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Palynology of the interval 1358.12 to1446.0 m of well 202/12-1, Faroe-Shetland Basin

ENERGY SYSTEMS AND BASIN ANALYSIS PROGRAMME
Commissioned Report CR/17/135

BRITISH GEOLOGICAL SURVEY

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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 202/12-1 was undertaken and samples were taken for palynology in order to provide additional facies information and age determinations.

Samples 1 to 3 (1358.12 to 1361.41 m) yield age diagnostic palynomorphs indicating Early to Late Volgian ages. Sample 2 at 1359.8 m contains *Dingodinium tuberosum* and *Gochteodinia villosa* which bracket the age of the sample around the late Mid Volgian and the early Late Volgian (Oppressus–Primitivus zones) (Riding and Thomas, 1992). Marine influence is indicated periodically through the interval studied although the very sparse samples cannot be given a robust classification.

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 202/12-1 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.

2 Palynology

Summary descriptions follow. Detailed data is set out in Appendix 2.The zones referred to are standard ammonite zones.

2.1 SAMPLES 1 TO 3 (1358.12 TO 1361.41 M) – EARLY TO LATE VOLGIAN

The kerogen assemblages in this interval are dominated by amorphous organic matter with variable levels of palynomorphs and very low levels of black and brown woody and plant material.

The palynomorph assemblage in sample 1 is 10% marine and includes the dinoflagellate cysts *Cribroperidinium globatum, Cribroperidinium hanseni, Hystrichodinium pulchrum, Systematophora areolata* and specimens questionably attributed to *Batioladinium pomum*. The overlapping published age ranges for these taxa suggest an Early to Mid Volgian age. If confirmed, the presence of *Batioladinium pomum* would push the age range into at least the Late Volgian (Lamplughi Zone) (Costa and Davey, 1992; Davey, 1982; Heilmann-Clausen, 1987; Riding and Thomas, 1992). The palynological assemblage in Sample 2 is 17% marine and includes the dinoflagellate cysts *Cribroperidinium globatum, Cribroperidinium* sp., *Dingodinium tuberosum* and *Gochteodinia villosa*. The overlapping published age ranges for latter two taxa brackets the age of the sample around the late Mid Volgian and the early Late Volgian (Oppressus–Primitivus Zones) (Riding and Thomas, 1992). Sample 3 yields the dinoflagellate cysts *Hystrichodinium pulchrum Cribroperidinium globatum, Cyclonephelium hystrix, Dingodinium tuberosum* and *Sirmiodinium grossi*. These are fairly long-ranging taxa but their overlapping published age ranges indicate the Kimmeridgian to Late Volgian (Riding and Thomas, 1992).

The palynological assemblages are dominated by pollen, particularly bisaccate pollen and *Perinopollenites elatoides.* Spores are infrequent, the only significant specimen is questionably attributed to *Cicatricosisporites perforatus* indicating Volgian or younger strata.

2.2 SAMPLES 4 TO 11 (1418.53 TO 1446 M) – VOLGIAN

Palynological residues from these samples are generally very poor, in some cases so sparse that a meaningful count of the kerogen or palynomorph assemblages was impossible. Samples 5 and **7** are both dominated by black wood with lesser amounts of brown wood and plant material. Palynomorphs are present although they don't show up in the kerogen count. The assemblages are dominated by non-age-diagnostic pollen with rare, poorly preserved dinoflagellate cysts. Sample 7 yielded the spore genus *Cicatricosisporites* indicating a Volgian or younger age. Sample at 1432.48 m is made up entirely of amorphous organic matter.

3 Conclusions

The highest three samples from this well – samples 1 to 3 (1358.12 to 1361.41 m) – yield age diagnostic dinoflagellate cysts indicating Kimmeridgian to Late Volgian ages. Sample 2 at 1359.8 m contains *Dingodinium tuberosum* and *Gochteodinia villosa* which bracket the age of the sample around the late Mid Volgian and the early Late Volgian (Oppressus–Primitivus Zones) (Riding and Thomas, 1992), i.e.

close to the Jurassic–Cretaceous boundary. The presence of the spore genus *Cicatricosisporites* in samples 2, 3 and 7 indicates Volgian or younger strata.

Marine influence is indicated periodically through the interval studied although the very sparse samples cannot be given a robust classification. Amorphous organic matter dominates the samples from the top and the bottom of the interval studied.

4 References

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Appendix 1 - Sample details (measured depths).

INFORMAL No.	BGS MPA No.	DEPTH (m)	SSK No.
1	67564	1358.12	63903
2	67563	1359.80	63902
3	67562	1361.41	63901
4	67561	1418.53	63900
5	67560	1426.43	63899
6	67559	1426.68	63898
7	67558	1427.28	63897
8	67557	1427.78	63896
9	67556	1428.99	63895
10	67555	1432.48	63894
11	67554	1446.00	63893

Appendix 2 - Palynology data.

Well 202/12-1											
Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
MPA Number	**67564**	**67563**	**67562**	**67561**	**67560**	**67559**	**67558**	**67557**	**67556**	**67555**	**67554**
Depth	1358.12	1359.8	1361.41	1418.53	1426.43	1426.68	1427.28	1427.78	1428.99	1432.48	1446
Age interpretation	**Late Volg. (Lamplughi)**	**Mid to Late Volg.**	**Early to late Volg.**	**Indeterminate**			**Volg. or younger**	**Indeterminate**			
Palaeoenvironment	**Marine**			**Terrest. taxa only**	**Marine**	**Indetermi nate**	**Marine**	**Terrestrial taxa only**		**Indetermi nate**	**Terrest. taxa only**
PTERIDOPHYTE SPORES											
Baculatisportites commaumensis			X		X						
Cicatricosisporites perforatus	?		?								
Cicatricosisporites sp.							**X**				
Cyathidites minor	X		X								
Gleicheniidites minor	X										
Gleicheniidites sp.		X	X	X							
Staplinisporites caminus	X										
GYMNOSPERM POLLEN											
Araucariacites australis	X	X					x	X	X		**X**
Bisaccate pollen undiff.	X	X	X	X	X						**X**
Cerebropllenites macroverrucosus	X		X		X						
Chasmatosporites sp.					X						
Classopollis classoides	X	X	X								
Exesipollenites scabratus	X	X	X	X	X		X		X		**X**
Monocolpate pollen	X	X					X				
Perinopollenites elatoides	X	X	X	X	X		X	X	X		X
Vitreisporites pallidus	X										
DINOFLAGELLATE CYSTS											
Batioladinium pomum	?										
Chorate dinocyst indet		X	X		?						X
Chytroesphaeridia sp.			X								
Cleistosphaeridium sp			X								
Cribroperidinium globatum	X	X	X								
Cribroperidinium hanseni	X										
Cribroperidinium sp.		X									
Ctenidodinium sp.			X								
Cyclonephelium hystrix			X								
Cyclonephelium sp.		X									
Dingodinium tuberosum		X	X								
Dinocyst operculum	X										
Gochteodinia villosa		X									
Gonyaulacoid dinocyst	X										
Gonyaulacysta sp.		X					X				
Hystrichodinium pulchrum	X		X								
Kallosphaeridium sp.		X	X				X				
Sentusidinium sp.	X				X						
Sirmiodinium grossii			X								
Systematophora areolata	X										
Systematophora sp.			X								
MISCELLANEOUS											
Foraminiferal test lining	X	X	X	X							
Micrhystridium spp.	X		X								
Pterospermella sp.	X	X									
Tasmanites sp.		X	X		?						
KEROGEN TYPE PERCENTAGES											
Wood	4	3	2		67		65			0	
Plant fragments	5	2	0		30		**33**			**0**	
Palynomorphs	21	0	11		0		**0**			**0**	
Amorph. organic material	70	95	87		3		**2**			**100**	