



The Physical Oceanography of Australia's Sunshine Coast

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Australia's Sunshine coast is located to the south of the Great Barrier Reef and Fraser Island between about 25°S to 28°S. With a width of nearly 70-80 km, the eastern Australian continental shelf is at its widest here. The shelf region is referred to as the Southeast Queensland Marine Coastal Zone due to its unique physical oceanographic characteristics. The most prominent large-scale oceanic feature is the southward flowing East Australian Current (EAC). It forms to the north of Fraser Island from Coral Sea outflows, intensifies, and follows the continental shelf as a swift continental shelf hugging current but variable in strength; stronger in the southern hemisphere summer and weaker in winter. Little attention has been paid to the physical oceanography of this region, although important physical processes take place that drive regional marine environmental conditions, drive cross-shelf exchanges and interactions with the EAC, and that represent marine connectivity processes significant to the larger scale eastern Australian fisheries. This presentation reviews recent discoveries that include the Southeast Fraser Island Upwelling System, the Fraser Island Gyre, and document the role of cyclonic mesoscale eddies in driving cross-shelf exchanges and contribute to the formation of the Fraser Island Gyre. The Southeast Fraser Island Upwelling System appears to be predominately driven by the interaction of the EAC with the continental shelf leading to the establishment of one of eight important marine ecological hotspots along the east Australian coast. The Fraser Island Gyre is most prominent during the southern hemisphere autumn and winter months. It is characterised by on-shelf northerly flow, turning eastward south of Fraser Island before joining the EAC. It emerges that cyclonic eddy formation as well as the south-easterly trade winds drive the gyre's establishment and strength. A census of short-lived (7-28 days) cyclonic eddies, the first for any western boundary current region, found that the Southeast Queensland Marine Coastal Zone appears to be characterised by the highest number of eddies found along the east Australian Coast. About 43% of all eddies or about 4-5 per year were detected and tracked in this region. All these recent discoveries were made possible by analysing data provided via Australia's Integrated Marine Observing System (IMOS). A future effort is to be made to obtain additional in-situ data in order to support these new findings.