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Palynology of Faroe-Shetland Basin well 205/26a-2 between 2093.77 and 2158.00 m

Energy Systems and Basin Analysis Programme

Commissioned Report CR/17/124

BRITISH GEOLOGICAL SURVEY

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Palynology of Faroe-Shetland Basin well 205/26a-2 between 2093.77 and 2158.00 m

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-2 was undertaken. Seven core samples were taken for palynology between 2093.77 and 2158.00 m in order to provide age determinations and additional facies information.

The interval between 2094.58 and 2104.63 m proved variably palynologically productive. The four palynofloras examined comprise relatively high diversity dinoflagellate cysts, including several marker species. This indicates marine deposition. Due to the presence of dinoflagellate cyst species such as *Heslertonia heslertonensis* and *Scriniodinium pharo*, this succession is assigned to the Ryazanian–Valanginian transition (Early Cretaceous). The most likely age is latest Ryazanian (Albidum Zone). The samples at 2093.77, 2157.58 and 2158.00 m all proved to be palynologically barren.

1 Introduction

As part of detailed sedimentological logging of conventional core from offshore well 205/26a-2, seven samples between 2093.77 and 2158.00 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 seven samples are listed in Appendix 1.

2 Palynology

The palynological data in this study are depicted in Appendix 2. The zones referred to are standard ammonite zones.

Sample 2 (2094.60 m) produced a relatively sparse palynomorph association but samples 3, 4 and 5 (2095.41 to 2104.60 m) yielded abundant palynofloras. By contrast, samples 1, 6 and 7 (2093.77, 2157.58 and 2158.00 m respectively) are palynologically barren. Samples 1 and 7 are rich in amorphous organic material, by contrast the kerogen in sample 6 was too sparse to meaningfully count.

The relatively thin palynologically productive interval (2094.60 to 2104.60 m) is rich in dinoflagellate cysts, thus it represents marine deposition. The similar nature of the assemblages, which are all relatively rich in woody fragments, indicates deposition as part of a single genetic succession.

The dinoflagellate cysts throughout samples 2 to 5 consistently include chorate dinoflagellate cysts, *Cribooperidinium* spp., *Gochteodinia villosa*, *Hystrichodinium pulchrum*, *Kleithriasphaeridium corrugatum*, *Muderongia endocavata/simplex*, *Scriniodinium pharo* and *Sirmiodinium grossii*. Other species recognised somewhat more sporadically are *Batioladinium jaegeri*, *Cteniodinium elegantulum*, *Cyclonophelium* spp., *Egmontodinium* spp., *Endoscrinium campanula*, *Heslertonia heslertonensis*, *Oligosphaeridium* spp., *Pseudoceratium brevispinosum*, *Systematophora* spp. and *Tubotuberella apatela*. The pollen, spores and miscellaneous palynomorphs proved low in diversity by comparison, and these are not biostratigraphically significant. However, they are consistent with the earliest Cretaceous age determination (see below).

This association is indicative of the earliest Cretaceous (Ryazanian–Valanginian transition). Specifically the occurrences of species such as *Ctenidodinium elegantulum*, *Heslertonia heslertonensis*, *Kleithriasphaeridium corrugatum*, *Muderongia endocavata/simplex* and *Pseudoceratium brevispinosum* mean that the maximum age is Late Ryazanian (Costa and Davey, 1992). In particular, the range base of *Heslertonia heslertonensis* is within the latest Ryazanian Albidum Zone (Heilmann-Clausen, 1987). This is the youngest range base, and defines the maximum age of this succession. Furthermore, the presence of *Gochteodinia villosa*, *Pseudoceratium brevispinosum*, *Scriniodinium pharo* and *Tubotuberella apatela* is evidence of an age no younger than earliest Valanginian. The oldest of these range bases is that of *Scriniodinium pharo*, which is in the earliest part of the Paratollia spp. Zone (Heilmann-Clausen, 1987; Costa and Davey, 1992); this defines the minimum age. The occurrence of *Egmontodinium exspiratum/polyplacophorum* in sample 2 probably represents reworking. Therefore, in summary, the weight of the evidence indicates a latest Ryazanian age (Albidum Zone) for samples 2 to 5.

3 Conclusions

Samples 2 to 5 (2094.60 to 2104.60 m) all proved variably palynologically productive. The dinoflagellate cysts present are relatively high in diversity and include several index species. On the basis of the occurrences of species such as *Heslertonia heslertonensis* and *Scriniodinium pharo*, this succession is assigned to the Ryazanian–Valanginian transition. The most probable age is latest Ryazanian (Albidum Zone). Furthermore, this interval represents marine deposition. The remaining three samples, at 2093.77, 2157.58 and 2158.00 m, proved devoid of palynomorphs.

4 References

- 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.)
- HEILMANN-CLAUSEN, C. 1987. Lower Cretaceous dinoflagellate biostratigraphy in the Danish Central Trough. *Danmarks Geologiske Undersøgelse*, Series A, No. 17, 1–89.

Appendix 1 - list of samples studied (measured depths).

Informal No.	BGS Registration No.	Depth (m)
1	MPA 67611	2093.77
2	MPA 67610	2094.58
3	MPA 67609	2095.41
4	MPA 67608	2102.29
5	MPA 67607	2104.63
6	MPA 67606	2157.58
7	MPA 67605	2158.00

Appendix 2 – palynology data

205/26a-2							
Informal sample number	1	2	3	4	5	6	7
MPA number	67611	67610	67609	67608	67607	67606	67605
Depth (m)	2093.77	2094.58	2095.41	2102.29	2104.63	2157.58	2158
Comments	barren	sparse	fairly rich			barren	
Age interpretation	Indet.	Late Ryaz.-earliest Valang.				Indet.	
Palaeoenvironment	Indet.	Marine				Indet.	
PTERIDOPHYTE SPORES:							
Cicatricosisporites spp.				X			
Coronatispora valdensis				X			
Cyathidites spp.				X	X		
spores - indeterminate				X	X		
GYMNOSPERM POLLEN:							
bisaccate pollen - undifferentiated	X						
Callialasporites spp.				X	X		
Classopollis spp.				X			
DINOFLAGELLATE CYSTS:							
Acanthaulax sp.				X			
Ambonosphaera staffinensis			X				
Batioladinium jaegeri				?	X		
Cassiculosphaeridia spp.				X			
chorate cysts - indeterminate		X	X	X	X		
Cribroperidinium gigas		X	X	X	X		
Cribroperidinium spp.		X	X	X	X		
Ctenodinium elegantulum			X	X			
Cyclonephelium spp.			X	X			
dinoflagellate cysts - indet.		X					
Egmontodinium expiratum/poly.		X					
Egmontodinium torynum					?		
Egmontodinium sp.					X		
Endoscrinium campanula					X		
Gochteodinia villosa			X	X	X		
Gonyaulacysta spp.			X				
Heslertonia heslertonensis			X		X		
Hystrichodinium pulchrum			X	X	X		
Kleithriasphaeridium corrugatum			X	X	X		
Muderongia endovata/simplex			X	X	X		
Oligosphaeridium complex/spp.		X		X	X		
Pseudoceratium brevispinosum			X				
Scriniodinium pharo			X	X	X		
Sentusidinium spp.			X				
Sirmiodinium grossii			X	X	X		
Systematophora spp.			X		X		
Tanyosphaeridium sp.			X				
Tubotuberella apatela			X				
MISCELLANEOUS:							
foraminiferal test linings		X					
KEROGEN TYPE (%)							
w ood	12	43	44	33	20	..	42
plant fragments	15	15	10	7	8	...	8
palynomorphs	...	13	28	40	55
amorphous organic material (AOM)	73	29	18	20	17	...	50