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Currents circulation in the waters of Admiralty Bay (region of Arctowski Station on King George Island)*)

ABSTRACT: The main current system occurring at Admiralty Bay is a two-phase flow system typical for fiords. Tidal waters are a decisive factor in determining the movements of water, whereas surface circulation is determined by winds, when the wind speed is higher than 4 m/s. The maximum values and directions of the surface drift current depend exclusively upon the actually prevailing wind field. The current speeds may reach the order of magnitude up to 100 cm/s. This flow lies above the two-phase system of currents generated by tides. The value of the currents produced by tides may reach up to ~50 cm/s. The direction of the current flow is not always in line with the corresponding of the tide. This is due probably to the irregularity and asymmetry of the tide and great inertis of the water masses.

Key words: Antarctic, current circulation

1. Introduction

Admiralty Bay lies at inward shores of King George Island, which lies near the centre of the South Shetland Islands (Fig. 1). This zone is characterized by complex meteorological conditions and intricate oceanic currents pattern.

The east-west transportation of waters along the west shoreline of islands adjacent to the Antarctic Peninsula is a characteristic feature of this region. This flow of water is an arm of the waters of the East Wind Drift, which approaching Drake Passage turns a part of the waters first southwards and then further on westwards. The speed of this part of the Drift is in the range of 25–35 cm/s.

Water masses on the other side of the Archipelago move in opposite direction. The current occurring in these waters called the Weddell Current moves north-eastwards and forming a whirlpool joins the West Wind Drift. In the region of 60° S the waters of the West Wind Drift are transported westwards with the speed of about 50 cm/s (Bagrancev 1976, Koniecka and Wojciechowska 1978, Toporkov 1968, Trešnikov 1976).

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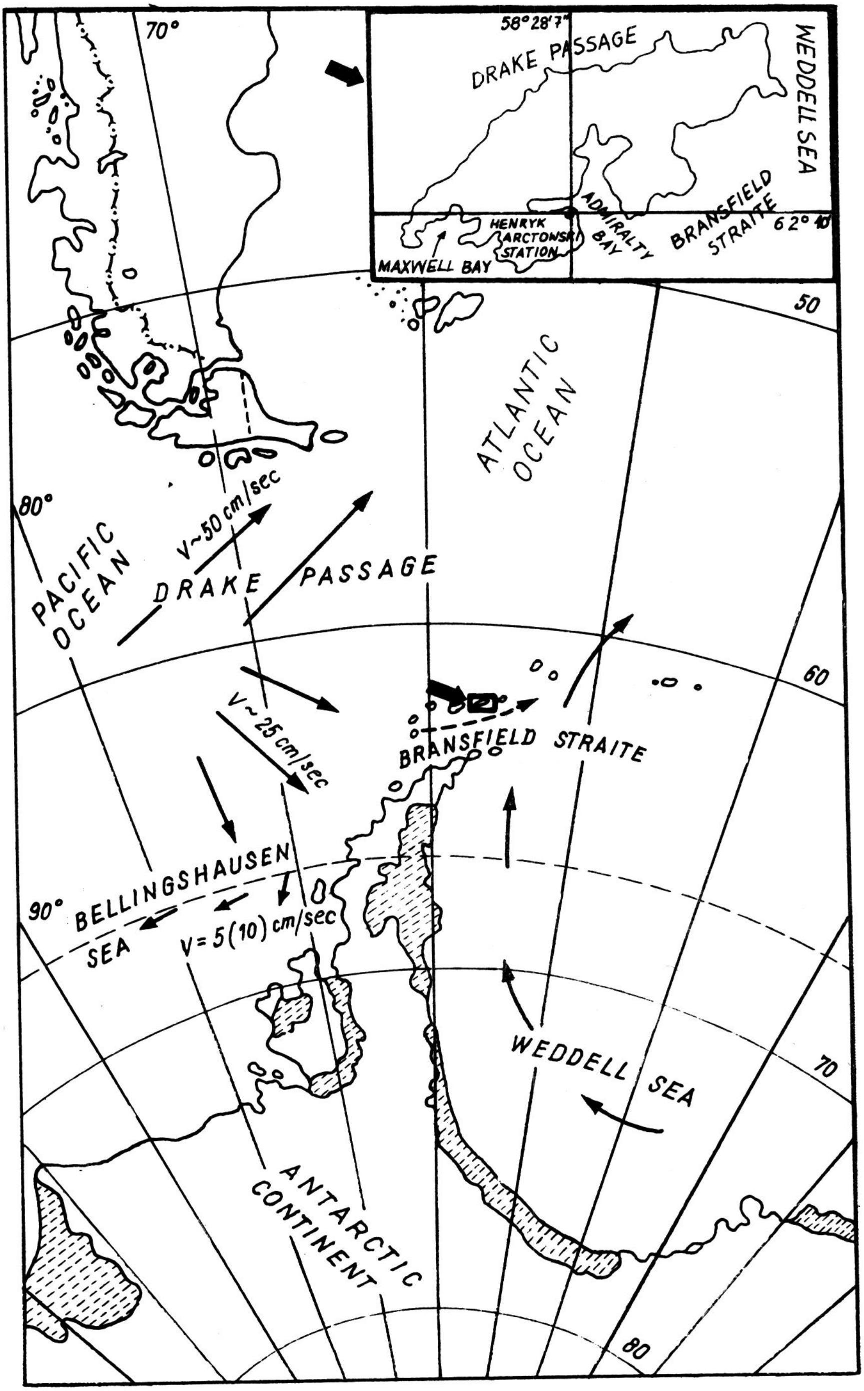

Fig. 1. Circulation of ocean waters in the South Shetlands region

As results from the investigations of the 13th Soviet Antarctic Expedition (Toporkov 1973) the direction of the movements of water masses in the Bransfield Strait is probably north-eastwards. These waters are a part of the East Wind Drift turning southwards before reaching Drake Passage and moving along the South Shetland Islands. A careful survey of the inshore topography of the bottom of Bransfield Strait allows to surmise that the flow of water in the Strait should not have any important effect upon the current system pattern in Admiralty Bay, itself.

This should be also favoured by the position of the entrance into the Bay in relation to the main current of the Strait.

The region of the South Shetlands is a very active area from meteorological point of view. Winds are subject to a particularly great differentiation throughout the different parts of King George Island and Admiralty Bay, as well. The investigations carried out during the Second Antarctic Expedition 77/78 (Pahlke, unpubl. data) showed that the most frequent wind directions were from the Sector SW (24.1%), W (21.8%) and N (17.0%). The remaining directions of the winds occurring in the region of Admiralty Bay were less frequent. The mean average wind speed during summer investigations at Admiralty Bay was about 7 m/s.

Admiralty Bay has a very diversified coastline, deeply indented with many inlets. The configuration of the bottom relief is similar to that of the fiords, showing steep falls of the bottom slope and great topographical diversity.

The position of the Bay with respect to Bransfield Strait and distribution of the predominant wind directions give a comparatively good shelter against shortlasting, dynamic inflows of the ocean.

The movement of waves occurring in the Bay is primarily caused by the local wind field. The observed in the Bay swell of the water of oceanic origin subsides promptly as it enters deeper and deeper into the fiord. It lasts several seconds and its, height, as a rule, does not exceed the order of several centimetres.

Admiralty Bay has irregular semi-daily tidal pattern. The height of the tide at its maximum reaches no higher than up to about 2.5 m.

At present no exact tidal parameters are available separated into amplitudes of syzygial and quadrature tides.

Up to the time when these values will be known from the already started at the Station continuous tidal recordings it seems that in meantime the precise tidal parameters may be accepted analogically to those obtained at the Bellingshausen Station, situated in close vicinity to the Arctowski Station on King George Island. According to the measurements made over there the maximum tidal amplitude was 103 cm and the aplitudes of syzygial and quadrature tides were 146 cm and 42 cm respectively (Vorob'ev 1972).

According to the measurements made at the Institute of Meteorology and Water Management Meteorological Station the temperatures of water at the entrance to the Bay ranged in summer season from 1.36°C at the water surface to −0.24°C at the bottom (at the depth ~500 m), decreasing gradually with the increasing depth.

Farther inside the Bay, along the Arctowski Station — Pt. Hennequin line the temperature changes, ranging from 1.76°C, at the surface, to −0.20°C, at the bottom (~300 m).

Salinity ranges from 33.9‰ at the surface, 34‰ at the depth of 25 m to 34.5‰ at the bottom (500 m deep). A similar vertical distribution of salinity values was observed inside the Bay. Small changes in salinity, produced mainly by inflow of fresh water from the glacier, do not have any significant effect on the eventual rise of the density gradient.

Such inconsiderable changes in the values of temperature and salinity indicate the lack of thermocline and hypocline. After these observation it is impossible to assume that temperature and salinity have any effect upon general current circulation in this area.

2. Materials and methods

2.1. Surface currents

Due to the great extent of the measurements area, about 130 km^2, the measurements of surface currents were made from six geodetic bases situated at various points of the Bay (Fig. 2). At each base, from two geodetic test-sites simultaneously cuts were made with theodolites and surface current tracers determined, having the consecutive coordinates of the shifting traces and the time intervals between the consecutive cuts. It is possible to determine the required current speed vectors. The length of geodetic bases marked out in the test-area ranged from 111.53 m (Demay Point Base) to 394.8 m (Kellar II Base). The difference in the length of the bases resulted from the configuration of the ground and the Sector of current measurements.

In the surface currents measurements for the greater part such natural indicators as drifting shore ice or in some cases ice-growlers were used as tracers.

Attempts were made to use also 0.5×0.5 m or 1.0×1.0 m counterbalanced wooden floats and rodamine as tracers. These tracers proved to be unsatisfactory due to the fact that drifting floats were invisible on the waves already at a distance of several hundred metres and rodamine lost its proper colour in the water very quickly.

Taking drifting floes broken from shore ice (occurring very often) as tracers for measuring surface currents was very convenient in as much as it gave the possibility of a simultaneous measurements of the surface currents over a comparatively large area. Moreover, it made possible to continue the measurements irrespective of weather conditions and on a wider area, not only in the nearest vicinity of the Station.

Taking the dirfting shore ice as tracers an attemps was made to select floes of a similar size and of a comparatively small height, so as to limit the effect of the wind.

The measurements of the surface currents were made for four different wind situations. Basing on the wind rose determining frequencies of wind directions (Pahlke, unpubl. data) and upon our own observations of the

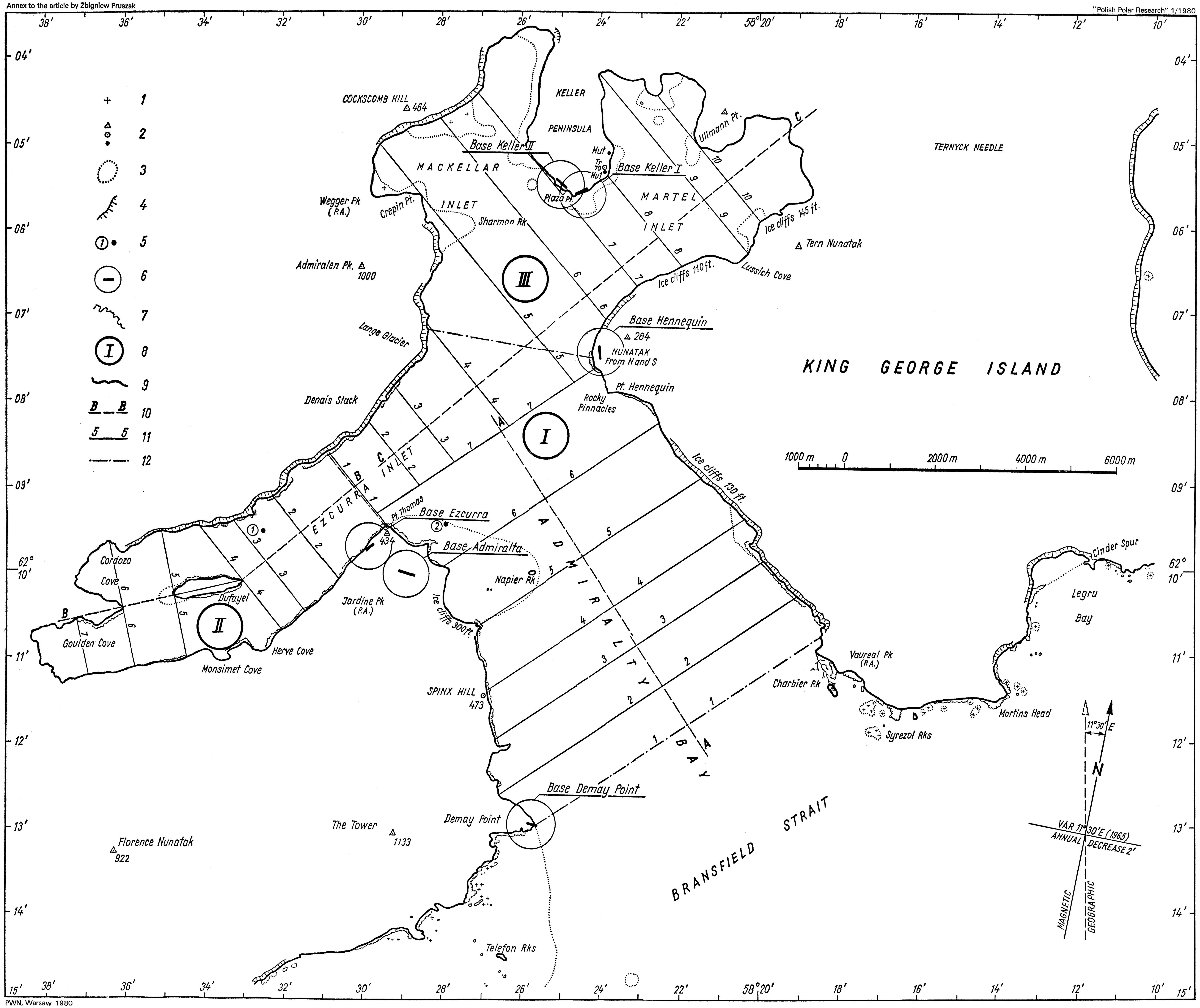

Fig. 2. Observation Stations and water circulation profiles in Admiralty Bay region

1 — single rocks, 2 — height point, 3 — area of underwater rocks occurrence, 4 — ice cliff, 5 — current meters stations, 6 — geodesic station, 7 — nearshore rocks, 8 — subareas of Admiralty Bay, 9 — coastline, 10 — longitudal sectionaxis, 11 — cross section axis, 12 — boundaries of subareas of the Bay

configuration of the shores, the winds and the associated with them currents circulation, three main sectors of wind activity were set apart. The additional situation was the case of relative calm (wind speed $\leqslant$ 3 m/s) and the determined cycle of the movements of waters connected with a corresponding tidal phase.

The wind speeds at which the measurements of the surface currents were made (within the scope of the determined sectors) were in the range of 4–10 m/s. This resulted to a high degree from the specificity of local winds, which are of a pulsative and unstable character, even within very short time intervals.

2.2. Intercurrents

The measurements of the intercurrents (sub-surface currents) were made using a submerged (at a certain depth below the water level) current-measurement station (Fig. 3). As current meters autonomically recording

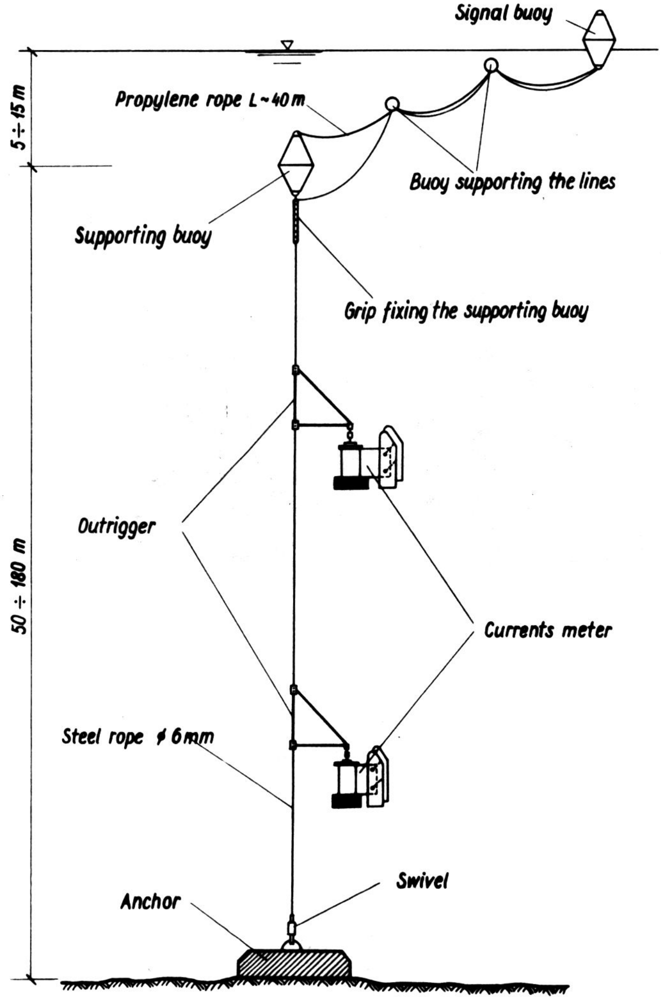

Fig. 3. Schematic diagram of the station used for measurements of intercurrents

current meter arrays (BPW-2 and BPW-2r type) were used. The measurements were made at 10 and 15 minutes intervals between every subsequent recording.

Each measurement consisted of the recordings of the current direction with respect to the magnetic north and the value of the current. The recording accuracy was 5° for direction and 2 cm (1 cm) for the module of the value.

The value of the current is the mean value from a certain time interval of the measurements whereas current direction is expressed by the actual temporary value (at the moment of the measurement).

The setting up and lifting of the set of current meter arrays at the measurement test-sites were made from the adapted for this purpose amphibian craft (Fig. 4).

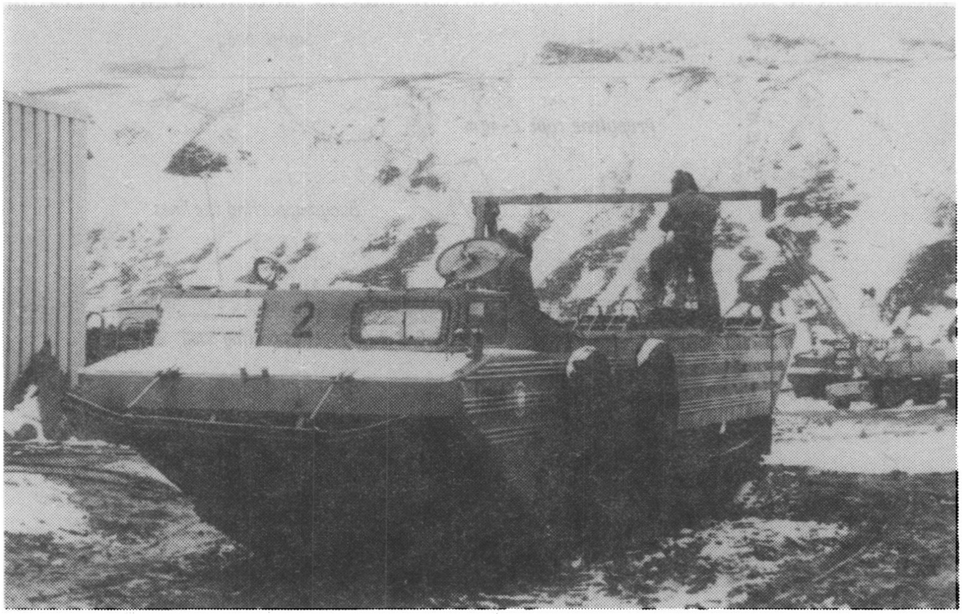

Fig. 4. Amphibian craft
Photo Z. Pruszak

Attempts were also made to use a helicopter for this purpose but the trials were unsuccessfull. There were some inaccuracies in the point setting up, in the oscillatory movement of the set of instruments in the air, some difficulties as regards the security of the set of the meters during the setting up, etc.

The measurements are included Ezcurra Inlet and a part of Admiralty Bay. The current meters reached the depths up to 100 m. The measurements at greater depths due to various factors such as e.g. slopes and faultings of the bottom, etc., proved to be technically impossible (with the equipment available at present).

3. Results and discussion

3.1. Determination of the volume of the water masses in Admiralty Bay

To calculate the volume of the waters in Admiralty Bay the whole area was divided into three parts: the main area — Admiralty Bay (I), Ezcurra Inlet (II) and Martel and Mackellar Inlets (III) (Fig. 2). The division was made on the basis of the natural configuration of the system of ramifications and arms of the Bay and displacement of the water masses. For each of the differentiated areas cross-sections of the bottom were determined (Figs. 5–8) on the basis of the available charts relevant to

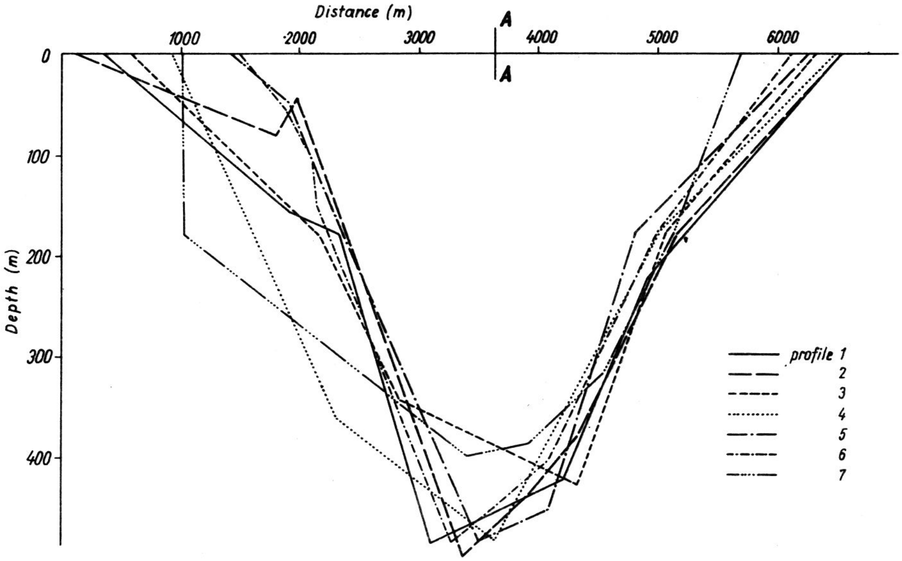

Fig. 5. Cross-sections of Admiralty Bay (Area I, A–A axis)

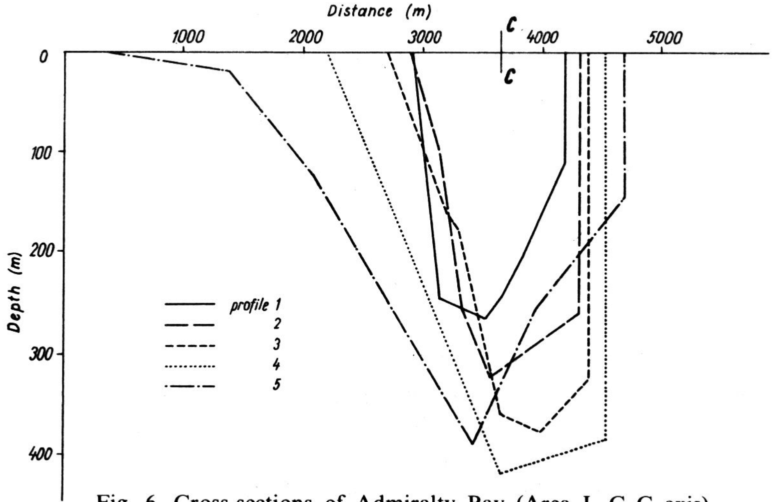

Fig. 6. Cross-sections of Admiralty Bay (Area I, C–C axis)

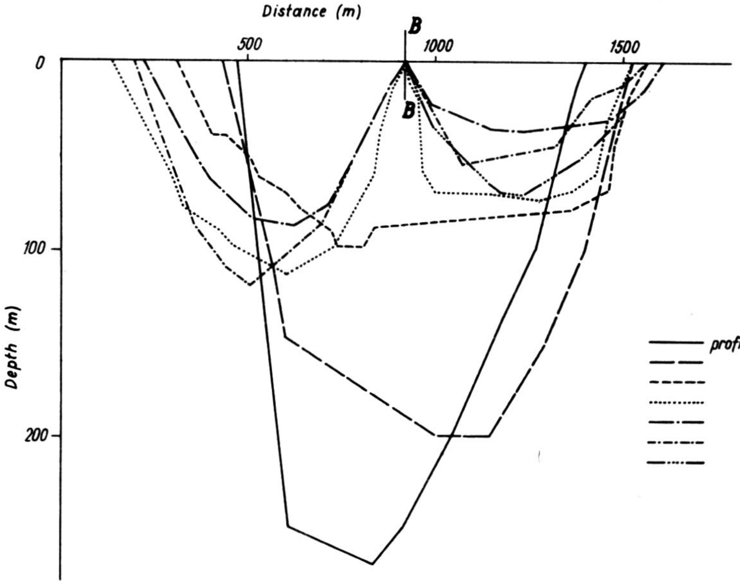

Fig. 7. Cross-sections of Ezcurra Inlet (Area II)

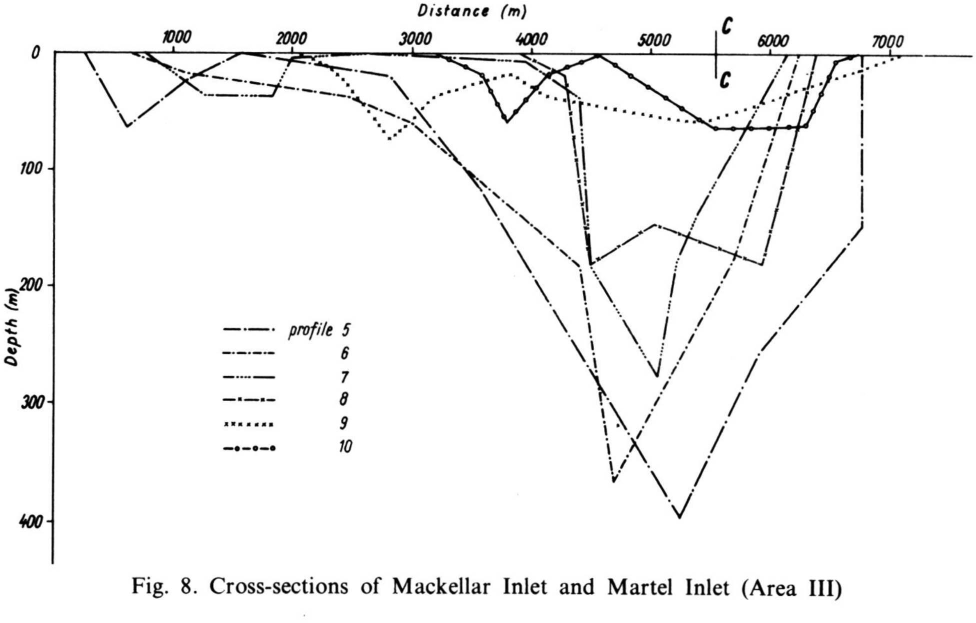

Fig. 8. Cross-sections of Mackellar Inlet and Martel Inlet (Area III)

bathymetry of the bottom, soundings carried out during the precedent expedition (77/78) and our own occasional bathymetric measurements. Longitudinal sections were also made along the axes A-A, B-B and C-C (Fig. 9).

As results from the calculations made on the basis of the sections of the bottom the total volume of waters in Admiralty Bay is of the order of 18 km^3.

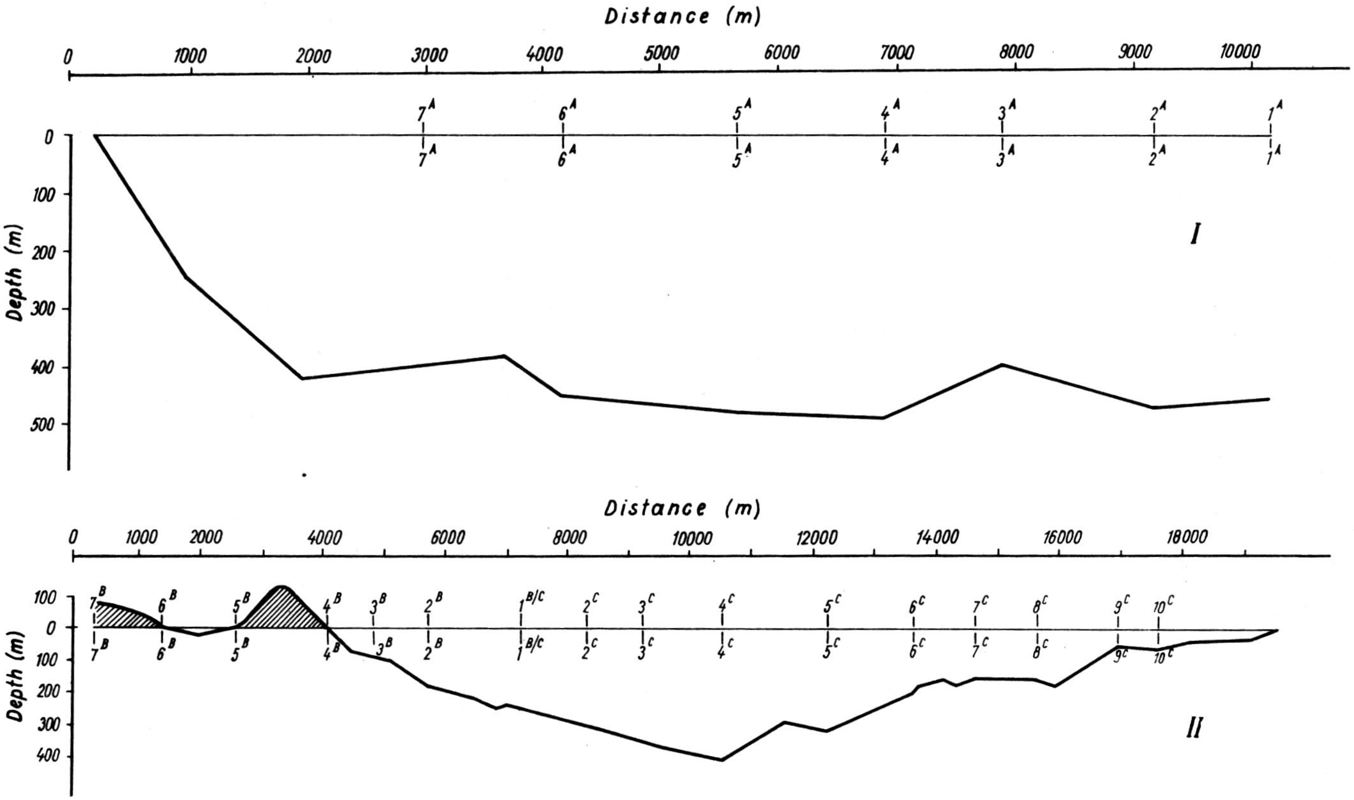

Fig. 9. Longitudinal sections along A-A axis (Area I), B-B and C-C axes (Area II)

The values for each of the investigated areas are, as follows: Ezcurra Inlet 1.33 km^3 (7.4%), Martel and Mackellar Inlets 3.13 km^3 (17.4%) and the main part of Admiralty Bay 13.56 km^3 (75.2%).

The obtained data show that the most important from the point of view of the ecosystem of the investigated water body are the structure of currents and the process of the exchange of waters in the main part of Admiralty Bay, which contains the greatest volume of the water masses and has a direct contact with the ocean waters.

3.2. Surface currents

Under the conditions prevailing in Admiralty Bay the surface circulation of the waters is, in the case of the occurrence of the wind stronger than $v \geqslant 4$ m/s, dependent on the distribution of wind directions. Current distribution was determined for three sectors of wind direction.

They correspond to the effects of the average wind velocity of about $v = 7$ m/s, which corresponds to the mean value of the wind speed measured at the Station in summer months (Figs. 10–12).

The values of the surface current for wind velocities lower than 7 m/s will decrease in relation to the values given in Figs. 10–12 and at higher wind velocities these values will increase.

The determined patterns of the surface currents system are valid for the wind speeds varying within the range of about $4 \text{ m/s} \leqslant v \leqslant 10$ m/s. At the wind speeds markedly higher than the value $v = 10$ m/s it is difficult to speak of a definite structure of the surface current circulation. This is due to the effect of the local, turbulent whirlpools of air disturbing current structures characteristic for definite winds. The winds occur then frequently in the form of violent gusts, producing a markedly heterogenous and unstable in time and space wind field, consequently, followed by the formation of drift surface currents systems.

A characteristic feature of the surface currents circulation (produced by winds) is an extensive outflow of the surface water from Admiralty Bay into Bransfield Strait.

Only the winds blowing from SW-W directions will cause in a part of the cross-section an inflow of surface waters into Admiralty Bay.

Some surface flows occur along Ezcurra Inlet — Martel Inlet and Mackellar Inlet axes. They are caused by the winds blowing from SW-W or N directions. The surface currents directions are the same as wind directions. The flow velocity is in the order of 20–30 cm/s, increasing locally to the maximum 50 cm/s.

In the main part of Admiralty Bay flow velocities ranged on the average from 30 cm/s to 50 (60) cm/s, now and then reaching locally the value of 100 cm/s or even more. The surface flow speed increases somewhat directly beyond the exit from the Bay. This is particularly noticeable when winds are blowing from Sector II (Fig. 11) towards the exit from the Bay, i.e. the "katabatic" winds effects. Along the shores of the Bay the current speeds are slightly lover than the mean values. This is due

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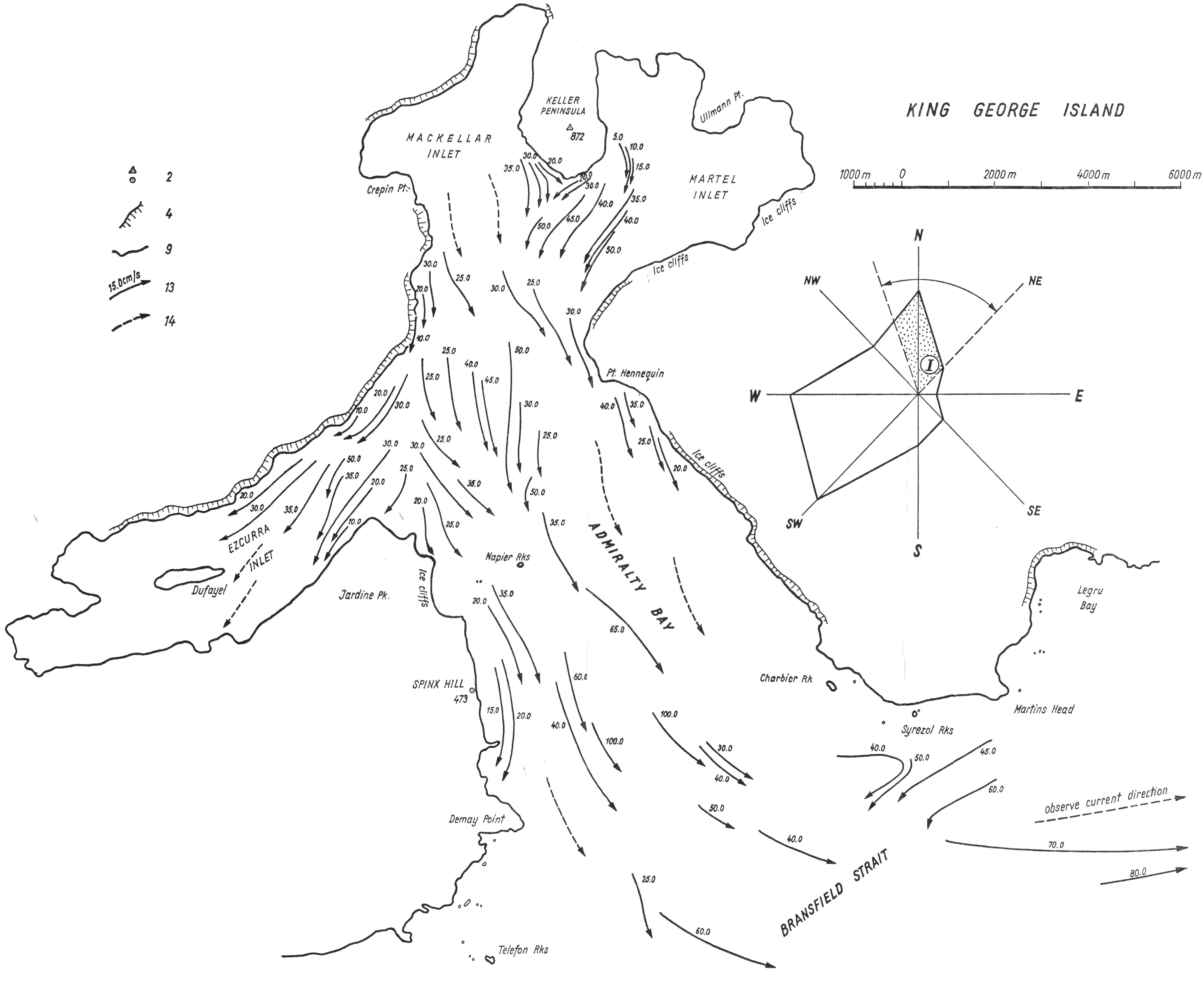

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Fig. 10. Surface waters circulation in Admiralty Bay for the winds from Sector I
1 — 12 see Fig. 2, 13 — direction and velocity of the current (cm/s), 14 — observed direction of the current

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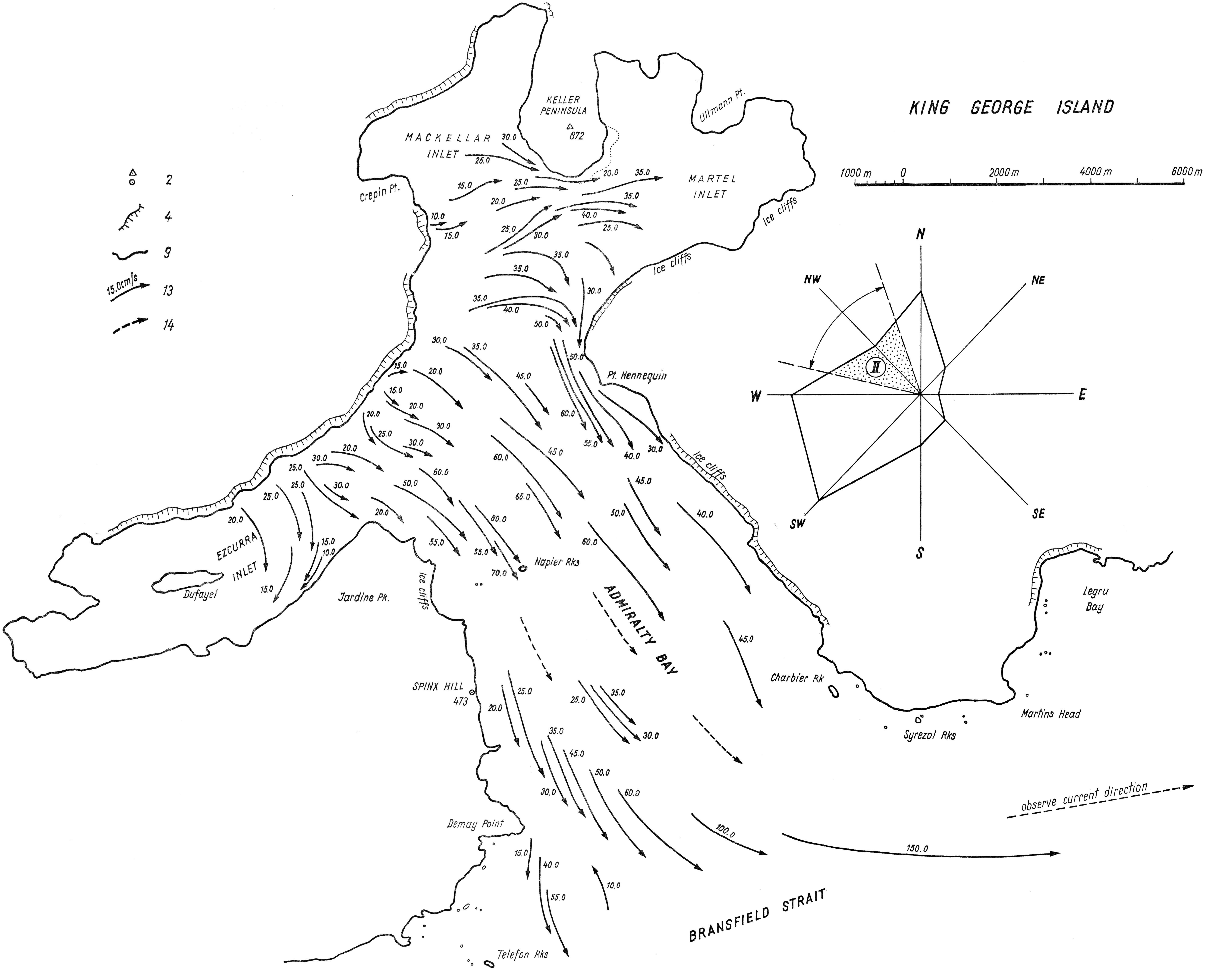

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Fig. 11. Surface waters circulation in Admiralty Bay for the winds from Sector II

1 — 12 see Fig. 2, 13 — direction and velocity of the current (cm/s), 14 — observed direction of the current

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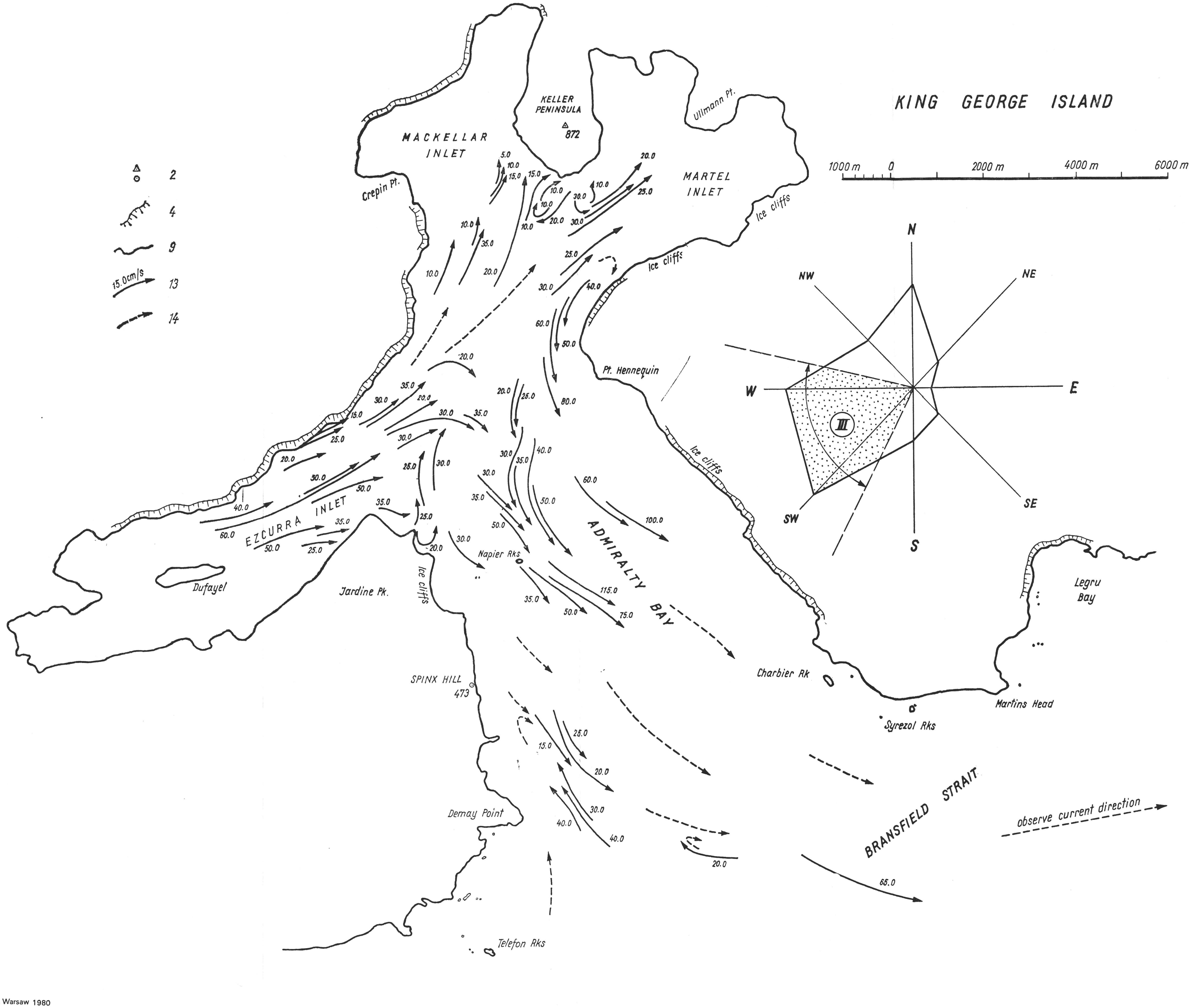

Fig. 12. Surface waters circulation in Admiralty Bay for the winds from Sector III

1 — 12 see Fig. 2, 13 — direction and velocity of the current (cm/s), 14 — observed direction of the current

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to the disturbance of the wind field, caused by fairly steep shores and a series of other boundary conditions produced by the coastline profile. Currents speeds in these areas range from 30 cm/s to 15 cm/s, now and then decreasing to still lower values. The region in the vicinity of Pt. Thomas (Fig. 12) is a good example of the disturbance of current circulation due to the local effect of steep shores.

Distribution of the surface currents illustrated in Figs. 10–12 is only to a small degree affected by tides. Wind effect is the predominant factor. Winds give rise to the drift current pattern superimposed on the two-phase current system generated by tides.

At the moments of subsidence of the wind ($v \leqslant 3$ m/s) or the absence of wind tide becomes the decisive factor determining the surface water circulation in Admiralty Bay. Surface currents get dependent on the movements of the intermediate water masses, being kinematically conjugated with them. The surface currents pattern for a situation of relative calm (wind velocity $\leqslant 3$ m/s) and the inflow of waters into the Bay through the lower part of the vertical profile is shown in Fig. 13.

According to the schematic diagram (Fig. 11) surface currents vectors (generated by tides) are directed in the opposite direction to that of the movements of the intermediate water masses. This forms a conjugated vertical circulation system in which, when the inflow of the waters into the Bay occurs at the bottom, the partly ouflow of the waters occurs at the surface and vice versa.

Within the tidal surface currents circulation pattern several whirlpools may be observed (Fig. 13). They occur mainly in the areas of the convergence of waters from Ezcurra Inlet, Mackellar Inlet and Martel Inlet with waters from Admiralty Bay. The formation of whirlpools appears to be the effect as well of the meeting of the flows from various directions as of the characteristic topography of the bottom. The mean speeds of the surface water currents are of the order of 20—30 cm/s, reaching locally the maximum values of the order of 50 cm/s. Near the coastline and in the whirlpools velocities often decrease to 10–15 cm/s. As can be seen in this case the surface flow velocites are about twelvehold lower than in the situation when flows are generated by winds and superimposed on the tidal currents system.

3.3 Intercurrents

The maximum values of the velocity of intercurrents in Ezcurra Inlet (measured to a depth of 100 m) range from ~20 cm/s at the depth of 25 m to about 40 (45) cm/s at greater depths. Higher values of the intercurrent module were noted in Admiralty Bay. At the depths reaching to 100 m deep the maximum flow velocities ranged from about 40 cm/s at the depth of ~25 m to 50 cm/s in the middle of the vertical profile, decreasing gradually to ~30 cm/s at a distance of 15 m above the bottom. Distribution of current values and directions and tidal records are illustrated in Figs. 14–16.

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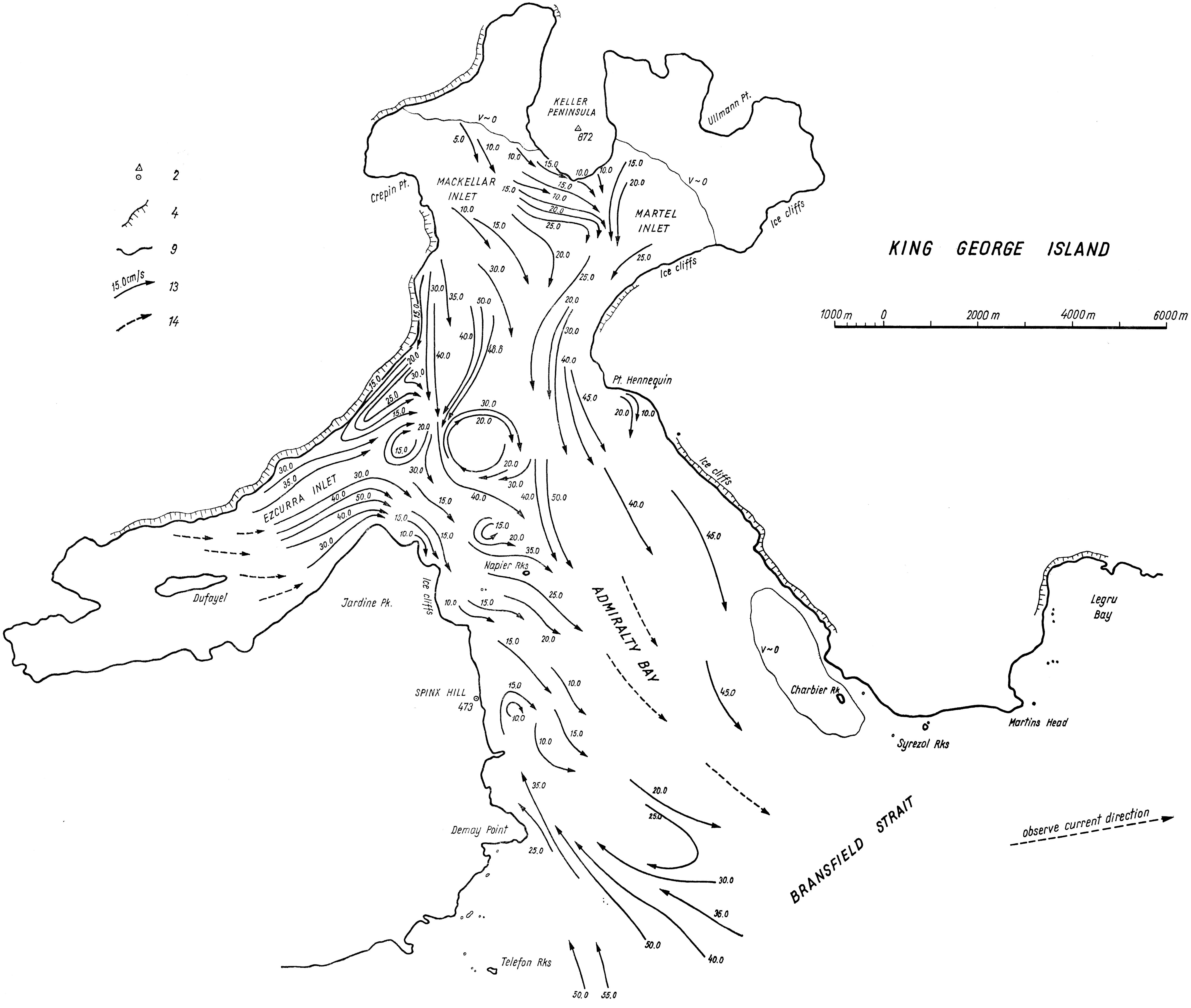

Fig. 13. Surface waters circulation in Admiralty Bay for occasions of relative calm (wind velocity — $v \leqslant 3$ m/s)

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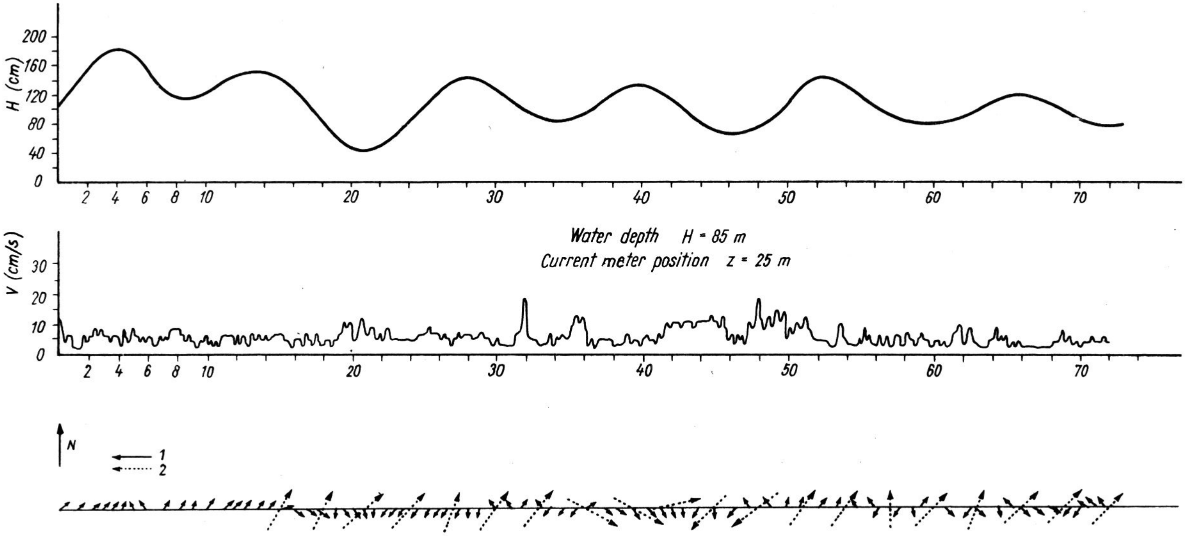

Fig. 14. Distribution of the values and directions of the intercurrents at the depth of 25 m, the values of the tides and wind direction for station I

1 — current direction, 2 — wind direction

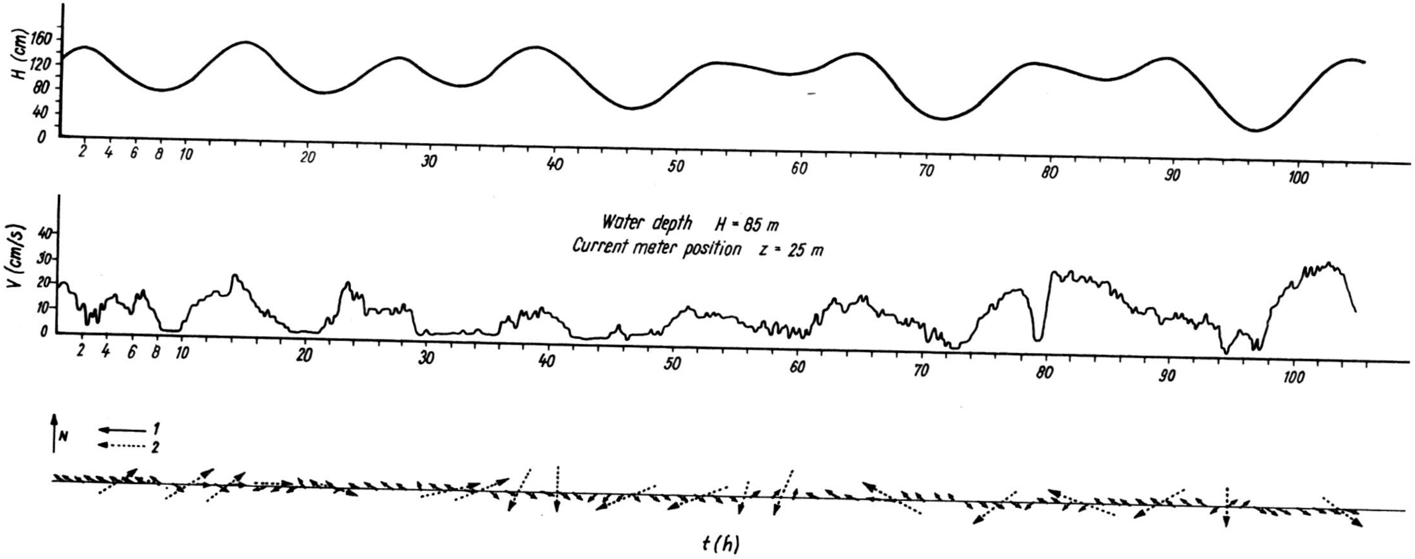

Fig. 15. Distribution of the values and directions of the intercurrents at the depth of 25 m, the values of the tides and wind direction for station 2
1 — current direction, 2 — wind direction

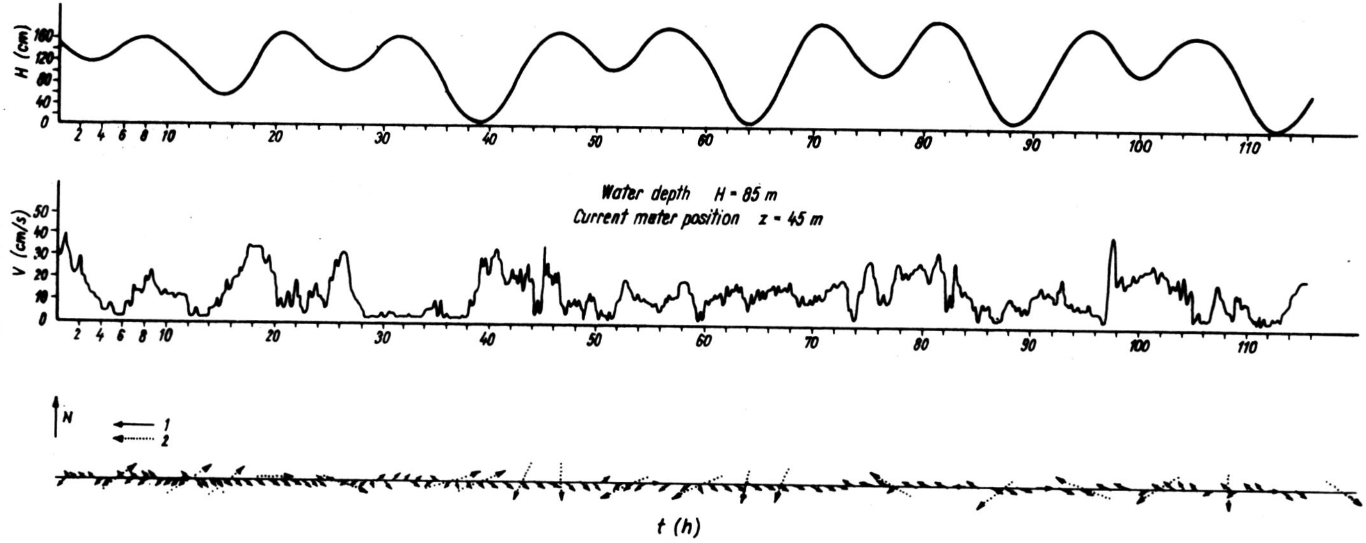

Fig. 16. Distribution of the values and directions of the intercurrents at the depth of 45 m and the values of the tides for station 2
1 — current direction, 2 — wind direction

The distribution of the frequencies of the intercurrent directions at Ezcurra Inlet, at the level 25 m below the water-level show directional assymetry of the flow (Fig. 17). Preponderance of the outflow of water from Admiralty Bay over the inflow is observed at that level and at the measurements test-site.

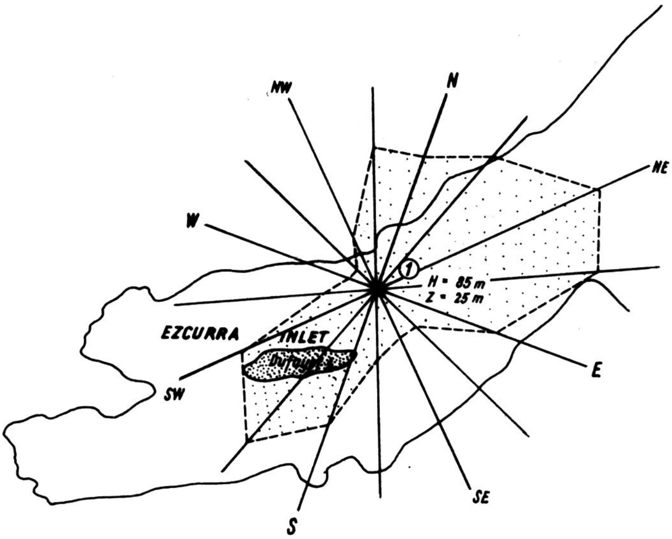

Fig. 17. Distribution of frequencies of intercurrent directions for station 1, and depth of 25 m

Proabably this is due to the formation of vertical whirlpools of water producing upwelling currents. They disturb regularity of directional spectra of flows associated with tidal cycles. The existence of the upwelling currents in this area may have its source in the characteristic bathymetry of the bottom revealing fairly great local slopes of the longitudinal profile and various types of abyssal plains.

In Admiralty Bay, itself, the curves of the frequency of flow directions present symmetrical distribution pattern with narrow spectra (Figs. 18–19). This may suggest a proper regularity of flows and the absence of the transvere water motion in respect of the main current.

Basing on the results from the measurements it may be stated that already at the depth of 25 m below the water-level no distinct association between the distribution of currents and the actually prevailing wind field is observed (Figs. 14, 15).

As can be seen from the analysis of the obtained results the flow of water masses in Admiralty Bay has a distinctly two-directional character. This results on the one hand from the characteristic morphological system of the Bay, on the other from the dynamics of the flow, which under the analysed conditions is a motive force of the given hydrodynamic processes.

The intercurrent direction changes every 5–14 hours and consequently it is not always in line with the actually occurring direction of the tidal cycle.

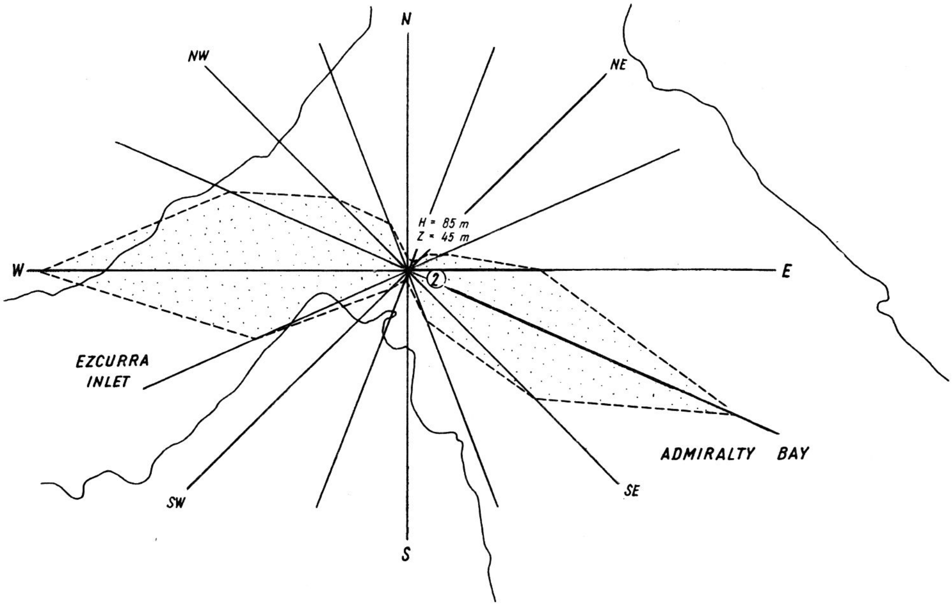

Fig. 18. Distribution of frequencies of intercurrent directions for station 2, and depth of 25 m

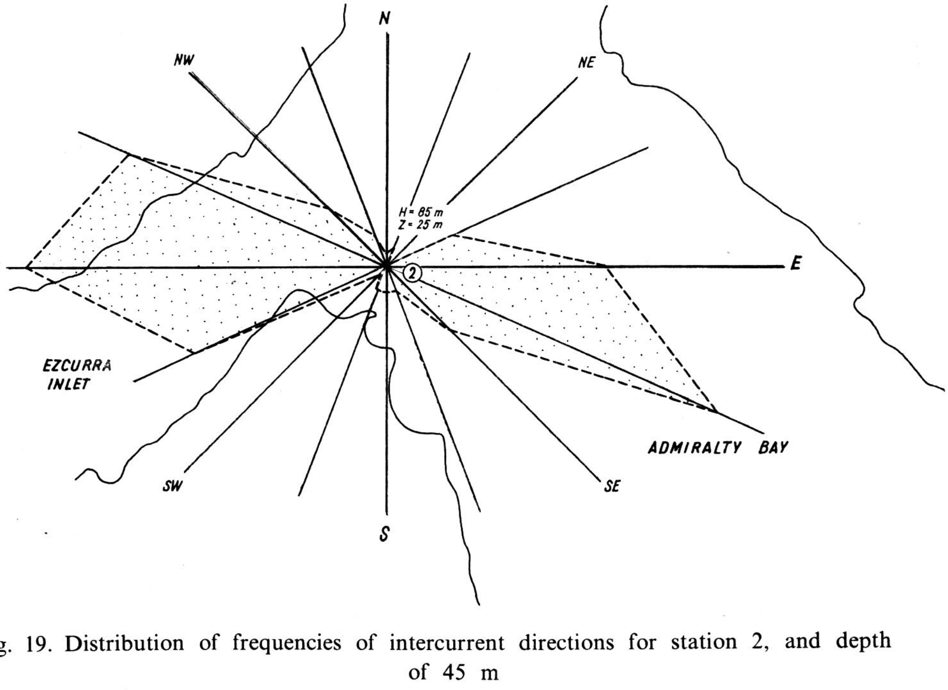

Fig. 19. Distribution of frequencies of intercurrent directions for station 2, and depth of 45 m

Very likely this results from the fact that the occurring tide is often irregular and asymmetric, moreover, its energy may be different in various phases. It is why it is not always exactly in time to reverse the flow of the water masses into opposite direction within each of its phases.

The occurrence of a series of sharp peaks on the basic component denoting variation of the current values in the function of time (Fig. 16) is worth mentioning. These peaks have a character of a fine scale velocity fluctuation and may indicate a turbulent energy transfer within the water.

3.4. Potential schematic diagram of circulation and exchange of the waters in Admiralty Bay

On the basis of the measurements it may be ayed that the two-phase flow system, typical for fiords (Wright 1971), is the principal current system in Admiralty Bay.

In the schematic diagram waters are carried into the Bay by the tide through the lower part of the vertical profile, the outflow of the waters occurs through the upper parts of the profile (Fig. 20).

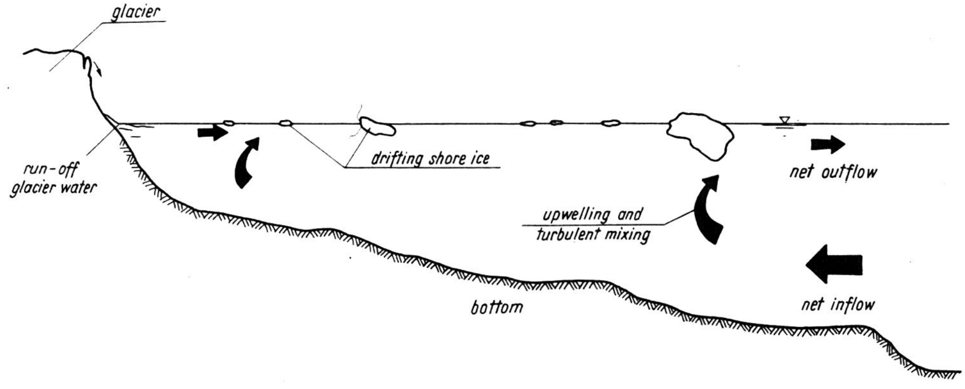

Fig. 20. Potential schematic diagram of two-phase water circulation in Admiralty Bay (occassion of low activity of the wind)

At the moment of the change of tidal phase this situation starts to turn round, though (due to irregularity, asymmetry, great inertia of water masses, etc.) the whole directional system of current circulation does not necessarily reverse at once to the opposite direction. There may occur a temporary shifting of the same phases of flow and tide directions (see 3.3.).

Drift surface currents reaching to the depth of several metres only are generated by the wind blowing at the water surface. They are super-imposed on a two-phase current system generated by tidal phenomena. The value and direction of the drift surface current depend on the actually prevailing wind field (see 3.2.).

On the basis of the analysis of the results from the measurements and other observations it may be assumed that the exchange of waters (reaching to the depth of 100 m) between Admiralty Bay and Bransfield Strait

(Ocean) lasts from one to two weeks, depending on the position of various sub-areas of water masses in the geometric pattern of the Bay.

The measurements were made to the depth of 100 m, only and all the analyses apply exclusively to the surface water layers. Therefore, it is difficult to state explicitly whether the water masses at a greater depth will be subject to the same principles.

The question of continuation of the studies and the extension of the scope of investigation is of paramount importance from the point of view of the hydrodynamics as well as the whole ecosystem of this region.

The author is grateful to Dr. S. Rakusa-Suszczewski, the Head of the Third Antarctic Expedition 78/79. My warmest thanks are given also to the technicians, K. Dramiński and J. Winiecki for their assistance in measurements and preliminary elaboration of the data.

4. Summary

Study of the current system of Admiralty Bay was done during the III Polish Antarctic Expedition 1978/79.

The measurements of surface currents were performed from six stations located in various points of the Bay, stationary measurements of undercurrents were also made (Figs. 1, 2).

Distribution of surface currents for three basic sectors of wind and for relatively calm weather (wind below 3 m/s) were found. Tides are the decissive factor causing a determined water circulation in the latter situation (Figs. 10–13).

The long term measurements of undercurrents in Ezcurra and Admiralty Bays allow to estimate that the basic current system in the Bay is a two-phase system (Fig. 20). Such system is typical for fiords and is strongly dependent on tides.

The results allowed, apart from current systems study, to evaluate roughly the exchange of waters between the Bay and Bransfield Strait.

On the basis of available maps and own data it was calculated, that water volume in Admiralty Bay equals 18.02 km^3, with 1.33 km^3 (7.4%) in Ezcurra Bay, 3.13 km^3 (17.4%) in Mackeller and Martel Bays, and 13.56 km^3 (75.2%) in the main part of Admiralty Bay.

Results of the paper form a basic part of hydrodynamics studies in Admiralty Bay, especially for its current system and water exchange studies. They can be also helpful for analysis of numerous hydrochemical and biological processes related with origin and distribution of krill shoals in region of Admiralty Bay.

5.Резюме

Расследование циркуляции течений района Залива Адмиральты было проведено в рамках III Польской Антарктической экспедиции.

В рамках этих исследований проведено измерения поверхностных течений из шести баз размещённых в разных пунктах Залива а также стационарные измерения глубинных течений (рис. 1, 2). Получено расположения поверхностных течений для трёх основных секторов деятельности ветра а также для ситуации относительного спокойствия (скорость ветра меньше 3 м/с) когда явления приливов и отливов становят фактор влияющий на определённую циркуляцию (рис. 10—13).

На основании долговременных измерений глубинных течений в Заливе Адмиральты (рис. 14—19), а также их анализа установлено что основной системой течений высту-

пающей в Заливе является система двухфазного расхода (рис. 20). Это система типична для фиордов и тесно связанная с циклами прилива и отлива.

Независимо от определения циркуляции течений полученные данные разрешили приблизительно оценить обмен водами между Заливом и Проливом Брансфильда.

Основываясь на доступных картах и собственной разведке вычислено, что объём вод в Заливе Адмиральты равняется 18,02 $км^3$ с чего в Заливе Эзкурра находится 1,33 $км^3$ (7,4%), в районе Заливов Маккеллер и Мартель 3,13 $км^3$ (17,4) а в основных частях Залива Адмиральты 13,56 (75,2%).

Совокупность проведенных работ становит основу для оценки этой части гидродинамического фона Залива Адмиральты, которая относится к циркуляции течений а также процессов обмена вод в Заливе. Можно также нею воспользоваться при анализе ряда гидрохимических и биологических процессов связанных с возникновением и расположением скоплении криля в районе Залива Адмиральты.

6. Streszczenie

Rozpoznanie cyrkulacji prądowej rejonu Zatoki Admiralicji przeprowadzone zostało w ramach III Polskiej Wyprawy Antarktycznej 1978/79.

W ramach tych badań wykonano pomiary prądów powierzchniowych z sześciu baz rozlokowanych w różnych punktach Zatoki, oraz stacjonarne pomiary prądów wgłębnych (rys. 1, 2).

Uzyskano rozkłady prądów powierzchniowych dla trzech zasadniczych sektorów działania wiatru oraz dla sytuacji względnego spokoju (prędkość wiatru mniejsza od 3 m/s), w której decydującym czynnikiem powodującym określoną cyrkulację wód są zjawiska pływowe (rys. 10–13).

Na podstawie długookresowych pomiarów prądów wgłębnych w Zatoce Ezcurra i Zatoce Admiralicji (rys. 14–19) oraz ich analizy ustalono, iż zasadniczym układem prądowym występującym w Zatoce jest układ przepływu dwufazowego (rys. 20). Jest to układ typowy dla fiordów i ściśle związany jest z cyklami pływu.

Niezależnie od określenia cyrkulacji prądowej otrzymane wyniki pozwoliły na przybliżoną ocenę wymiany wód pomiędzy Zatoką a Cieśniną Bransfielda.

W oparciu o dostępne mapy i własny rekonesans obliczono, iż objętość wód w Zatoce Admiralicji wynoszą 18,02 km^3, z czego w Zatoce Ezcurra jest jej 1,33 km^3 (7,4%), w obszarze Zatok Mackellar i Martel 3,13 km^3 (17,4%) oraz w zasadniczej części Zatoki Admiralicji 13,56 km^3 (75,2%).

Całość pracy stanowi podstawę do oceny tej części hydrodynamicznego tła Zatoki Admiralicji, która odnosi się do cyrkulacji prądowej oraz procesów wymiany wód w Zatoce. Może być także ona pomocna przy analizie szeregu procesów hydrochemicznych i biologicznych mających związek z powstawaniem i rozmieszczeniem skupień kryla w rejonie Zatoki Admiralicji.

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