CONTRIBUTION ON THE VARIATION OF ALKALINITY IN THE SOUTH EASTERN BLACK SEA

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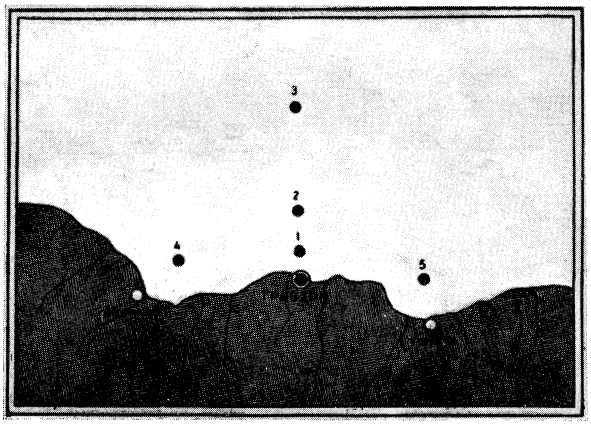
ABSTRACT

In this paper, the variation of alkalinity values of the south eastern black Sea waters have been studied during the research period in 1954-1956. The reasons of the variations have been explained and a correlation between alkalinity and chlorinity values of the water has been obtained.

It is known that there is only one research about the black Sea alkalinity that made by DOBRJANSKII (1930) during october-november. In that paper the vertical structure of the black Sea alkalinity was given during the period of research.



MAP 1. — *The locations of the research stations at the south eastern black Sea.*

Generally, the alkalinity and the specific alkalinity values of sea water shows that whether or not there is a deflection from the characters of normal ocean water. Alkalinity and specific alkalinity values of sea water also have an importance for living organisms.

In this investigation, alkalinity value of sea water is determined by WATTENBERG's method (1933). Alkalinity determinations in the south eastern black Sea were made consecutively each month, in various position during the year 1954-1956. And so, the vertical structure of the alkalinity was studied. The stations taken during this research are shown in map I.

Obtained minimum and maximum values of alkalinity and differences between them at various depths during the year of 1955 and 1956 are shown separately in table 1. The variations of the

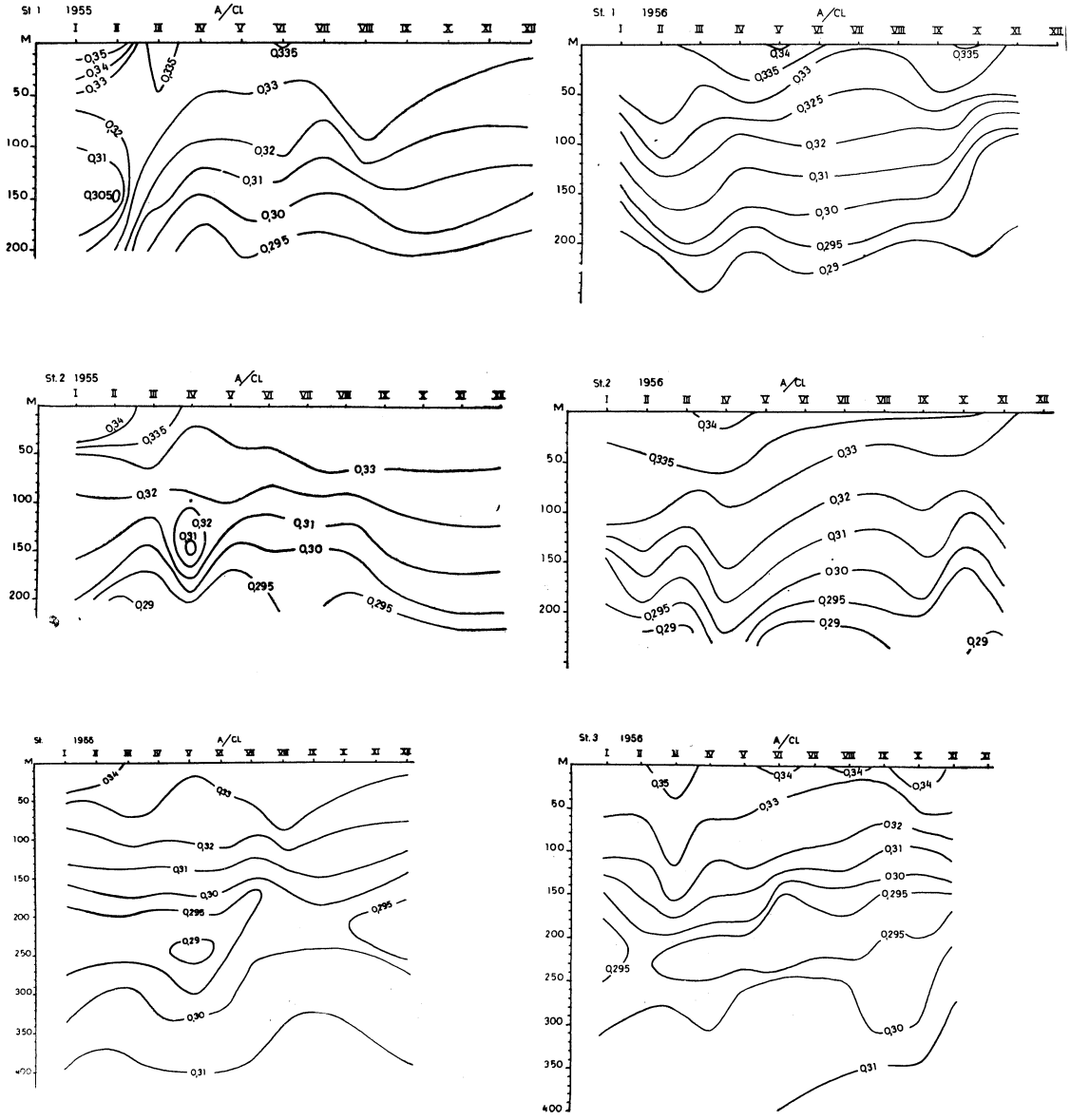


FIG. 1. — *The variations of the specific alkalinity structures in the research stations during* 1955 *and* 1956.

specific alkalinity structures in the research stations during 1955 and 1956 are also shown in figure 1. According to the results, the alkalinity and specific alkalinity values of the black Sea waters show differences in the various positions. As a result of these different states, different

amounts of carbondioxide are brought about in various positions in the sea. The mixing of the sea waters is increased with the diffusions of differently dissolved gases in various positions.

Depth m	1955				1956			
	Min.	Mean	Max.	Diff.	Min.	Mean	Max.	Diff.
0	3,262	3.350	3.497	0,235	3.140	3.296	3.397	0.257
30	3.265	3.363	3.417	0.152	3.230	3.322	3.400	0.170
50	3.327	3.678	3.822	0.495	3.272	3.335	3.435	0.163
100	3.327	3.365	3.427	0.100	3.280	3.332	3.370	0.090
150	3.312	3.367	3.425	0.113	3.282	3.342	3.390	0.108
200	3.322	3.429	3.892	0.570	3.335	3.371	3.462	0.127
250	3.400	3.473	3.547	0.147	3.425	3.489	3.550	0.125
300	3.525	3.550	3.622	0.097	3.545	3.574	3.622	0.077
350	3.605	3.658	3.725	0.120	3.602	3.670	3.757	0.155
400	3.720	3.750	3.816	0.096	3.367	3.658	3.772	0.405

TABLE 1. — *Obtained mean, minimum and maximum values of alkalinity and differences between them at various depths in the sonth eastern black Sea during the years* 1955 *and* 1956.

Depth m	1955				1956				
	Min.	Mean	Max.	Diff.	Min.	Mean	Max.	Diff.	Mean value of 1955 and 1956
0	0.332	0.336	0.354	0.022	0.321	0.331	0.344	0.023	0.334
30	0.330	0.334	0.334	0.010	0.321	0.328	0.339	0.018	0.331
50	0.328	0.330	0.368	0.040	0.321	0.330	0.338	0.017	0.330
100	0.315	0.321	0.330	0.015	0.286	0.309	0.336	0.050	0.315
150	0.297	0,304	0.333	0.036	0.293	0.305	0.323	0.030	0.305
200	0.332	0.295	0.289	0.043	0.288	0.298	0.306	0.018	0.297
250	0.292	0.295	0.300	0.008	0.295	0.293	0.300	0.005	0.294
300	0.295	0.300	0.305	0.010	0.297	0.299	0.304	0.007	0.300
350	0.301	0,305	0.311	0.010	0.300	0.303	0.304	0.004	0.304
400	0.310	0.311	0.317	0.007	0.291	0.307	0.313	0.022	0.309

TABLE 2. — *Obtained mean, minimum and maximum values of specific alkalinity (A/Cl) and differences between them at various depths, in the south eastern black Sea during the years* 1955 *and* 1956.

On the other hand, different amounts of carbondioxide correspond to the different photosynthesis and so bring about different phytoplankton productions in various positions of the sea.

The vertical mean values of the specific alkalinities at different depths, during the years of 1955 and 1956 are shown in table 2. Vertical variations of specific alkalinity differences between minimum and maximum values in different depths are shown monthly in figure 2. As it is seen that, specific alkalinity is changed mostly above the 250 meters. More or less, existing of an inverse correlation in great depths are observed. This result shows more or less existing probability of a viscid vertical circulation in the black Sea. The vertical variation of the specific alkalinity from surface to 1200 meters in shown in table 3. These results observed by means of the research ship « Calypso » during its research period in 1955 (+). This is another indicator, the

Depth m	Specific alkalinity (A/Cl)
0	0.339
50	0.323
100	0.317
250	0.301
500	0.325
1000	0.352
1200	0.361

TABLE 3. — *Vertical variation of specific alkalinity (A/Cl) at station* 46. These samples were taken by the author in research ship « Calypso» during its research period in 1955.

existing of hydrogen sulphure at different depths during the summer and winter. On the other hand, the specific alkalinity values of the south eastern black Sea water shows differences than obtained values in northern coast of the black Sea. According to the results, specific alkalinity values of the south eastern black Sea are 2.5-2.8 times more than the approximately constant value of 0.123. The area in northern coast of the black Sea where the stream and river flow into the sea, specific alkalinity reaches a high value (DOBRJANSKII 1930). It is seen that, according to the results of 1955 and 1956, yearly variation of specific alkalinity increases at the end of summer. Its reason those that the decreasing of density at near of surface and the changing of wind direction from its main direction in the yearly period. The relation between specific alkalinity (A/Cl) and chlorinity, according to the results of 1955 in the south eastern black

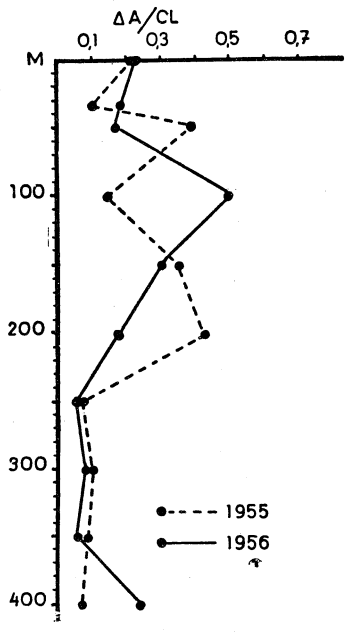


FIG. 2. — *Vertical variations of specific alkalinity differences between minimum and maximum values, in different depths.*

Sea is shown in figure 3. This relation has been obtained by 201 results of alkalinity determinations. The relation, with the same way by 243 alkalinity results has been obtained for the year 1956 (fig. 4). It is clearly seen that the curve of 1955 likes the curve of 1956. The last relation as a result of 1955 and 1956 by 444 results of alkalinity determination has been obtained and it is shown in figure 5. According to the figure 5, the specific alkalinity value decreases with the

increasing of chlorinity until the chlorinity value of ‰ 11.7. After this value, specific alkalinity increases with the increasing of chlorinity. The chlorinity value of ‰ 11.7 is a critical value

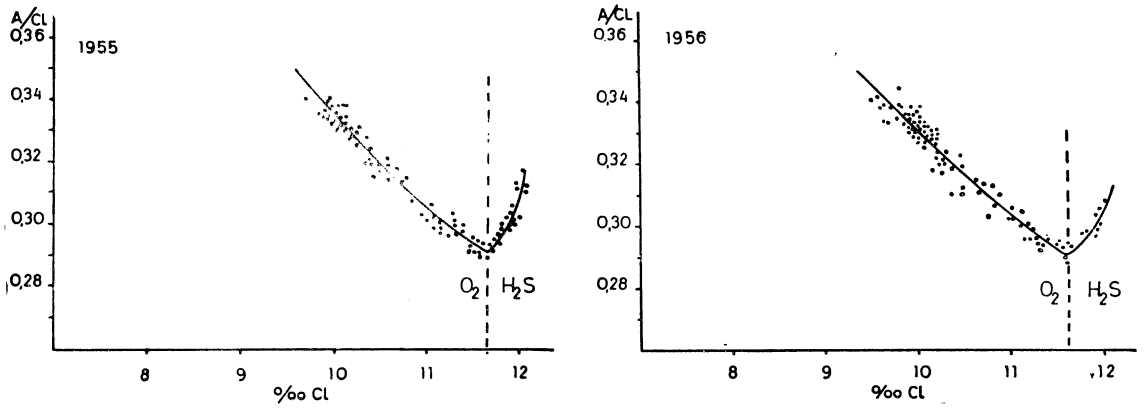


FIG. 3 and 4. — *The relation between specific alkalinity (A/Cl) and chlorinity ‰ :* left, *base on* 201 *results of alkalinity determinations in* 1955 ; right, *base on* 243 *results of alkalinity determinations in* 1956.

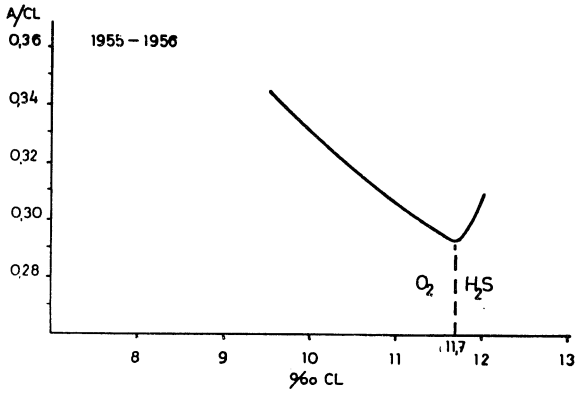


FIG. 5. — *The relation between specific alkalinity (A/Cl) and chlorinity base on* 444 *alkalinity results in* 1955 *and* 1956.

for the black Sea. Because, the chlorinity of ‰ 11.7 is a border between the anearob and aerob depths, that is, above the value of ‰ 11.7, hydrogen sulphide is exist in the Black Sea.

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