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The palynology of Faroe- Shetland Basin well 204/19-1 (4209.4 to 4222.8 m)

Energy Systems and Basin Analysis Programme

Commissioned Report CR/17/019

BRITISH GEOLOGICAL SURVEY

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Summary

During Phase 3 of the BGS Faroe-Shetland Consortium project on the Jurassic of the UK sector of the Faroe-Shetland Basin, graphic/lithological logging of core from well 204/19-1 was undertaken. Five samples for palynology between 4209.40 and 4222.80 m were collected in order to provide age determinations and palaeoecological interpretations.

The palynomorph assemblages were extremely sparse with the exception of sample 5 at 4222.8 m. This horizon yielded an Early Cretaceous dinoflagellate cyst flora indicative of a maximum age of earliest Barremian. Other elements in sample 5 suggest that a post Barremian age is unlikely but not impossible. The remainder of the samples, between 4209.4 and 4219.55 m produced sparser palynobiotas which are devoid of marker species. Marine deposition prevailed throughout the succession investigated.

1 Introduction

As part of a wider study of the Mesozoic successions of the Faroe-Shetland Basin, selected cores from well 204/19-1 were logged. Five samples were taken for palynology between 4209.40 and 4222.80 m in order to provide age determinations and palaeoecological interpretations. The samples were prepared using standard acid maceration techniques.

2 Sample details

The five samples studied herein from well 204/19-1 are listed below. The columns represent, respectively, the informal sample number, the BGS registration number (prefixed MPA), the collector's number and the depth in metres (measured depths). Listings of palynomorphs, including semiquantitative data, are held on the respective BGS micropalaeontology/palynology data sheets, which have been archived.

| | | | |
|---|-----------|----------|---------|
| 1 | MPA 67653 | SSK63996 | 4209.40 |
| 2 | MPA 67652 | SSK63995 | 4212.96 |
| 3 | MPA 67651 | SSK63994 | 4216.60 |
| 4 | MPA 67650 | SSK63993 | 4219.55 |
| 5 | MPA 67649 | SSK63992 | 4222.80 |

3 Palynology

The occurrences of palynomorphs and kerogen macerals are depicted in Appendix 1. The five samples generally yielded relatively poorly-preserved, sparse, low diversity palynofloras. Dinoflagellate cysts were observed throughout, hence the interval examined represents a marine depositional setting.

The upper part of the succession examined (samples 1–4; 4209.4 to 4219.55 m) produced sparse palynobiotas. No marker taxa were encountered. The dominant kerogen type in this interval is amorphous organic material.

Sample 5 (4222.8 m) proved the most productive with a relatively diverse palynobiota. This includes the dinoflagellate cysts *Achomosphaera neptuni*, *Cribroperidinium* spp., *Cyclonephelium* spp., *Odontochitina operculata*, *Oligosphaeridium complex*, *Perrisseiasphaeridium* sp. and *Systematophora* spp. This is a characteristically Early Cretaceous flora. Specifically, the occurrence of *Odontochitina operculata* indicates that sample 5 is no older than earliest Barremian (Costa and Davey, 1992). Unfortunately there is no other taxon which has a well-defined Early Cretaceous range top in this horizon. However, the occurrences of forms such as *Egmontodinium* sp., *?Gochteodinia* sp., *Perrisseiasphaeridium* sp. and *Systematophora areolata* suggest that a post-Barremian age is unlikely, however this should not be taken as definitive evidence. Sample 5 is relatively rich in woody tissue.

4 Conclusions

The palynomorph assemblages in well 204/19-1 between 4209.4 and 4222.8 m were poorly productive with the exception of sample 5 (4222.8 m). The latter horizon yielded a dinoflagellate cyst flora indicative that the maximum age is earliest Barremian (Early Cretaceous). Other elements in sample 5 suggest that a post Barremian age is unlikely but not impossible. The remainder of the samples, between 4209.4 and 4219.55 m, produced sparser palynobiotas which are devoid of index taxa. Marine deposition prevailed throughout the succession investigated.

5 Reference

COSTA, L I, and DAVEY, R J. 1992. Dinoflagellate cysts of the Cretaceous System. 99–153 *in A stratigraphic index of dinoflagellate cysts*. POWELL, A J (editor). (London: Chapman and Hall, British Micropalaeontological Society Publications Series.)

Appendix 1.

The occurrences (X) of palynomorphs in the five samples examined from well 204/19-1. The numbers in the four kerogen maceral columns represent percentages and are an average of several observations.

| Well 204/19-1 | | | | | |
|---|---------------|---------|--------|---------|----------------------|
| Number | 1 | 2 | 3 | 4 | 5 |
| MPA Number | 67653 | 67652 | 67651 | 67650 | 67649 |
| Depth in metres | 4209.4 | 4212.96 | 4216.6 | 4219.55 | 4222.8 |
| Age interpretation | Indeterminate | | | | Early Cret. (Barrem) |
| Palaeoenvironment | Marine | | | | |
| PTERIDOPHYTE SPORES | | | | | |
| Trilete spore - indeterminate | | X | | | |
| GYMNOSPERM POLLEN | | | | | |
| Bisaccate pollen undiff. | | | X | | |
| DINOFLAGELLATE CYSTS | | | | | |
| Achomosphaera neptuni | | | | | X |
| Cassiculosphaeridia sp. | | | | | X |
| Chorate dinoflagellate cysts - undifferentiated | | | | | X |
| Cribopteridinium sp. | | ? | | | X |
| Cyclonephelium spp. | | X | ? | | X |
| Dinoflagellate cysts - indeterminate | X | X | X | X | X |
| Egmontodinium sp. | | | | | X |
| Gochteodinia sp. | | | | | ? |
| Odontochitina operculata | | | | | X |
| Oligosphaeridium complex | | | | | X |
| Perrisseiasphaeridium sp. | | | | | X |
| Systematophora areolata | | | | | X |
| Systematophora spp. | | | | | X |
| Tanyosphaeridium sp. | | | | ? | ? |
| KEROGEN TYPE PERCENTAGES | | | | | |
| Wood | 30 | 13 | 10 | 17 | 47 |
| Plant fragments | 7 | 3 | 7 | 5 | 10 |
| Palynomorphs | 0 | 0 | 1 | 0 | 3 |
| Amorphous organic material (AOM) | 63 | 84 | 82 | 78 | 40 |