

EVIDENCE AND PROBLEMS OF INTERGLACIAL MARINE DEPOSITS IN TASMANIA¹G. VAN DE GEER², E. A. COLHOUN² & A. BOWDEN²**ABSTRACT**

Van de Geer, G., E. A. Colhoun & A. Bowden 1979 Evidence and problems of interglacial marine deposits in Tasmania – *Geol. Mijnbouw* 58: 29-32.

The paper outlines the distribution, height and origin of extensive pre-Holocene marine deposits from various localities in Tasmania. The marine deposits occur up to 20-30 m above present sea-level. The stratigraphic relationships of the deposits are discussed in relation to associated glacial, freshwater, aeolian and slope deposits. ¹⁴C dating of some of these deposits strongly suggests that most of the marine deposits are of Last Interglacial age.

Other Australian studies suggest that the maximum sea level attained in southeastern Australia during the Last Interglacial was 5-10 m. The higher marine levels in Tasmania, inferred to be of Last Interglacial age, suggest that differential tectonic and hydroisostatic deformation may have occurred during the late Quaternary.

INTRODUCTION

The aim of this paper is to outline and discuss some of the problems associated with the interpretation of the evidence related to the distribution, characteristics and age of the interglacial marine deposits which occur extensively on various sectors of the Tasmanian coast (Fig. 1).

DISTRIBUTION

In northwestern Tasmania, Pleistocene marine sediments cover the northern parts of wide embayments south of Smithton and south and west of Montagu, and on Robbins Island. These marine sediments partially overlie Cambrian dolomites and Tertiary limestones.

The extensive marine deposits decline continuously from their apparent upper limit at 20 m to below present sea-level. Meandering tidal channels have locally exposed the deposits which probably form the foundation of the Holocene barrier systems and shallow offshore areas. Numerous low, degraded

beach ridges occur in a number of localities on the Pleistocene marine deposits, indicating that the former alignment of progradational shorelines approximated to the present pattern. The medium to fine marine sands contain a rich, well preserved fauna of molluscs and foraminifera, very similar to those now found in shallow offshore areas. Water bore data (GULLINE, 1959) indicates that there is no apparent stratigraphic break in the sediments which suggests that these sand deposits probably represent a single interglacial marine sequence.

A number of fossil shore platforms covered with well-rounded pebbles and cobbles occur in the Circular Head area. Morphologic and stratigraphic relationships suggest that these relict marine features may be of the same age as the marine sands around and west of Smithton.

Pleistocene marine landforms and sediments are widespread on King Island. Bedrock surfaces at approximately 69 m and a boulder beach deposit at 37 to 46 m on King Island have been tentatively interpreted as evidence for Pleistocene sea-level stands. Fossiliferous marine deposits are widespread below 20 m (JENNINGS, 1959, 1961).

On the central part of the northwest coast, between Circular Head and Port Sorell, some rock benches above 20 m have been interpreted as representing former sea-level stands (EDWARDS, 1941; CHICK, 1971). Marine deposits occur

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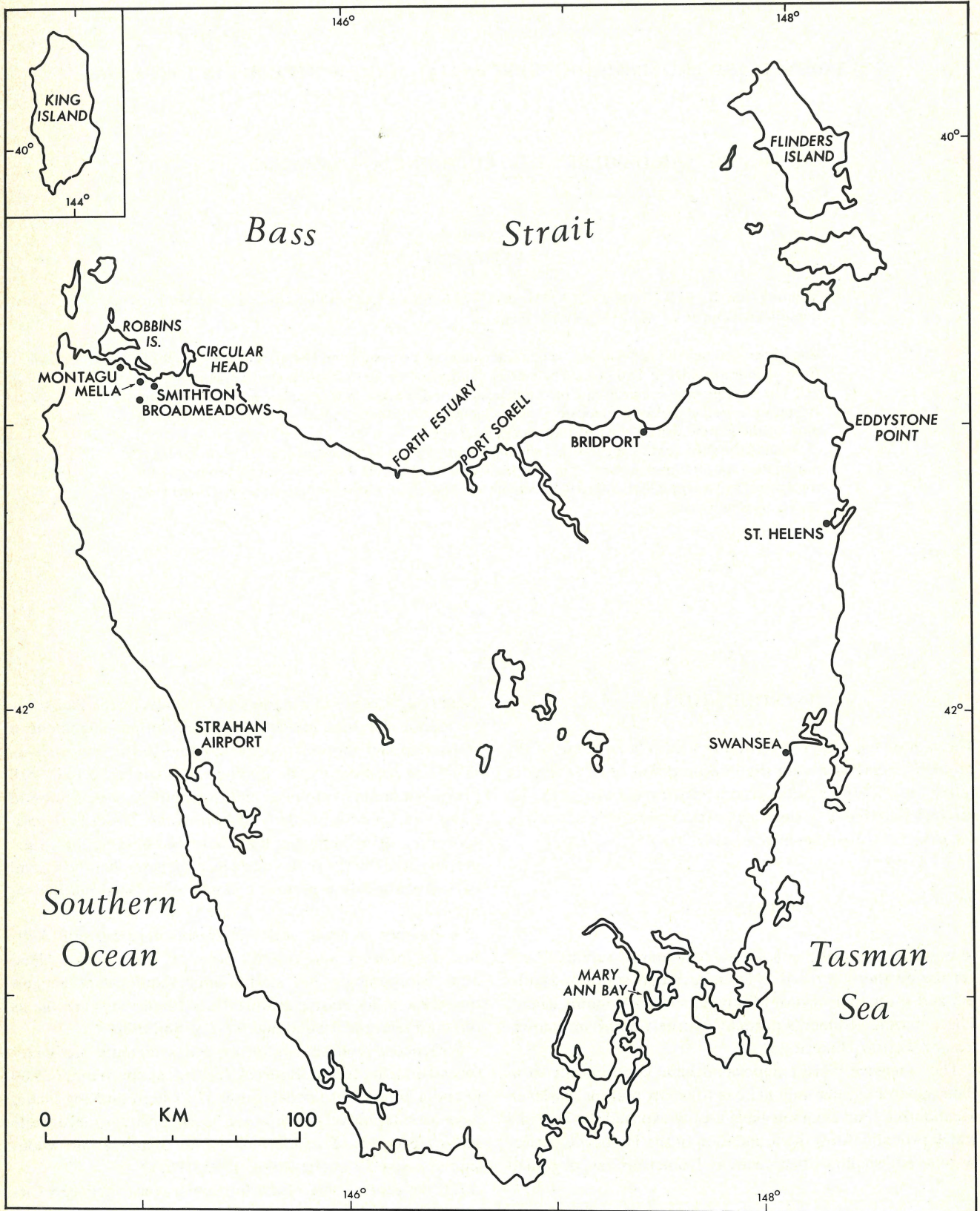


Fig. 1
Localities

at a number of localities and attain a maximum elevation of approximately 22 m. At the mouth of the Forth estuary, marine sands occur at 17 m and glacial outwash gravels have been partly reworked to form large cobble beach ridges (COLHOUN, 1976). Beach deposits, possibly derived from glacial outwash gravels, also occur up to 22 m on the west coast at Strahan Airport (BANKS ET AL., 1977).

In northeastern Tasmania, from Bridport to Eddystone Point, deeply podzolised marine sands containing sponge spicules have been identified up to 30 m and form extensive coastal plains. Although the overall coastal surface generally declines seaward, it is interrupted by the presence of WNW to ESE trending linear terrestrial dunes and lunettes. On Flinders Island, KERSHAW & SUTHERLAND (1972) have interpreted bedrock surfaces between 61 and 77 m, shell carbonate rich deposits at 30 to 37 m and at several levels below 20 m as evidence for a number of stands of sea-level during the Pleistocene.

Elevated remnants of marine and estuarine deposits occur at several localities on the east coast, especially between St. Helens and Swansea. They also occur on the margins of the ria coastline of the southeast. Some of these sediments contain molluscan faunas as at Swansea and Mary Ann Bay where a maximum elevation of 22 m is attained.

The Pleistocene coastal geomorphology of southwestern Tasmania has not been investigated due to its relative inaccessibility.

PROBLEM OF AGE

Except for the possible high levels represented on King and Flinders islands, all pre-Holocene marine deposits known from Tasmania are believed to be of Last Interglacial age. These deposits frequently exhibit deeply podzolised soil profiles which locally have strongly indurated $B_{h(ir)}$ sand-rock horizons. This contrasts strongly with the characteristically immature soil profiles developed in Holocene marine sands.

Indirect evidence which suggests a Last Interglacial age is provided by the relative stratigraphic relationships demonstrated on the northwest coast where at Forth Estuary the marine deposits are reworked from outwash deposits believed to belong to the Penultimate Glaciation (COLHOUN, 1976), and on the west coast where at Strahan the marine deposits may also have been derived from outwash deposits (BANKS ET AL., 1977).

In addition, the marine sands near Mella on the northwest coast are overlain by swamp peats and pollen-rich freshwater shell and algal marl-beds which pass laterally into algal mounds formed by artesian spring waters. The swamp peats have yielded remains of extinct large marsupials (GILL & BANKS, 1956). A number of radiocarbon dates on freshwater peat at Broadmeadows of $11,410 \pm 770$ BP (GaK-5969) and $17,600 \pm_{1430}^{1700}$ BP (GaK-6324), and an assay of $47,500 \pm_{2600}^{2700}$ BP

(GrN-7481) from an *in situ* tree stump situated approximately half way through a sectioned spring mound at Mella demonstrate that the formation of the freshwater deposits commenced before 50,000 BP. The thickness of the freshwater deposits suggests that they began to form by about 100,000 BP which indicates a Last Interglacial age as the youngest age for the Mella marine sands.

During the maximum of the Last Glacial stage, reduction of vegetation contributed to the deflation of unconsolidated sand bodies (COLHOUN, 1975). The prevalent westerly winds led to the formation of extensive dune fields in many coastal areas of western, northern and eastern Tasmania. These terrestrial dunes were largely derived from adjacent marine sands and are particularly well developed in northeastern Tasmania where longitudinal and lunette forms are widespread. Radiocarbon dates on materials associated with terrestrial dunes and aeolian sediments indicate that this phase of aeolian activity occurred between $\sim 22,000$ and $15,000$ BP (SIGLEO & COLHOUN, 1975; Colhoun, Mook & Van de Geer, in prep.).

Thick slope deposits consisting of angular, poorly sorted and poorly stratified materials are a very common feature of many steep coastal slopes. They strongly resemble periglacial head deposits. Radiocarbon dating of similar slope deposits in a number of inland areas has indicated that the bulk are of Last Glacial age.

Thus the morphology, the weathering and soil profile characteristics, the stratigraphic relationships and the radiometric dating of overlying and associated deposits point to a probable Last Interglacial age for all known pre-Holocene interglacial marine sediments in Tasmania.

EXTERNAL RELATIONS

In Southeastern Australia, marine deposits of pre-Holocene age, recorded up to 10 m above the present sea-level, have generally been inferred to be of Last Interglacial or of interstadial age (DAVIES, 1959; THOM, 1965; LANGFORD-SMITH & THOM, 1969; HAILS & HOYT, 1968; GILL & AMIN, 1975; MARSHALL & THOM, 1976). In a comprehensive review, THOM (1973) has concluded that an interstadial sea-level higher than the present one is unlikely to have occurred. GILL & AMIN (1975) have concluded that the 7.5 m and 3 to 4 m marine terraces of the western Victorian coast represent sea-levels of the Last Interglacial stage on the basis of U/Th assays of 125,000 y and $107,920 \pm 10,817$ y. As absolute dating of marine deposits of presumed Last Interglacial age from the temperate waters of Tasmania is not possible at present, no direct age correlation can be achieved with Victoria.

The very much greater heights recorded for Tasmania cannot be explained in terms of synchronous eustatic events but appear to reflect the effects of differential tectonic instability and perhaps hydro-isostatic responses of Tasmania and the Bass Strait island region during late Quaternary times.

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