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# The Oceanographic Research in the Southern Region of the Hawaiian Islands—VI

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## Abstract

The oceanographic observations were carried out in the southern region of the Hawaiian Islands in May, 1983. The general features of the water masses are described by the temperature-salinity curves at each stations obtained in oceanographic survey. The salinity maximum water is found at a depth of about 150 m and the salinity minimum at a depth of about 400 m-500 m. The temperature-salinity curves indicates the Eastern North Pacific Central Water.

## 1. Introduction

Since 1977, the Keiten Maru (G. T. 860 ton) of Kagoshima University occupied the oceanographic researches in connection with the tuna-fishing condition in the southern region of the Hawaiian Islands. The oceanographic observations were carried out in the region along 20° N between 165° W and 167°-30' W in May, 9th-19th, 1983. In this report, the oceanographic information described by using data obtained the records of S. T. D. measurement. The observation stations are shown in Fig. 1. The depth-temperature-salinity data at each station are tabulated in Table 1.

## 2. Results and Discussion

The representative temperature-salinity curves are shown in Fig. 2. The Eastern North Pacific Central Water and the Pacific Equatorial Water defined by Sverdrup et al. (1942) are indicated by dotted bands. The surface water is a depth of about 50 m and the numerical values of the temperature and the salinity are about 25.0°C and 34.80 ‰, respectively. The water of the salinity maximum is found at a depth of about 150 m and the salinity minimum at a depth of about 400 m-500 m; the former corresponds to the subsurface saline water and the latter to the subarctic intermediate water.

The subsurface saline water found in the northeast region of the Hawaiian Islands around 29°N, 148°W (1977, Henmi) spreads to the south and enters this region.

The mean values of the temperature and the salinity of the subsurface saline water are about 21.2°C and 34.24 ‰, respectively. On the other hand, the subarctic intermediate water of low salinity sinks at the subarctic convergence and extends toward

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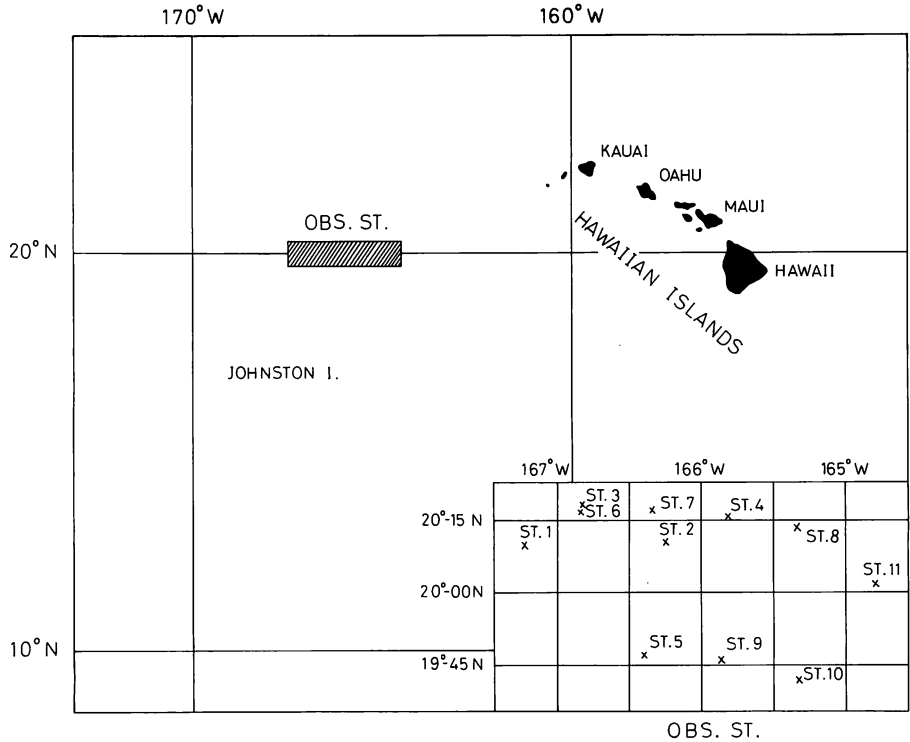


Fig. 1. Map showing the oceanographic stations of S. T. D. observation in the southwestern region of the Hawaiian Islands

the south, which has been mixed with waters of the tropical region. The mean values of the temperature and the salinity of this water are about 8.1°C and 34.14‰, respectively.

The values of the salinity maximum and minimum are almost the same to that of the EC-water and EI-water (1981, Yuwaki and Henmi). The temperature-salinity curves have a quite similar form to the first group in the southern region of the Hawaiian Islands, where the North Equatorial Current flows. (1981, Yuwaki and Henmi) The water between 200 m-300 m is a mixture of the EC-water and the EI-water. The temperature-salinity curves below at a depth of about 250 m coincide with that of the Eastern North Pacific Central Water.

### 3. Conclusions

The oceanographic research in the southwestern region of the Hawaiian Islands was carried out in May, 1983. The water mass consist of the surface water, the subsurface

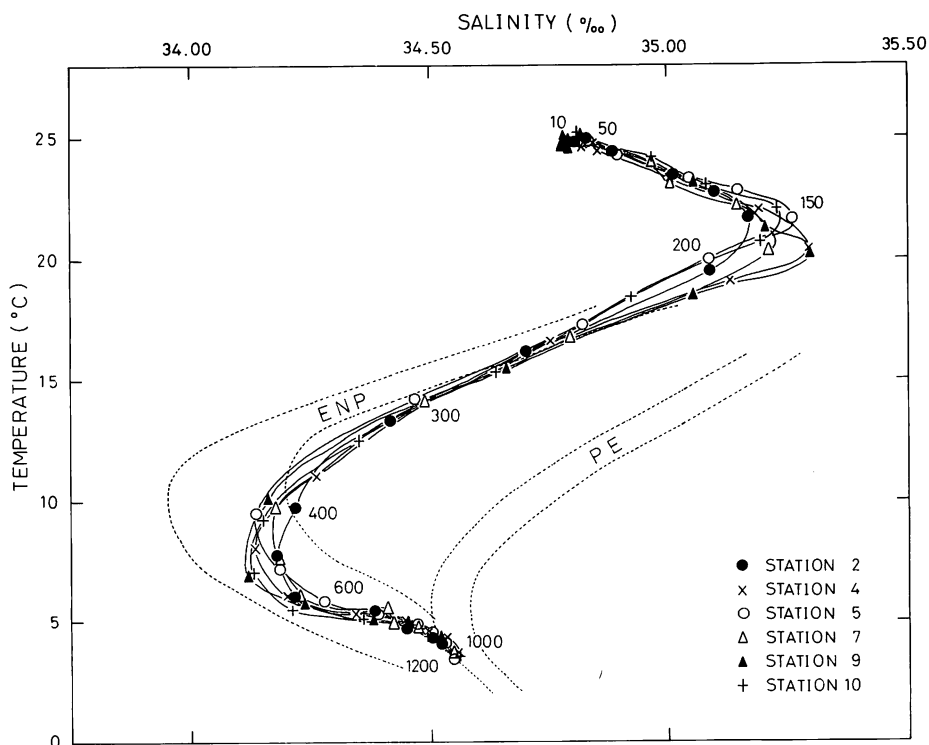


Fig. 2. The representative temperature-salinity curves in the southwestern region of the Hawaiian Islands. Observing depth are entered. (m) E.N.P. Eastern North Pacific Central Water. P.E., Pacific Equatorial Water.

saline water and the subarctic intermediate water. The temperature-salinity curves have an inverted form of the letter 'S' characterized by a salinity maximum at a depth of about 150 m and a salinity minimum at a depth of about 400 m-500 m. The water below at a depth of about 250 m coincide with the Eastern North Pacific Central Water.

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Table 1. The depth-temperature-salinity data at each stations.

Depth	Station 1 Lat. 20°-10'1N Long. 167°-12'8W May 9, 1983		Station 2 Lat. 20°-10'8N Long. 166°-14'2W May 10, 1983		Station 3 Lat. 20°-18'4N Long. 166°-49'6W May 11, 1983	
	Temp. (°C)	Salinity (‰)	Temp. (°C)	Salinity (‰)	Temp. (°C)	Salinity (‰)
0	25.34	34.760	25.07	34.836	25.14	34.789
10	25.33	34.760	25.06	34.838	25.13	34.795
20	25.33	34.759	25.06	34.838	25.13	34.794
30	25.33	34.762	25.04	34.833	25.13	34.795
50	24.79	34.903	24.86	34.820	25.13	34.798
75	23.72	35.145	24.48	34.893	24.94	34.811
100	22.00	35.195	23.55	35.017	24.13	34.919
125	21.33	35.324	22.75	35.104	23.39	35.082
150	20.61	35.261	21.71	35.172	22.40	35.172
200	17.81	34.910	19.54	35.094	19.22	34.973
250	14.29	34.499	16.24	34.703	15.40	34.561
300	12.25	34.327	13.28	34.417	12.87	34.366
400	9.20	34.185	9.66	34.217	9.61	34.187
500	7.13	34.119	7.68	34.178	7.66	34.254
600	5.80	34.229	6.04	34.214	5.99	34.216
700	5.26	34.378	5.37	34.385	5.45	34.399
800	4.90	34.457	4.70	34.452	4.81	34.474
900	4.48	34.493	4.28	34.504	4.40	34.501
1000	4.08	34.529	4.02	34.522	4.04	34.522
1200	3.49	34.558	—	—	3.51	34.552

Depth	Station 4 Lat. 20°-16'0N Long. 165°-48'6W May 12, 1983		Station 5 Lat. 19°-47'3N Long. 166°-22'9W May 13, 1983		Station 6 Lat. 20°-17'3N Long. 166°-50'0W May 14, 1983	
	Temp. (°C)	Salinity (‰)	Temp. (°C)	Salinity (‰)	Temp. (°C)	Salinity (‰)
0	24.78	34.841	24.93	34.834	25.28	34.790
10	24.79	34.842	24.93	34.836	25.27	34.793
20	24.79	34.843	24.92	34.836	25.27	34.796
30	24.79	34.845	24.91	34.834	25.27	34.799
50	24.63	34.820	24.77	34.829	25.18	34.789
75	24.60	34.819	24.26	34.902	24.72	34.846
100	24.44	34.855	23.34	35.043	23.70	34.924
125	23.35	35.074	22.78	35.152	22.44	35.161
150	21.99	35.194	21.75	35.269	21.01	35.195
200	20.36	35.297	20.05	35.092	18.70	34.808
250	19.14	35.134	17.28	34.825	16.49	34.737
300	16.57	34.755	14.19	34.470	13.58	34.419
400	10.99	34.256	9.46	34.136	8.89	34.166
500	8.04	34.133	7.20	34.185	7.21	34.239
600	6.00	34.196	5.84	34.276	5.78	34.260
700	5.20	34.339	5.27	34.392	5.35	34.356
800	4.89	34.443	4.78	34.470	5.02	34.444
900	4.51	34.491	4.44	34.505	4.59	34.483
1000	4.15	34.532	4.11	34.528	4.12	34.519
1200	3.62	34.554	3.52	34.555	3.55	34.551

Depth	Station 7 Lat. 20°-17'7N Long. 166°-19'7W May 15, 1983		Station 8 Lat. 20°-14'4N Long. 165°-20'0W May 16, 1983		Station 9 Lat. 19°-46'2N Long. 165°-51'5W May 17, 1983	
	Temp. (°C)	Salinity (‰)	Temp. (°C)	Salinity (‰)	Temp. (°C)	Salinity (‰)
0	25.07	34.831	25.15	34.829	25.12	34.816
10	25.05	34.831	25.07	34.818	25.06	34.820
20	25.04	34.833	24.92	34.822	24.94	34.789
30	25.01	34.834	24.91	34.824	24.84	34.798
50	24.97	34.832	24.82	34.811	24.75	34.790
75	24.78	34.815	24.62	34.813	24.62	34.784
100	23.85	34.974	23.78	34.969	24.55	34.795
125	23.13	35.095	22.52	35.124	23.17	35.057
150	22.08	35.149	21.54	35.311	21.18	35.210
200	20.19	35.215	19.30	35.071	20.21	35.303
250	16.85	34.800	16.02	34.678	18.43	35.059
300	14.02	34.491	13.37	34.420	15.38	34.663
400	9.72	34.174	10.09	34.208	10.05	34.160
500	7.62	34.184	7.11	34.106	6.93	34.118
600	6.05	34.226	5.76	34.179	5.68	34.236
700	5.45	34.361	5.03	34.300	5.05	34.382
800	4.94	34.422	4.70	34.414	4.78	34.449
900	4.64	34.473	4.48	34.486	4.44	34.496
1000	4.30	34.503	4.04	34.514	4.11	34.523
1200	3.64	34.540	3.48	34.550	3.56	34.551

Depth	Station 10 Lat. 19°-42'1N Long. 165°-18'2W May 18, 1983		Station 11 Lat. 20°-02'1N Long. 164°-46'8W May 19, 1983	
	Temp. (°C)	Salinity (‰)	Temp. (°C)	Salinity (‰)
0	25.23	34.818	25.11	35.050
10	25.20	34.820	25.11	35.048
20	25.15	34.817	24.65	35.021
30	24.97	34.829	24.17	35.079
50	24.78	34.820	22.85	35.159
75	24.06	34.971	21.29	35.192
100	23.01	35.087	20.35	35.199
125	22.01	35.232	19.80	35.185
150	20.68	35.197	18.42	34.690
200	18.35	34.926	14.11	34.507
250	15.29	34.639	11.40	34.259
300	12.45	34.351	9.92	34.179
400	9.16	34.146	7.54	34.122
500	7.05	34.128	6.07	34.204
600	5.43	34.207	5.35	34.295
700	4.87	34.355	4.83	34.413
800	4.56	34.465	4.51	34.485
900	4.29	34.494	4.17	34.513
1000	3.95	34.525	3.86	34.533
1200	3.46	34.556	3.36	34.561