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NATURAL ENVIRONMENT RESEARCH COUNCIL

Palynology of Faroe-Shetland Basin well 205/26a-4 between 2454.39 and 2498.91 m

Energy Systems and Basin Analysis Programme
Commissioned Report CR/17/125

BRITISH GEOLOGICAL SURVEY

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J B Riding

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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-4 was undertaken. Twenty core samples were taken for palynology between 2454.39 and 2498.91 m in order to provide age determinations and additional facies information.

The uppermost succession (2454.39 to 2469.17 m; samples 1 to 11) is considered to be of Late Jurassic to earliest Cretaceous (Mid Volgian to Early Ryazanian) age based on sparse dinoflagellate cysts, which include the marker species *Perisseiasphaeridium insolitum*. The interval between 2470.67 and 2498.91 m (samples 12 to 20) proved palynologically barren, therefore no age assessments are possible.

1 Introduction

As part of detailed sedimentological logging of conventional core from offshore well 205/26a-4, twenty samples between 2454.39 and 2498.91 m were collected for palynological analysis in order to provide biostratigraphical ages and palaeoecological information. The samples were all prepared using standard acid-based techniques. The samples, aqueous residues and microscope slides are held in the BGS collections at Keyworth, Nottingham.

The twenty samples are listed in Appendix 1.

2 Palynology

The palynological data from samples 1 to 11 in this study is depicted in Appendix 2, and these data are discussed below.

Samples 1 to 11 produced sparse associations of dinoflagellate cysts, pollen, miscellaneous microplankton and spores (Appendix 2). The consistent occurrences of marine palynomorphs indicates that this palynologically productive interval was deposited in marine conditions, possibly within a single genetic depositional succession. The productive samples are all sparse in numbers of palynomorph specimens observed, and the associations are of low diversity (Table 1). Samples 1 to 8 (2454.39 to 2467.63 m) are dominated by amorphous organic material (Appendix 2). The lowermost three samples (9 to 11; 2468.18 to 2469.17 m) are rich in wood fragments.

The dinoflagellate cysts include relatively consistent records of chorate forms, *Cribroperidinium* spp., *Cyclonephelium* spp., indeterminate forms and *Systematophora* spp. Less prominent and more sporadic taxa include *Endoscrinium* sp., *?Muderongia* sp., *Oligosphaeridium* spp., *Perisseiasphaeridium insolitum* and *?Tubotuberella apatela* (Appendix 2). The pollen, spores and miscellaneous palynomorphs proved relatively low in diversity, and these are not biostratigraphically significant. However, they are consistent with the Late Jurassic to earliest Cretaceous age determination (see below).

The occurrences of forms such as *Cribroperidinium* spp., *Cyclonephelium* spp., *Endoscrinium* sp., *?Muderongia* sp., *Oligosphaeridium* spp., *Perisseiasphaeridium insolitum* and *Systematophora daveyi* are indicative of a Late Jurassic to earliest Cretaceous (Mid Volgian to Early Ryazanian) age (Heilman-Clausen, 1987; Riding and Thomas, 1992). The principal marker here is *Perisseiasphaeridium insolitum* in sample 10 (2468.65 m), which ranges from the Mid Volgian to Early Ryazanian (Davey, 1982). All the other forms in samples 1 to 11 are entirely consistent with this age assessment. Furthermore, the samples stratigraphically above sample 10 are also deemed to be of Volgian to Early Ryazanian age; no key markers are present here. Due largely to

the sparsity of the palynofloras, biostratigraphical interpretations resolved to the level of ammonite zones are not feasible herein.

The lowermost nine samples (12 to 20; 2470.67 to 2498.91 m) are all entirely devoid of palynomorphs, and hence no age assessment is possible for this succession. Furthermore, all these horizons except sample 19 (2493.05 m), are so sparse in kerogen that no meaningful counts can be made. However, sample 19 is dominated by woody tissue (95%), with amorphous organic material being subordinate (5%).

3 Conclusions

The uppermost succession (samples 1 to 11: 2454.39 to 2469.17 m) is interpreted as being of Late Jurassic to earliest Cretaceous (Mid Volgian to Early Ryazanian) age based on sparse dinoflagellate cysts, principally *Perisseiasphaeridium insolitum*. Samples 12 to 20 (2470.67 to 2498.91 m) all proved devoid of palynomorphs, hence no age assessments are possible.

4 References

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- 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 - list of samples (measured depths).

Informal No.	BGS Registration No.	Depth (m)
1	MPA 67584	2454.39
2	MPA 67583	2452.25
3	MPA 67582	2454.97
4	MPA 67581	2454.97
5	MPA 67580	2462.28
6	MPA 67579	2463.14
7	MPA 67578	2465.58
8	MPA 67577	2467.63
9	MPA 67576	2468.18
10	MPA 67575	2468.65
11	MPA 67574	2469.17
12	MPA 67573	2470.67
13	MPA 67572	2473.94
14	MPA 67571	2476.07
15	MPA 67570	2478.97
16	MPA 67569	2483.79
17	MPA 67568	2486.46
18	MPA 67567	2489.08
19	MPA 67566	2493.05
20	MPA 67565	2498.91

Appendix 2 – palynomorph data from the productive samples (1 to 11).

205/26a-4a											
Number	1	2	3	4	5	6	7	8	9	10	11
MPA Number	67584	67583	67582	67581	67580	67579	67578	67577	67576	67575	67574
Depth (m)	2454.39	2452.25	2454.97	2454.97	2462.28	2463.14	2465.58	2467.63	2468.18	2468.65	2469.17
Comments	V. sparse	V. sparse	V. sparse	V. sparse	V. sparse	V. sparse	Sparse	Sparse	Sparse	Sparse	Sparse
Age interpretation	Mid Volgian to Early Ryazanian										
Palaeoenvironment	Marine										
PTERIDOPHYTE SPORES:											
Contignisporites sp.									X		
Cyathidites spp.										X	
spores - indeterminate					X		?	X	X	X	X
GYMNOSPERM POLLEN:											
bisaccate pollen - undifferentiated	X	X		X	X		X	X	X	X	X
Cerebropollenites macroverrucosus								X	X		
Classopollis spp.			X							?	
Perinopollenites elatoides										X	
pollen - indeterminate								X			
DINOFAGELLATE CYSTS:											
chorate dinoflagellate cysts - indet.									X		X
Cribrerodinium hansenii											?
Cribrerodinium spp. (thick-w alled)						X					
Cribrerodinium spp.				X	?		X	X	X		C
Cyclonephelium spp.							?		X	X	X
dinoflagellate cysts - indet.			X	X	X	X	X	X	X	X	
Endoscrinium sp.											
Muderongia sp.		?									
Oligosphaeridium complex/patulum				X			?				
Perisseiasphaeridium insolitum										X	
Systematophora areolata											X
Systematophora daveyi	X										X
Systematophora spp.									X		X
Tubotuberella apatela		?									
MISCELLANEOUS:											
acritarch - indet.										X	
Botryococcus			X	X							
foraminiferal test linings	X			X	X	X		X	X	?	X
Micrhystridium sp.			X						X		
Tasmanites spp.	X								X		X
KEROGEN TYPE PERCENTAGES											
wood	17	22	5	17	15	17	22	36	42	45	60
plant fragments	3	3	...	6	12	5	7	12	17	23	12
palynomorphs	2	...	83	2	1	2	3	2	3	2	10
amorphous organic material (AOM)	78	75		75	72	76	68	50	38	30	18