Table DR1.

Stage	mid-point age (Ma)	Echinoid secies diversity	Bedrock area (maps with marine sediment outcrop)	Bedrock area (maps with terrestrial/ fluviatile sediment outcrop)	Sea level - m above baseline (Hardenbol et al. 1998)	Named lithostratigraphic units	maps/fm (average unit extent)	map area inferred marine	UK map area	inferred marine area as proportion of UK area	marine area preserved as proportion of original marine area	Marine rock area preserved as proportion of total area
Berriasian	142.85	1	5	9	114	3	2.50	24	546	0.04395604	0.20833333	0.00915751
Valanginian	138.30	2	4	16	95	3	2.00	24	546	0.04395604	0.16666667	0.00732601
Hauterivian	133.20	6	4	20	141	3	1.33	31	546	0.05677656	0.12903226	0.00732601
Barremian	127.50	1	6	22	177	3	3.00	31	546	0.05677656	0.19354839	0.01098901
Aptian	118.50	26	28	7	132	22	3.11	79	546	0.14468864	0.35443038	0.05128205
Albian	105.80	60	51	1	200	23	7.29	117	546	0.21428571	0.43589744	0.09340659
Cenomanian	96.55	78	70	0	236	18	11.67	140	546	0.25641026	0.5	0.12820513
Turonian	91.40	36	73	0	255	6	24.33	358	546	0.65567766	0.20391061	0.13369963
Coniacian	87.55	29	68	0	223	2	34.00	330	546	0.6043956	0.20606061	0.12454212
Santonian	84.65	34	61	0	218	4	30.50	330	546	0.6043956	0.18484848	0.11172161
Campanian	77.05	39	39	0	234	7	13.00	330	546	0.6043956	0.11818182	0.07142857
Maastrichtian	68.05	11	2	0	218	1	2.00	330	546	0.6043956	0.00606061	0.003663
First differenced												
Ber-Val	-4.55	1.00	-1.00	7.00	-18.18	0.00	-0.50					
Val-Hau	-5.10	4.00	0.00	4.00	45.45	0.00	-0.67					
Hau-Bar	-5.70	-5.00	2.00	2.00	36.36	0.00	1.67					
Bar-Apt	-9.00	25.00	22.00	-15.00	-45.45	19.00	0.11					
Apt-Alb	-12.70	34.00	23.00	-6.00	68.18	1.00	4.17					
Alb-Cen	-9.25	18.00	19.00	-1.00	36.36	-5.00	4.38					
Cen-Tur	-5.15	-42.00	3.00	0.00	18.18	-12.00	12.67					
Tur-Con	-3.85	-7.00	-5.00	0.00	-31.82	-4.00	9.67					
Con-San	-2.90	5.00	-7.00	0.00	-4.55	2.00	-3.50					
San-Cam	-7.60	5.00	-22.00	0.00	15.91	3.00	-17.50					
Cam-Maa	-9.00	-28.00	-37.00	0.00	-15.91	-6.00	-11.00					

Table DR2.

Model comparisons using AICc

Model formula	AICc.best			AICc weight	log L	R2 (Nagelkerke)	AR0	AR1	AR2	AR3	
intercept only null mode (TDE~1)	104.701452	5	0	0.03201288	-49		109.47241	104.701452	105.49153	106.997452	
TDE ~ rock	101.279251	1	1	0.17719289	-44	0.531118403	103.273435	102.654233	101.279251	103.237947	
TDE ~ units	100.489822	0	1	0.26294718	-45	0.481349483	104.894746	100.489822	102.034493	102.991913	
TDE ~ sea level	109.074125	9	0	0.00359593	-49	-0.06059846	109.799844	109.074125	110.402883	112.270686	worse than null models greyed out
TDE ~ average unit extent	107.0459	7	0	0.00991367	-48	0.104334564	110.5738	107.0459	107.5121	109.0548	worse than null models greyed out
TDE ~ rock + units	100.115251	0	1	0.31710682	-43	0.599054592	100.115251	101.032013	100.182569	102.136573	single best model orange
TDE ~ rock + sea level	108.501091	8	0	0.00478899	-45	0.422151372	110.11631	109.444494	108.501091	110.496421	worse than null models greyed out
TDE ~ sea level + units	101.114142	1	1 3	0.19244166	-44	0.564250758	101.114142	101.724646	102.822128	104.812379	

Some model details

	AICc.best	AR order	Phi1	rock coefficient	rock p-value	units coefficient	units p-value
TDE ~ rock	101.279251	2	0.6073991	0.7277172	0.0008	NA	NA
TDE~ units	100.489822	1	0.7180978	NA	NA	1.966663	0.0142
TDE~ rock + units	100.115251	0	NA	0.5398222	0.0014	1.3930755	0.0099

All residuals are normally distributed
Residuals from the rock and units models are heteroskedastic
Residuals from the rock+units composite model are homoskedastic
For TDE ~ rock + units: Multiple R-squared: 0.8431, Adjusted R-squared: 0.8083

'rock' = bedrock area
'units' = lithofacies units