Physical Oceanography of Cook Strait

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Cook Strait affords the only direct communication between the differing oceanographic environments of the east and west coasts of New Zealand. The hydrological pattern is complex and the limited observations available permit only a generalized view to be presented. Some localized measurements over brief periods give an indication of this complexity. The interaction of the eastern and western hydrological regimes is at present best shown by the surface temperament/salinity distribution patterns. The average summer temperatures range from 64 deg. F. in the north-west to 59 deg. F. in the south-east and a well marked temperature discontinuity is generally found in the narrows. The average winter temperatures are 54 deg. F. in the north-west and 49 deg. F. in the south-east. The surface salinities follow the same pattern. If the discontinuity be interpreted as the boundary between waters of western and eastern affinities, its fluctuations are an index to the short term and seasonal variations in the interacting boundary zone between the two water types.

Indirect measurements of water movement in the southern Strait and the pattern of drift card recoveries indicate a nett movement south-east through the Strait along the northern shore. A possible equivalent northward nett flow along the southern coast is supported by only a portion of the available data.

The tidal currents are of an order greater than any suspected circulatory current. The range and phase varies in complex fashion over the Strait. Between Makara and Wellington a difference in phase of up to 5 hours has been observed and this apparently varies with the age of the moon.

While the broad pattern of distribution of water type remains reasonably constant the day to day pattern of total surface water movements varies continuously. Flow in the Strait is essentially turbulent and the surface water movements in the narrows persist to near the bottom without radical change in velocity.

Plankton

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By and large the planktonic population of one water mass will differ from that of another either in the species present or in the composition of the population. Where several water masses are mixing the planktonic organisms collected at a point in the mixture will depend on which water masses are contributing towards the environment at that point. The relative abundance of the several populations may well be indicative of the proportions of the respective contributions and of the length of time since these were made.

The water in Cook Strait may be assumed to be a mixture of waters. The chief components probably are of subtropical and subantarctic origin. Water which enters the Strait from the Tasman Sea may differ from either of these. An extension of the East Cape Current, which reaches and is deflected into eastern Cook Strait at times, shows qualities indicating a tropical origin. Upwelling in and near the Straits may add yet another, different water.

Some, or all, of these waters could be present at one time. Each may introduce a