International Council for the Exploration of the Sea

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Hydrography Committee

Water Temperature and Salinity of the Southern Baltic in the period August 1967 - May 1968

By
Jan Piechura *

As in the previous years the Maritime Department of the National Institute for Hydrology and Meteorology at Gdynia conducted in the above mentioned period seasonal investigations in the area of the Southern Baltic. The positions of the hydrographical stations are given in Fig. 1. The research cruises took place in the following periods: 3-13 August, 1967; 27 October - 2 November, 1967; 10-16 February, 1968; 10-16 May, 1968.

The characteristics of the temperature and the salinity of the waters are found on the basis of the results of measurement performed at 6 hydrological stations of the following coordinates:

No. of stations	Area	Geographical coordinates	
		Latitude	Longitude
P_{28}	Gotland Deep	55°47'N	18°37'E
P_1	Deep of Gdańsk	54°50'N	19°20'E
P_3	Furrow of Słupsk	55°14'N	17°03'E
P_5	Deep of Bornholm	55°18'N	15°58'E
P_6	Gate of Bornholm	55°21'N	14°32'E
P_7	Deep of Arkona	55°02'N	14°01.5'E

The results of the measurements of water temperature and salinity are shown on Figs. 2 and 3 as the functions T (H) and S (H).

* Panstwowy Instytut Hydrologiczno-Meteorologiczny, Zaklad Oceanografii, Gdynia

Water temperature

In August, 1967, the temperature of the surface water in the region of the Southern Baltic was exceptionally high, average 18-19°C. A lower temperature was noted only in the Bay of Hanö and in the vicinity of the Isle of Oland. In the cross section from Briusterort to Kapelludden the temperature of the surface water decreased from about 21.3°C in the south to about 16.7°C in the north. The measurements in this section were carried out during a spell of calm and cloudless weather, which caused the high water temperatures on the surface and the lack of a distinct thermocline; the temperature decreased rather uniformly from the surface to a depth of about 40 m. The homogeneous near-surface layer did almost not exist. The measurements on the other cross section however were carried out after a storm during which the wind and the waves mixed up the water layers to a depth of about 15-20 m. The thermocline appeared mainly in the layer from 20 to 30 m. Beneath, mostly at a depth of about 50-60 m, appeared a layer of the lowest temperature. The values measured here amounted most frequently to about 3-4°C. Higher values were noted at the Deep of Bornholm (4.0-4.5°C) and the Deep of Arkona (above 6°C). At the end of October, 1967, the temperatures of the surface water were differentiated, changing from about 6.5 to 12.6°C. The warmest waters (>12°C) were observed in the region of the Gulf of Gdańsk, the coldest (<7°C) in the vicinity of the Isle of Oland and in the Bay of Hanö. The most frequent values were found in the limits between 10-12°C. The vertical distribution of the temperature in the upper layer was different in the different areas of the Baltic Sea. In some regions (for instance the Gulf of Gdańsk, the Basin of Bornholm) the thermal compensation reached to a depth of 40-50 m, in others (the Furrow of Bornholm, the Furrow of Słupsk) to a depth of 20-30 m, and in the Deep of Arkona the temperature increased in the whole layer from the surface to the bottom. The thermocline appeared mostly at a depth of 40-60 m, but the vertical temperature gradients were smaller than in August. The layer of the temperature minimum, at the average about 4-6°C, appeared mostly at a depth of 50-70 m. In February, the surface waters were already cooled off to the temperature of maximum density or slightly less. The mean temperature of these waters amounted to 1.9-2.4°C and was equalized to a depth of 40-50 m, and on the Deep of Gdańsk even to 70 m.

In the period from February to April the temperature of the surface water did not change much.

In April, the temperature was about 2.2-2.5°C in the layer from zero to 30-40 m, and in the Deep of Gdańsk even to 50 m. The occurrence of a layer of temperature minimum - at a depth of about 40-50 m, values in the limits of 1.5-2.5°C were measured - certifies however that, in the meantime, the temperature decreased, and, later on, increased.

In May, the temperature of the surface waters amounted to about 6-8°C, and the thermal compensation reached to a depth of 10-20 m. In the layer of 10-20 or 20-30 m, a thermocline in process of formation was observed. Lower, at a depth of 30-70 m, minimum temperature values of about 2-3°C were measured. In the deep layers the changes of temperature were very insignificant. In the Deep of Bornholm, the temperature of the water near the bottom amounted to about 4.8 to 6.0°C. In the Furrow of Bornholm and in the Deep of Arkona however, on account of the lesser depth of those regions, the temperature of the water near the bottom changed considerably.

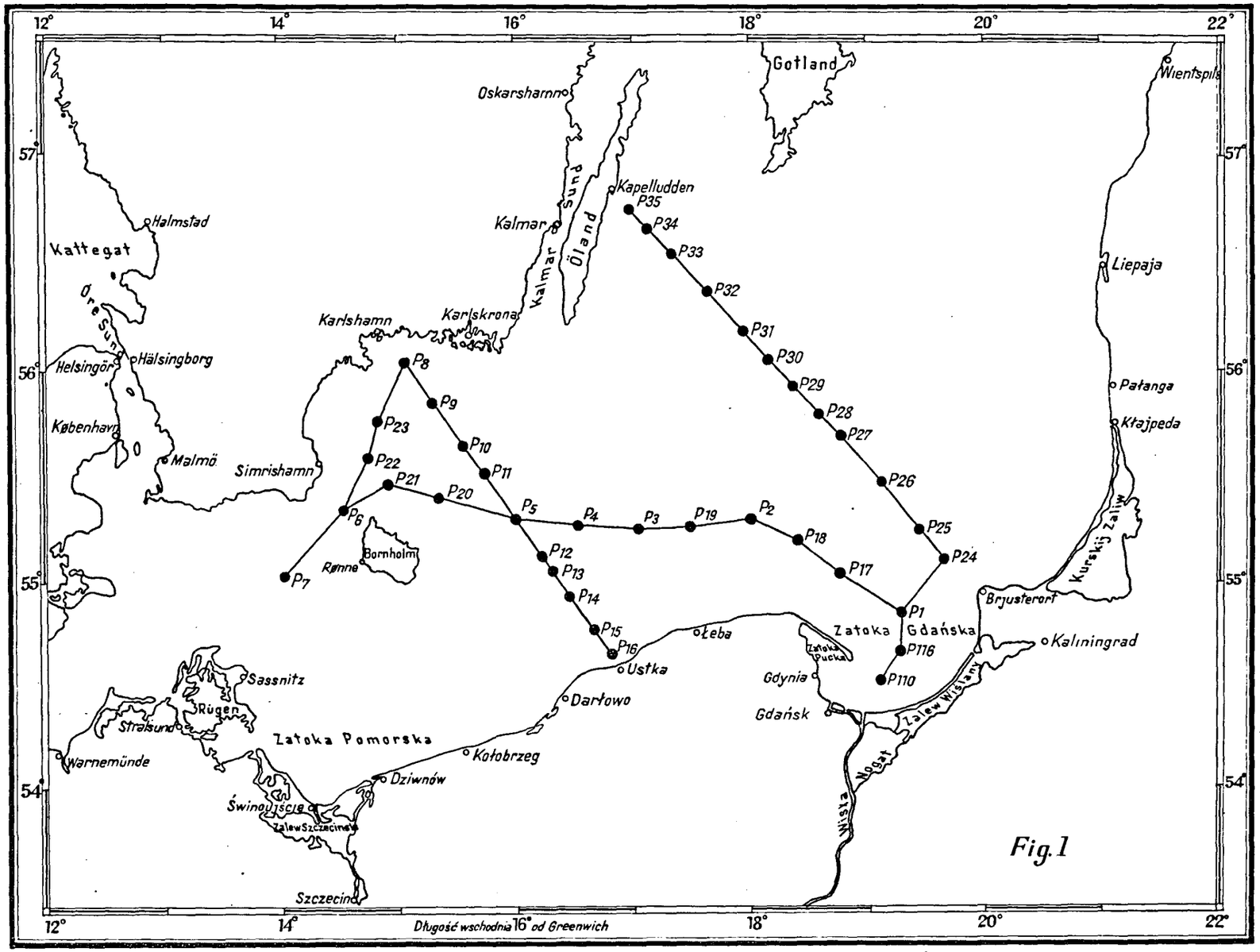
In August and in October, values in the limits of 8-12°C were measured here, while in the period of February-May, the temperature of the waters near the bottom amounted hardly to about 2°C.

Salinity

The salinity of the surface waters of the Southern Baltic did not show greater changes in the reported period; it amounted mostly to about 7.2-7.6‰. In winter the salinity in most parts was slightly higher than in other seasons. Slightly bigger fluctuations were noted only in the coastal zone and in the western part of the Baltic. In the Furrow of Bornholm and in the Deep of Arkona, at the end end of October, the surface salinity increased to 8.4-8.6‰, whereas in the remaining periods it amounted only to 7.4-7.8‰. The upper isohaline layer reached to a depth of 60-70 m in the Deep of Gdańsk, 40-70 m at the station P_{28}, 50-60 m in the Furrow of Słupsk, 40-60 m in the Deep of Bornholm, 30-40 m in the Furrow of Bornholm and 20-30 m in the Deep of Arkona. Lower, the salinity increased towards the bottom more or less rapidly, depending on the region and the period under investigation. The maximum vertical gradients of salinity were observed most frequently directly under the mentioned depth or somewhat deeper. Also in the bottom layer greater changes of salinity were not observed, being mostly about 1.0-1.5‰ during the reported period. The salinity of the bottom water decreased slightly from August to February-April. More considerable changes of the salinity of the bottom waters took place only in the Furrow of Bornholm and in the Deep of Arkona. In the Furrow the salinity was mostly between 11.9 and 13.1‰, only in February it fell to 9.4‰. In the Deep of Arkona on the contrary, the February values of the salinity increased to 16.5‰, whereas in the other periods they reached only to 12.7-14.1‰.

Generally it must be stated that, in the reported period, the salinity of the deep waters of the Southern Baltic was relatively low.

The variation of the temperature and salinity of the deep waters shows that, in the reported period no considerable inflow of salty waters into the Baltic occurred.


12°
14°
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Oskarshamn
Kapelludden
Kalmar
Kalmar Sund
Öland
Halmstad
Kattegat
Öre Sund
Karlshamn
Karlskrona
Helsingör
Hälsingborg
København
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Liepaja
Pałanga
Kłajpeda
Kurskij Zaliw
Brjusterort
Kalıningrad
Zatoka Gdańska
Zatoka Pucka
Łeba
Ustka
Darłowo
Kołobrzeg
Dziwnów
Gdynia
Gdańsk
Zalew Wiślany
Wisła Nogat
Sassnitz
Rügen
Stralsund
Zatoka Pomorska
Warnemünde
Świnoujście
Zalew Szczeciński
Szczecin
Fig. 1
Długość wschodnia 16° od Greenwich

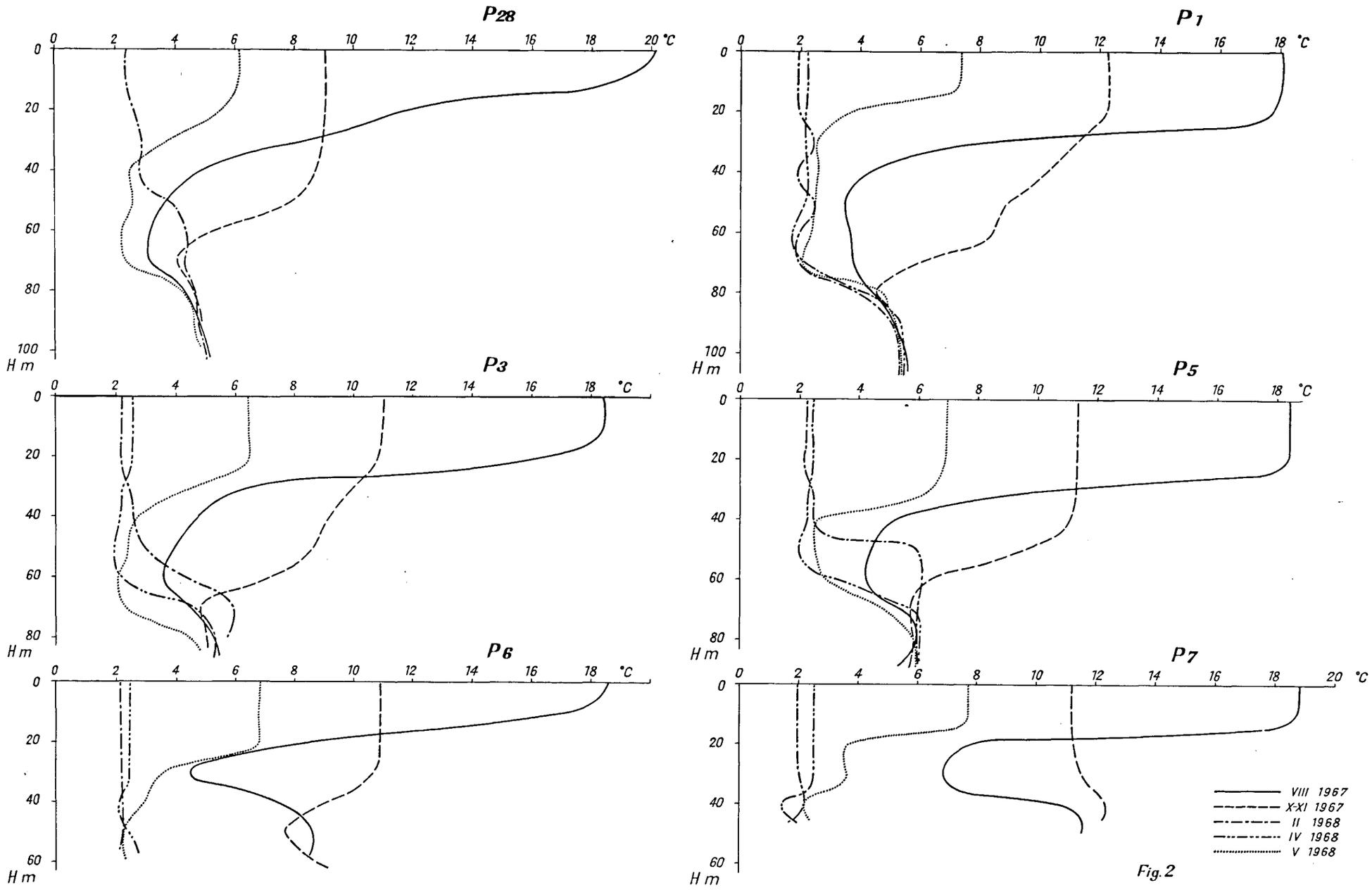

Fig. 2

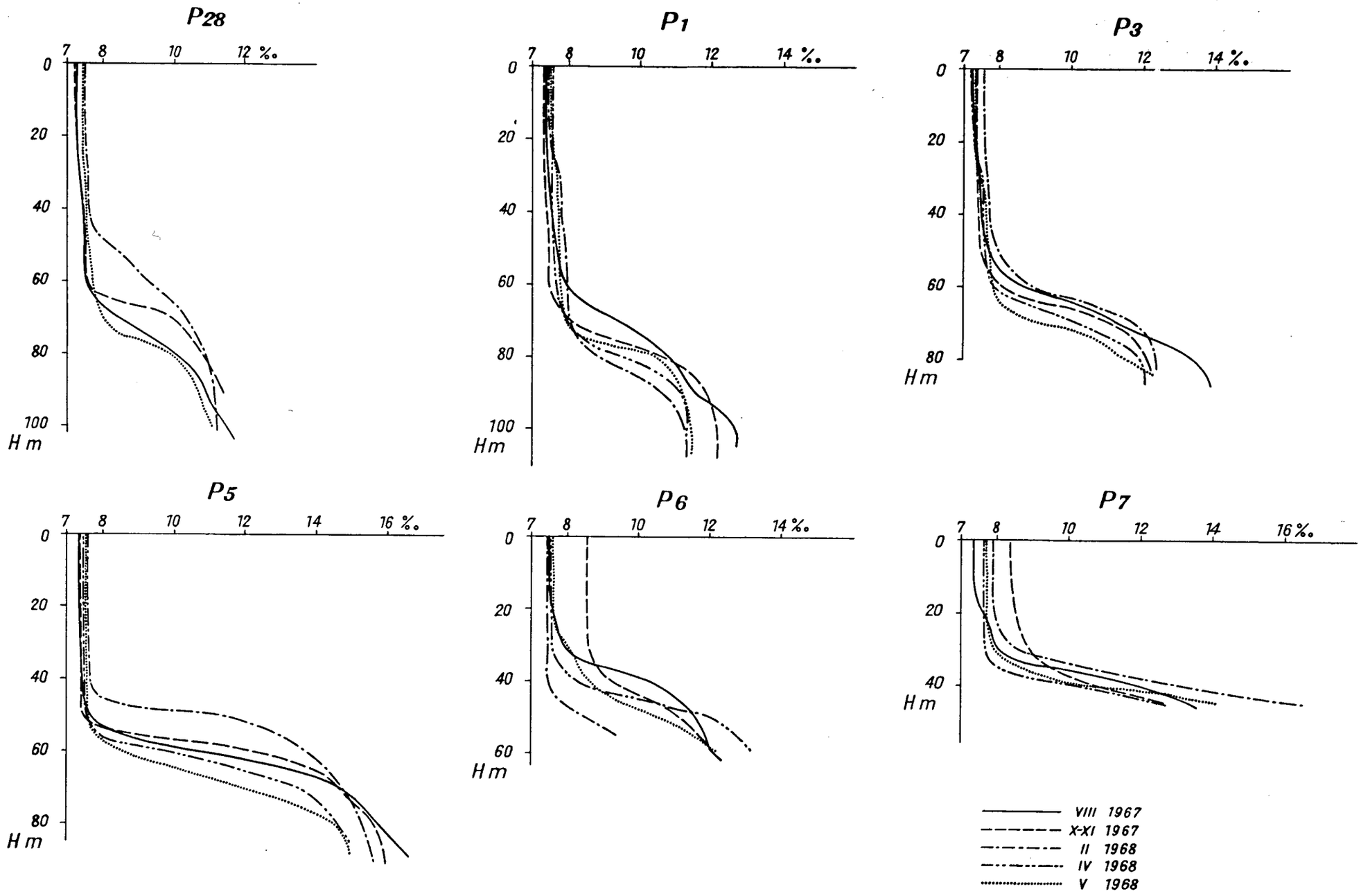

Fig.3