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ENERGY SYSTEMS AND BASIN ANALYSIS PROGRAMME

Commissioned Report CR/17/133

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Summary

As part of Phase 3 of the BGS Faroe-Shetland Consortium project on the Jurassic of the UK sector of the Faroe-Shetland Basin, detailed logging of core from well 205/26a-5Z was undertaken and samples were taken for palynology in order to provide additional facies information and age determinations. Analysis of kerogen and palynological assemblages indicate a marine anoxic basin with little terrestrial input. The dinoflagellate cyst assemblage in the lowermost sample (MPA 67544; 2960.84 m) indicates a Kimmeridgian to Early Volgian age. The overlying samples are Kimmeridgian or younger.

1 Introduction

During detailed logging of core from well 205/26a-5Z, samples were taken for palynology in order to provide additional facies information and age determinations for the lithofacies analysis. The samples were prepared for palynology using standard acid maceration techniques. An additional oxidation treatment was carried out on the residues to remove some of the amorphous organic material (AOM) which could be obscuring palynomorphs. The residues were mounted onto glass slides for microscopic examination. The samples, aqueous residues and microscope slides are held in the BGS collections at Keyworth, Nottingham. Counts of kerogen types were carried out on unoxidised residues. Palynological analysis was carried out on oxidised material.

Sample details are given in Appendix 1.

2 Palynology

Summary descriptions of all 11 samples follow. Detailed palynological data is set out in Appendix 2. The zones mentioned are standard ammonite zones.

2.1 SAMPLES 1 TO 9 (2929.45 TO 2958 M) – KIMMERIDGIAN OR YOUNGER

The kerogen assemblages from this interval are all dominated by abundant amorphous organic material (AOM) (58 to 95%). In sample 8, the AOM is markedly clumped. On removal by a second oxidation treatment only sparse plant tissue remains.

Palynomorphs are generally very sparse throughout this interval with a variable proportion of marine taxa. In some cases, this is composed of foraminiferal test linings or acritarchs, such as *Micrhystridium*, alone. These groups are of little use in age determination.

In sample 2, poorly preserved dinoflagellate cysts include specimens tentatively assigned to *Cribroperidinium globatum* and *Oligosphaeridium* sp. If confirmed, this would suggest a Late Jurassic age (Riding and Thomas, 1992). The presence of the dinoflagellate cyst *Cribroperidinium globatum* in sample 4 again indicates a Late Jurassic age. The dinoflagellate cyst *Cyclonephelium hystrix* is present in sample 6 indicating a Kimmeridgian or younger age (Riding and Thomas, 1992). Sample 9 yields the dinoflagellate cyst *Cribroperidinium globatum* indicating a Late Jurassic age (Riding and Thomas, 1992) along with specimens tentatively attributed to *Cyclonephelium hystrix* and *Prolixosphaeridium* sp.

The pollen assemblages from this interval are dominated by undifferentiated bisaccate pollen plus *Araucariacites australis*, *Cerebropollenites macroverrucosus*, *Classopollis classoides*, *Exesipollenites scabratus* and *Perinopollenites elatoides*. These taxa are all long-ranging and typically Mesozoic but with no good age indicators. The spore assemblages are generally very sparse with *Gleicheniidites* sp., *Ischyosporites variegatus* or *Retitriteles semimuris* very occasionally present.

2.2 SAMPLE 10 (2960.84 M) – KIMMERIDGIAN TO EARLY VOLGIAN

The kerogen in this sample is dominated by abundant AOM (81%). Palynomorphs make up 2% of the kerogen assemblage. Of the palynomorph assemblage, 21% is classified as marine – mostly dinoflagellate cysts. This is the most diverse dinoflagellate cyst assemblage from the section studied and it includes *Cribroperidinium globatum*, *Cyclonephelium hystrix*, *Oligosphaeridium patulum* and *Prolixosphaeridium anasillum*. Together they indicate a Kimmeridgian to Early Volgian (Pectinatus Zone) age.

The pollen assemblage includes undifferentiated bisaccates, *Araucariacites australis*, *Cerebropollenites macroverrucosus*, *Chasmatorites apertus*, *Classopollis classoides*, *Exesipollenites scabratus* and *Perinopollenites elatoides*. These taxa are all long-ranging and typically Mesozoic but with no good age indicators.

3 Conclusions

The outstanding feature of the samples from this well is the overwhelming dominance of amorphous organic material and the sparse nature of the palynological assemblages. Marine indicators were found in varying proportions in all samples but spores were very rare. Together these factors indicate a marine basin with minor terrestrial input. The dinoflagellate cyst assemblage in the lowermost sample (sample 10; 2960.84 m) indicates a Kimmeridgian to Early Volgian age.

Reference

RIDING, J B, and THOMAS, J E. 1992. Dinoflagellate cysts of the Jurassic System. 7–97 in *A stratigraphic index of dinoflagellate cysts*. POWELL, A J (editor). (London: Chapman and Hall, British Micropalaeontological Society Publications Series.)

Appendix 1 - Sample details (measured depths).

INFORMAL No.	BGS MPA No.	DEPTH (m)	SSK No.
1	67553	2929.24	63892
2	67552	2930.66	63891
3	67551	2932.79	63890
4	67550	2944.90	63889
5	67549	2948.85	63888
6	67548	2950.91	63887
7	67547	2953.72	63886
8	67546	2955.11	63885
9	67545	2958.00	63884
10	67544	2960.84	63883

Appendix 2 - Palynology data

Well 205/26a-5z										
Number	1	2	3	4	5	6	7	8	9	10
MPA Number	67553	67552	67551	67550	67549	67548	67547	67546	67545	67544
Depth	2929.24	2930.66	2932.79	2944.9	2948.85	2950.91	2953.72	2955.11	2958	2960.84
Age interpretation	Kimmeridgian or younger									Kimm. to early Volg. (Pectinatus Zone)
Palaeoenvironment	Marine						Indeterminate	Marine		
PTERIDOPHYTE SPORES										
Gleicheniidites sp.							X			
Ischyosporites variegatus									X	
Leptolepidites plurituberosus										?
Retitriletes semimuris		?								
GYMNOSPERM POLLEN										
Araucariacites australis		X	X	X	X	X	X		X	X
Bisaccate pollen undiff.	X	X	X	X	X	X	X		X	X
Cerebropllenites macroverrucosus	X			X		X	X			X
Chasmatorites apertus							X		X	X
Chasmatorites sp.		?								
Classopollis classoides							X		X	X
Exesipollenites scabratus	X	X	X	X	X	X	X		X	X
Monocolpate pollen		X								
Perinopollenites elatoides	X	X	X	X	X	X	X		X	X
DINOFLAGELLATE CYSTS										
Cribroperidinium globatum		?		X					X	X
Cyclonephelium hystrix				?		X			?	X
Oligosphaeridium patulum										X
Oligosphaeridium sp.		?								?
Prolixosphaeridium anasillum										X
Prolixosphaeridium sp.									?	
MISCELLANEOUS										
Foraminiferal test lining	X	X	X	X	X	X	X		X	X
Michystridium spp.							X		X	X
Prasinophyte algae				X	X					
KEROGEN TYPE PERCENTAGES										
Wood	3	3	2	22	1	8	5		8	7
Plant fragments	3	2	1	17	3	6	5		6	10
Palynomorphs	1	1	1	3	1	1	2		2	2
Amorph. organic material (AOM)	93	94	96	58	95	85	88		84	81