

peniplains on the top of the Otway Group (BMR 88-302). Large areas of the Otway Group erosion surface are often the result of three or more successive periods of peneplanation (Line WB 82-32, S.Ps 450-750). It is vital to identify the Upper Albian peneplain in order to calculate the maximum topography that may have been caused by that first period of block tilting.

#### 3.4 THE RELATIONSHIP BETWEEN RELATIVE SEA LEVEL CHANGES, DEPOSITION IN NON-MARINE BASINS, AND UNCONFORMITIES

The sedimentary response of marine basins to relative changes in sea level is well documented; that in non-marine basins, less so. In general, sea level lowstands are correlated with periods of greater downcutting by rivers and streams than are highstands. A higher sand-shale ratio can be expected in non-marine sediments deposited during lowstands than highstands. Further, highstands, with their moister, more humid climates, tend to cause large lakes within which finer grained sediments accumulate.

Local changes in sea level are induced by episodes of rifting and drifting. The peneplanation of the topography caused by these periods of tectonism will be accelerated during sea level lowstands. For these reasons, the seismic sequence boundaries within the non-marine sediments of the Bass Basin can be correlated to sea level lowstands of Upper Albian, Upper Cenomanian, Upper Turonian, and Upper Maastrichtian ages, that can, in turn, be dated by periods of Otway and Tasman periods of rift and drift, respectively.

#### 3.5 THE OTWAY DRIFT PHASE (PART 2)

The drifting apart of Australia from Antarctica began in Upper Albian times. The cooling of the lithosphere immediately after the period of Otway rifting caused subsidence within all the sub-basins of the Bass Basin. Each of the three sub-basins within T/15P subsided along major listric faults or collapsed between fault-bounded margins.

The architecture of these sub-basins was fashioned from the tilted half-graben. Drainage would be down the dip slopes into lakes at the base of the foot wall. These lakes would drain, in turn, in the direction of regional dip, which seismic time interval studies show to be in a southerly direction. The central and southern areas of the Boobyalla Sub-Basin subsided and form the depocentre for this sub-basin.

Eustatic sea levels rose from the period of Otway rifting to their maximum height of 250 m above present sea level in the Middle Turonian. Frequent relative sea level lowstands interrupted this inexorable rise. The facies of the sediments deposited within the sub-basins will reflect the duration and magnitude of the highstand and lowstand periods.

An enormous outpouring of volcanics accompanied the subsidence of the sub-basins. The Total Magnetic Intensity map (Fig 3) indicates the extent of this period of volcanism. Volcanic cones and mounds are seen in the vicinity of major faults, and lavas are observed to have flowed down the dip face of half-grabens or collected within the subsiding trough of the central and southern Boobyalla Sub-Basin.

##### 3.5.1 Cenomanian Deposition Within the Durroon Sub-Basin

The seismic sequence between the unconformity on the surface of the Otway Group and the succeeding unconformity is wedge shaped. It is thickest adjacent to the bounding listric fault and shows onlap onto the slowly tilting