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Palynology of the interval 840.55 to 860.21 m of well 202/09-1, Faroe- Shetland Basin

ENERGY SYSTEMS AND BASIN ANALYSIS PROGRAMME

Commissioned Report CR/17/134

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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 202/09-1 was undertaken and samples were taken for palynology in order to provide additional facies information and age determinations.

Analysis of the kerogen revealed assemblages dominated by black and brown woody and plant material. Marine palynomorph assemblages were present only in the uppermost sample (840.55 m) where the dinoflagellate cysts *Oligosphaeridium patulum* and *Perisseiasphaeridium pannosum* indicate a Kimmeridgian to Early Volgian (Mutabilis to Pectinatus zones) age. The presence of the spore genus *Cicatricosisporites* in samples including sample 8 (856.54 m) near the base of the interval, indicates a Volgian or younger age and hence an Early Volgian age for the whole sample run.

1 Introduction and method

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 202/09-1 was undertaken and samples were taken for palynology in order to provide additional facies information and age determinations. The samples were prepared using standard acid maceration techniques. 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 data is given in Appendix 1.

2 Palynology

Summary descriptions of all nine samples follow. Detailed palynology data is given in Appendix 2. The zones referred to are standard ammonite zones.

2.1 SAMPLE 1 (840.55 M) – EARLY VOLGIAN

This kerogen assemblage is dominated by black and brown woody and plant material with much smaller numbers of palynomorphs. The palynomorph assemblage is 20% marine including the dinoflagellate cysts *Cribroperidinium globatum*, *Cyclonephelium hystrix*, *Oligosphaeridium patulum* and *Perisseiasphaeridium pannosum* which indicate a Late Jurassic age. Taken together, the latter two restrict the age range to Kimmeridgian to Early Volgian (Mutabilis to Pectinatus zones) (Riding and Thomas, 1992).

2.2 SAMPLES 2 TO 9 (842.46 TO 860.21 M) – EARLY VOLGIAN

Analysis of the kerogen revealed assemblages dominated by black and brown woody and plant material with significant numbers of palynomorphs especially in samples 3 (843.87 m) and 8 (856.54 m). Amorphous organic material (AOM) is very uncommon in all samples in marked contrast to other sections sampled from the Faroe-Shetland Basin during this project. Spores and pollen dominate the palynological assemblages with spores particularly important – up to 72% in sample 3 (843.87 m). The assemblages indicate a well-oxygenated environment with significant terrestrial input. Spore and pollen taxa are generally long ranging in this part of the stratigraphical column but the presence of the spore genus *Cicatricosisporites* in samples 3 (843.87 m), 5 (852.18 m), 6 (854.19 m) and 8 (856.54 m) indicates a Volgian or younger age.

3 Conclusions

Kerogen assemblages from core from the interval 840.55 to 860.21 m well 202/09-1 is dominated by black and brown woody and plant material with amorphous organic material (AOM) very uncommon throughout. Spores and pollen dominate the palynological assemblages with spores particularly important indicating a well-oxygenated environment with significant terrestrial input. Dinoflagellate cysts and other marine indicators are only present in the uppermost sample (1, 840.55 m) where they indicate a Kimmeridgian to Early Volgian age range (Mutabilis to Pectinatus zones). The presence of the spore genus *Cicatricosisporites* in samples including sample 8 (856.54 m) near the base, indicates a Volgian or younger age and hence an Early Volgian age for the whole sample run.

4 References

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 data (measured depths).

INFORMAL No.	BGS MPA No.	DEPTH (m)	SSK No.
1	67593	840.55	63844
2	67592	842.46	63843
3	67591	843.87	63842
4	67590	850.29	63841
5	67589	852.18	63840
6	67588	854.19	63839
7	67587	858.09	63838
8	67586	856.54	63837
9	67585	860.21	63836

Appendix 2 – Palynology data

Well 202/09-1									
Number	1	2	3	4	5	6	7	8	9
MPA Number	67593	67592	67591	67590	67589	67588	67587	67586	67585
Depth	840.55	842.46	843.87	850.29	852.18	854.19	858.09	856.54	860.21
Age interpretation	Early Volgian								Indeterminate
Palaeoenvironment	Marine		Terrestrial taxa only		Marine	Terrestrial taxa only			
PTERIDOPHYTE SPORES									
<i>Baculatisportites commauensis</i>	X	X	X	X	X	X		X	X
<i>Calamospora mesozoica</i>	X								
<i>Cicatricosisporites perforatus</i>			X		?	X		X	
<i>Cyathidites mesozoica</i>			X						
<i>Cyathidites minor</i>	X	X	X	X	X	X	X	X	X
<i>Densosporites</i> sp.	X		X	X	X			X	
<i>Dictyophyllidites</i> sp.			X	X					
<i>Foraminisporis wontaggiensis</i>	X	X							
<i>Gleicheniidites cirniidites</i>	X	X	X	X				X	
<i>Gleicheniidites minor</i>				X					
<i>Gleicheniidites</i> sp.		X			X	X			X
<i>Ischyosporites variegatus</i>			X						
<i>Ischysorites</i> sp.				X					
<i>Neoraistrickia breviclavata</i>							?		
<i>Neoraistrickia</i> sp.			X	X		X		X	
<i>Obtusisporis canadensis</i>		X	X			X			
<i>Retitriletes austroclavatidites</i>			X					X	
<i>Retitriletes semimuris</i>			X	X		X		X	
<i>Retitriletes</i> sp.		X		X					
Spore - indeterminate	X	X	X	X	X	X	X	X	X
<i>Torosisporis</i> sp.									X
<i>Triplanosporites</i> sp. ?			X						
<i>Tuberositriletes grossetuberculatus</i>					?				
GYMNOSPERM POLLEN									
<i>Araucariacites australis</i>	X	X	X		X	X		X	X
<i>Bisaccate pollen undiff.</i>	X	X	X	X	X	X	X	X	
<i>Callialasporites dampieri</i>					X	X		X	
<i>Cerebropllenites macroverrucosus</i>	X	X	X	X	X	X	X	X	X
<i>Chasmatosporites apertus</i>		X	X	X					X
<i>Classopollis classoides</i>		X	X		X	X		X	
<i>Exesipollenites scabratus</i>	X	X	X	X	X	X	X	X	X
<i>Monocolpate pollen</i>		X		X	X	X	X	X	X
<i>Perinopollenites elatoides</i>	X	X	X		X	X	X	X	X
<i>Vitreisporites pallidus</i>	X	X	X	X	X	X		X	
DINOFAGELLATE CYSTS									
<i>Cribrerodinium globatum</i>	X								
<i>Cyclonephelium hystrix</i>	X	?							
<i>Gonyaulacoid</i> dinocyst	X								
<i>Oligosphaeridium patulum</i>	X								
<i>Perisseiasphaeridium</i> cf. <i>pannosum</i>	X								
Small chorate dinocyst	X								
MISCELLANEOUS									
Foraminiferal test lining	X								
<i>Micrhystridium</i> spp.	X								
<i>Pterospermella</i> sp.	X								
<i>Tasmanites</i> sp.					?				
KEROGEN TYPE PERCENTAGES									
Wood	48	32	13	44	41	56	37	10	53
Plant fragments	46	63	12	32	43	29	54	15	42
Palynomorphs	6	5	72	23	14	15	3	73	2
Amorph. organic material (AOM)	0	0	3	1	2	0	6	2	3