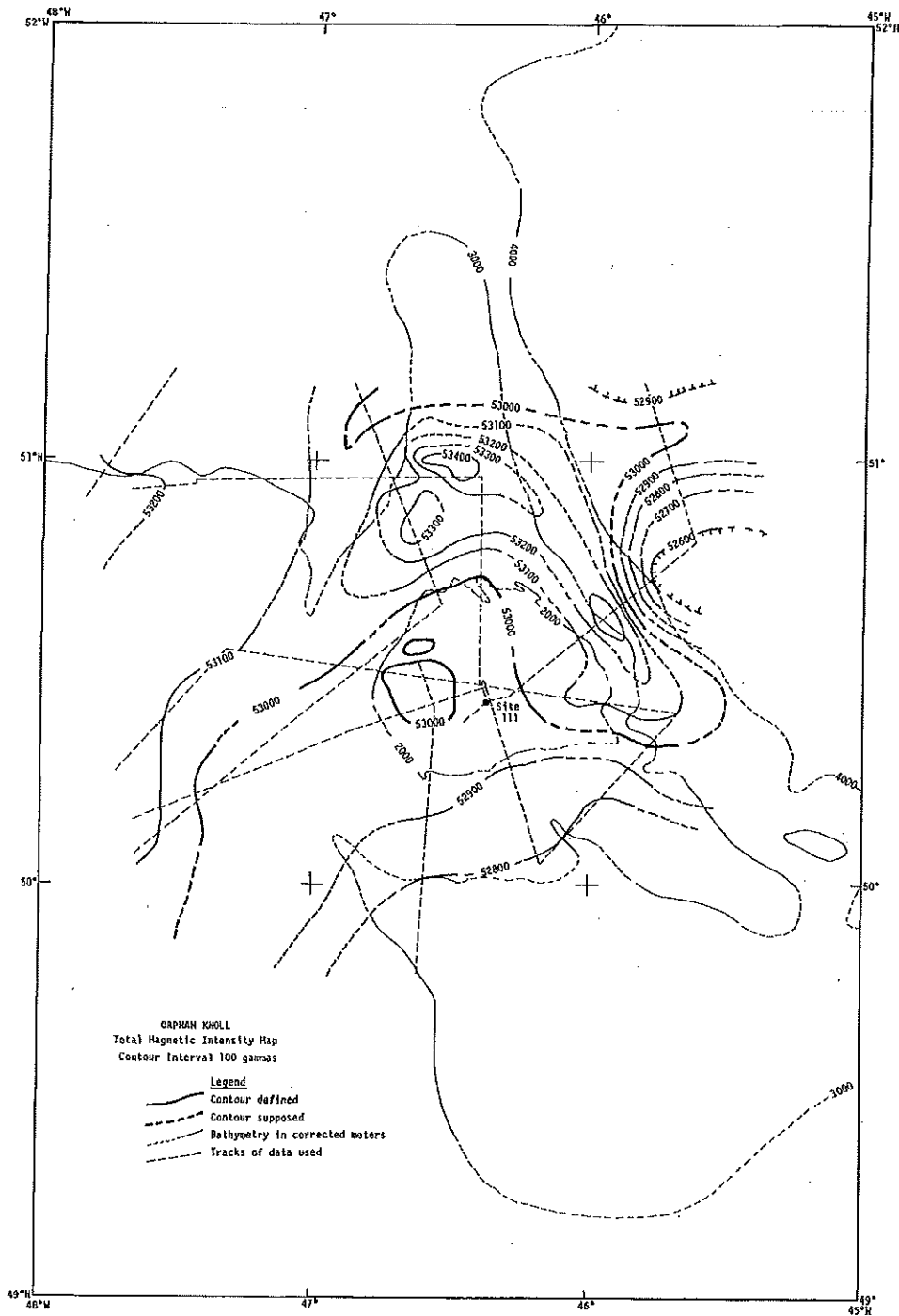


Figure 2.