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Heat balances and thermally-driven lagoon-ocean exchanges on a tropical coral reef system (Moorea, French Polynesia)

The role of surface and advective heat-fluxes on buoyancy driven circulation was examined within a tropical coral reef system. Measurements of local meteorological conditions as well as water temperature and velocity were made at six lagoon locations for two months during the austral summer. We found that temperature rather than salinity dominated buoyancy in this system. The data were used to calculate diurnally phase-averaged thermal balances. A one-dimensional momentum balance developed for a portion of the lagoon indicates that the diurnal heating pattern and consistent spatial gradients in surface heat fluxes creates a baroclinic pressure gradient that is dynamically important in driving the observed circulation. The baroclinic and barotropic pressure gradients make up 90