Malcolm B. Hart, Pritpal Mangat and Meriel E. FitzPatrick Microfossil evidence for the EECO and MECO events in the Eocene sediments of the Isle of Wight.

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Sea level changes in Whitecliff and Alum Bays, using palaeodepth data from the foraminiferal assemblages present in the London Clay Formation.

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## Larger foraminifera in the Uppermost Lutetian, including Alveolina sp.







The London Clay Fm, in Whitecliff Bay, exposed on the foreshore after removal of beach sands.



Whitecliff Bay, on the eastern coastline of the Isle of Wight is a major section through almost all the Palaeogene. The London Clay Formation is central.



The London Clay Formation in the Alum Bay succession. Access is only in the cliffs as there is no foreshore succession accessible.





Using samples from the cliff and foreshore in Whitecliff Bay we have created a zonation based on benthic foraminifera.



The successions at Whitecliff Bay and Alum Bay can be correlated using foraminifera. The planktonic datum (Wright, 1972, *P.G.A.*) can also be identified using the first appearance of planktonic taxa, marked by the 'D'.

The assemblages of foraminifera are relatively limited, even when all taxa are plotted in a range chart. This led Bowen, in the 1950s, to conclude that an accurate zonation of the London Clay Formation might not be possible.



Using the range chart for the foraminiferal taxa, planktonic:benthonic ratios, alpha diversity, triangular diagrams and other methods of palaeoecological importance (including morphogroup analysis), the potential water depth changes in the succession have been determined. The same approach in the Alum Bay succession has allowed the sea level changes in both to be compared.

The Early Eocene (EECO) Event is, therefore, seen to be a response to a glacioeustatic change.







Using the methods described in previous slide the changes in water depth (probably glacio-eustatic), the sea level curves for Whitecliff and Alum bays can be superimposed (checked against palaeontology and palaeomagnetic data) and confirmed by the position of the planktonic datum.



Curry's palaeogeographical map included a shallow, clear, sea around the Channel Islands that was based on his sampling in 1955 and the earlier work of Dangeard in 1928. Dennis Curry (1966, v. 77, 437-468), in his article on 'problems of correlation in the Anglo-Paris Basin', interpreted the occurrence of this distinctive Middle Eocene assemblage – including species of Alveolina and other 'larger' benthic foraminifera.





This map (from Curry *et al.*, 1970) shows marine Eocene sediments in an embayment NE of Jersey. These are recorded in some of the Jersey cores – but are they in-situ or more modern, reworked sediments?

## **Evidence of Middle Eocene sediments with 'larger' foraminifera**

Whitecliff Bay (Curry, 1966, P.G.A.), where a distinctive assemblage of characteristic Middle Eocene foraminifera is known from the Bracklesham Group.

Curry (Geol. Mag., 1960) records a number of locations from which samples of pale buff/cream, fossiliferous, Middle Eocene limestone were collected during a cruise on MBA Sarsia in 1955.



*Alveolina* Limestone, off-shore Selsey Bill (Mixon Rocks).

Valognes, on the Cotentin Peninsula, where there is a diverse Middle Eocene assemblage in the Calcaire Grossier.

Dangeard (1928) records 'Lutetian' sediments between Jersey/Guernsey and Jersey/France.

In core O-VC18 the foraminifera appear abraded and broken, which is probably indicative of reworking and derivation from *in-situ* Middle Eocene. The age of these sands may be later!



*Alveolina* from the Eocene of England. Adams, C.G., 1962, *Micropaleontology*, 8, 45-54.

- > Fisher's Beds 21 & 22, Brackelsham Bay, Sussex.
- > Mixon Rocks, Selsey Bill, Sussex.
- Fisher Bed XV11, Bracklesham Group, Whitecliff Bay Isle of Wight.

## Adams records 2 species – *Alveolina fusiformis* (in which he also places *A. boscii*) and *Alveolina elongata.*

"The majority of alveolines from Bracklesham and the Isle of Wight are damaged, being either abraded or broken. They show..... The shape of the test of *Alveolina* probably made it particularly susceptible to rolling.... and considerable abrasion.....if burial was delayed owing to slow deposition of sediment. It seems....that these are natural death assemblages, and not reworked....."

In the samples below the peat, east of Jersey, not only the alveolinids are abraded and broken: many bivalves and gastropods are also broken. We have been looking for Holocene/Recent ostracods and foraminifera to confirm the age of the sediments as Eocene or later.

## Microfossil evidence for the EECO and MECO events in the Eocene sediments of the Isle of Wight.



Using samples collected from both the cliff and foreshore exposures in White Cliff Bay, Alum Bay, Selsey Bill, together with some of the 'Jersey Cores' and Dennis Curry's samples from the English Channel, we show that the EECO Event, the Late Lutetian Event and the MECO Event can be identified using benthic foraminifera and the changes inferred from these assemblages.