| Journal of Coastal Research | 14 | 3 | 1168–1169 | Royal Palm Beach, Florida | Summer 1998 |
|---|---|---|---|---|---|

# DISCUSSION

# Discussion of: Johnson, M. E. and Libbey, L. K., 1997. Global Review of Upper Pleistocene (Substage 5e) Rocky Shores: Tectonic Segregation, Substrate Variation and Biological Diversity *Journal of Coastal Research*, 13(2), 297–307.

**Stephen K. Donovan**

Department of Geography and Geology
University of the West Indies
Mona, Kingston 7, Jamaica

The recent review of rocky shorelines of the Pleistocene substage 5e by JOHNSON and LIBBEY (1997) is a welcome contribution to a field that is somewhat understudied. However, although I warmly applaud the initiative of the authors in compiling and interpreting this fascinating database, I do query whether the desire to determine a consistent tectonic classification of such shorelines has not led to the true range of settings becoming partially masked by "shoehorning". This is particularly noticeable to a Caribbean worker like myself, who sees substage 5e rocky shorelines in Barbados, Grand Cayman, Haiti and Jamaica (JOHNSON and LIBBEY, 1997) all being classified together under the broad tectonic setting of "island arcs".

What is an island arc? I choose the following definition from a recent publication, although most physical geology textbooks and dictionaries will say much the same thing; "A group of islands usually with a curving archlike pattern, generally convex towards the open ocean, having a deep trench or trough on the convex side and usually enclosing a deep basin on the concave side" (PARKER, 1997, p.186).

Thus armed with a working definition of an island arc, we are in a position to assess the claims of the various Antillean islands mentioned above. The only volcanically active island arc in the region is in the Lesser Antilles (WADGE, 1994), such as is demonstrated by the ongoing eruptions in Montserrat (WILLIAMS, 1997). Although none of the listed islands falls precisely within the arc *sensu stricto,* Barbados is the closest geographically. It represents the exposed apex of an accretionary prism, the Barbados Ridge (SPEED, 1994), and is entirely sedimentary in origin, but is nevertheless part of the broad island arc environment. However, this is not true of the other three islands. Both Jamaica and Haiti (which constitutes the western end of the island of Hispaniola) originated as part of an earlier island arc system (LEWIS and DRAPER, 1990; MONTGOMERY *et al.,* 1994), but this was a Cretaceous phenomenon and both islands have been volcanically quiescent since the Paleogene. Although both continue to be tectonically active, this is due to their positions adjacent to the North Caribbean Plate Boundary. Similarly, Grand Cayman is a subaerially exposed summit of the Cayman Ridge, which forms the northern margin of the Cayman Trench (JONES, 1994). The Cayman Islands have been the site of limestone deposition since the Oligocene.

In conclusion, JOHNSON and LIBBEY (1997) have classified four Antillean islands, from each of which Pleistocene substage 5e rocky shorelines have been reported, as occurring within an "island arc" tectonic setting. In fact, of these, only Barbados can be regarded as being associated with the active Lesser Antilles island arc. The other three examples lie in tectonically active regions adjacent to the Northern Caribbean Plate boundary. In consequence, it is suggested that "island arc" is an inadequate and erroneous description for these occurrences. Rather, they represent occurrences adjacent to an active plate margin, that between the North American and Caribbean Plates. Thus, they are closer in tectonic setting to the "active continental margin" setting of JOHNSON and LIBBEY (1997), which might constructively be re-named as the "active plate margins" setting to include such examples.

## ACKNOWLEDGMENTS

This comment was written during the period of National Geographic Society grant #5722-96, which is gratefully acknowledged.

## LITERATURE CITED

JOHNSON M.E. and LIBBEY, L.K., 1997. Global review of Upper Pleistocene (substage 5e) rocky shores: Tectonic segregation, substrate variation, and biological diversity. *Journal of Coastal Research,* 13, 297–307.

JONES, B., 1994. The Cayman Islands. *In:* DONOVAN, S.K. and JACKSON, T.A., (eds.), *Caribbean Geology: An Introduction.* Kingston:

University of the West Indies Publishers' Association, pp. 87–109.
LEWIS, J.F. and DRAPER, G., 1990. Geology and tectonic evolution of the northern Caribbean margin. *In:* DENGO, G. and CASE, J.E., (eds.), *The Geology of North America, Volume H. The Caribbean Region.* Boulder: Geological Society of America, pp. 77–140.
MONTGOMERY, H.; PESSAGNO, E.A., JR., and PINDELL, J.L., 1990. A 195 Ma terrane in a 165 Ma sea: Pacific origin of the Caribbean Plate. *GSA Today,* 4(1), 3–6.
PARKER, S.P., (ed.), 1997. *McGraw-Hill Dictionary of Earth Sciences (International Edition).* New York: McGraw-Hill, xii + 468 pp.
SPEED, R.C., 1994. Barbados and the Lesser Antilles Forearc. *In:* DONOVAN, S.K. and JACKSON, T.A., (eds.), *Caribbean Geology: An Introduction.* Kingston: University of the West Indies Publishers' Association, pp. 179–192.
WADGE, G., 1994. The Lesser Antilles. *In:* DONOVAN, S.K., and JACKSON, T.A., (eds.), *Caribbean Geology: An Introduction.* Kingston: University of the West Indies Publishers' Association, pp. 167–177.
WILLIAMS, A.R., 1997. Montserrat: Under the volcano. *National Geographic,* 192(1), 58–75.