



### **0.0.1 OSL dating to establish the framework of the Gulf of Carpentaria over the last 180ka**

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The Gulf of Carpentaria is an epicontinental sea (maximum depth 70 m) bordered to the east by Torres Strait (12 m depth) and to the west by the deeper Arafura Sill (53 m depth), an area sensitive to the Asian monsoon and ENSO, which play a crucial role on a worldwide scale. Throughout the Late Quaternary, during times of sea-level low-stands, the gulf was separated from the open waters of the Indian and Pacific oceans, forming Lake Carpentaria with outlet channels to the Arafura Sea.

In 1997, six sediment cores were collected from the Gulf of Carpentaria, using a giant piston-corer deployed from the *Marion Dufresne*. Sedimentological features and nannofloral information recorded in each core allowed the recognition of eight stratigraphic units within these cores. Twelve OSL dates spanning from  $7 \pm 1$  ka to  $178 \pm 18$  ka were estimated using three sediment cores collected from the Gulf. The usefulness of the OSL Dating technique on such sediment cores covering marine to lacustrine conditions has been demonstrated by establishing a time frame for the changing environments of the Gulf of Carpentaria since MIS 6.6.

The compilation and interpretation of these data enables the development of a detailed spatial and temporal understanding of the palaeoenvironmental history of the Gulf of Carpentaria. Our results establish the timing of the discrete closure and breach sequences of the Arafura Sill and Torres Strait as related to Quaternary sea level fluctuations, and the corresponding alternations between the Gulf and Lake Carpentaria.

Furthermore, from the sedimentary record of the Gulf evidence of dry and wetter

episodes are observed and interpreted as intensification of the monsoon and/or cyclonic activity. These may be linked to ENSO events and global oceanic and atmospheric processes.