# IMPACT OF CLIMATE VARIABILITY ON THE CIRCULATION OF AN EAST-AUSTRALIAN BAY

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The climate along the subtropical east coast of Australia is changing significantly. Rainfall has decreased about by 50 mm per decade and temperature increased by about 0.1 °C per decade during the last fifty years. These changes are likely to impact upon episodes of hypersalinity and the persistence of inverse circulations which are often characteristic features of the coastal zone in the subtropics. These conditions are controlled by the balance between evaporation, precipitation and freshwater discharge. In this study, we use observations and results from an ocean model to investigate the circulation pattern and water renewal of Hervey Bay, a subtropical bay off the central east coast of Australia. The investigation of this shallow coastal environment (mean depth 15 m) showed how current climate trends have impacted upon the physical characteristics of the bay. The observed hypersalinity zone and inverse circulation, which are climatological features, are caused by the high evaporation rate, solar heat fluxes and the water renewal timescales of the bay. The region therefore acts as an effective source for an accumulation of salt. Over the last two decades the outflow of this salt has increased by about 25 % in direct consequence of recent climate trends. Further the manifestation of this salt export, in form of gravity currents, has also increased in frequency and strength. With the help of Lagrangian particle techniques, we could track these plumes on their way along/down the continental shelf to depths up to 220 m, to form a „Hervey Bay“ water mass. These outflow events, when integrated over the time they occur, have a volume comparable to the volume of the bay and have broad implications for the local biology, sediment dynamics but also for pollutant transport. The study further indicates that hypersalinity conditions are more persistent and reversal of these conditions is less frequent in the last decade due to the reduced supply of freshwater.