Current meter observations in the Sea of Okhotsk near Shmidt Peninsula, northern Sakhalin

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Abstract

Current meter measurements from the summer of 2006 at the Kaygano-Vasyukansky (KV), Vostochno-Shmidtovsky (VS) and Zapadno-Shmidtovsky (ZS) oil and gas-bearing blocks are analyzed. Observations revealed the important role of the diurnal tidal currents, which predominated over other types of water motions in the area which adjoins the remote part of northern Sakhalin Island (Shmidt Peninsula). The ellipses of main tidal constituents were highly compressed and changed little with depth. Residual (non-tidal) flows in the intermediate and near-bottom layers had a steadier nature in comparison with the surface, in which the wind effect was shown. The main flow in these layers had orientations on the KV block to the south and south-southwest; on the VS block to the east and south-southeast; in the northern part of the ZS block to the south-southwest and to the east; in the southern part of the ZS block to the north and northeast.

Introduction

In the summer of 2006, the Sakhalin Institute of Fisheries and Oceanography (SakhNIRO) carried out comprehensive studies on potential oil fields in the Sea of Okhotsk, which adjoin Shmidt Peninsula at the northern end of Sakhalin Island. The program included taking flow measurements at the water surface, intermediate and near-bottom layers every 10 minutes at four autonomous stations which were deployed on the Kaygano-Vasyukansky (KV), Vostochno-Shmidtovsky (VS) and Zapadno-Shmidtovsky (ZS) oil and gas-bearing blocks. The moorings positions are represented in Figure 1 and related parameters are given in the Table 1.

Dynamic processes in the waters adjacent to Shmidt Peninsula represent significant interest not only for offshore development, but because our current measurements were the first full-scale experiment in this region. During the period from 1988 to 1997, a large amount of observational data were obtained in the oil and gas-bearing areas of the northeastern shelf of the island, but in the region more to the south. The results of these analyses have been well described (Popudribko *et al.*, 1998; Putov and Shevchenko, 1998; Kochergin *et al.*, 1999; Krasavtsev *et al.*, 2001; Rybalko and Shevchenko, 2003; Shevchenko and Rybalko, 2003; Shevchenko, 2004). These investigations revealed the extraordinarily complex

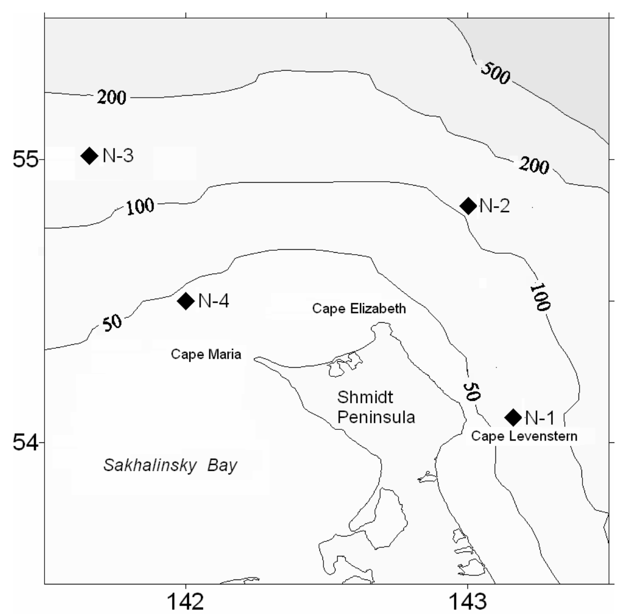

Fig. 1 Bathymetric map of the research area and mooring locations. Mooring station N-1 was deployed at KV, N-2 at VS, and N-3 and N-4 at ZS.

Table 1 Moorings information.

Oil and gas-bearing blocks	Mooring	Latitude (N)	Longitude (E)	Deployment date	Recovery date	Depth (m)
KV	N-1	54°05′	143°10′	July 21, 2006	August 27, 2006	78
VS	N-2	54°50′	143°00′	July 21, 2006	August 26, 2006	97
ZS	N-3	55°00′	141°40′	July 21, 2006	August 26, 2006	130
ZS	N-4	54°30′	142°00′	July 21, 2006	August 26, 2006	45

nature of water dynamics in this region, the main features of which are:

- Strong diurnal tidal currents of 2–3 knots (1–1.5 m/s) in the coastal zone from Cape Elizabeth to Lunsky Bay (approximately 51°25′N);
- Coastal upwelling due to the action of the southern winds during the summer season;
- The sharp strengthening of coastal flow to the south in the fall period as a result of the change in the wind field to winter monsoon conditions, with characteristic winds blowing from the north and northwest directions, which transfer low salinity water caused by the Amur River run-off along the east coast of Sakhalin.

However, only at the KV block it is possible to expect that these dynamic processes will have a similar nature, since topographical conditions in the region to the north of Sakhalin differ significantly from the northeastern shelf of the island. Currents in this area are especially interesting, since it was studied to the much smaller degree. One of a few works (Putov and Shevchenko, 2001) was dedicated to the analysis of current meter measurements in the shelf region near Okhotsk (the Kukhtuyskaya oil and gas-bearing area). Although the measurements were conducted at the significant distance from Shmidt Peninsula, let us examine some results of this work, since it is interesting to compare them with the measurements obtained in the present project.

Near Okhotsk, currents were measured in the surface, intermediate and near-bottom layers for two weeks at the end of May–beginning June 1988 (Putov and Shevchenko, 2001). Records showed that tidal fluctuations prevailed, and they were somewhat weaker in the surface layer compared to the intermediate layer which was influenced by water stratification. In the thin heated upper layer, inertial flows were also noted, but were practically absent at depths below the thermocline.

Residual currents were comparatively small and oriented in a west–southwest direction, and their intensity diminished with the depth. In the middle layer flow was observed in a western direction, while in the upper layer, directions were more irregular, probably due to the variable action of the wind.

KV Block (N-1) Mooring Results

The N-1 mooring, which included the SonTek/YSI Acoustic Doppler Profiler (ADP), was deployed on July 21 near Cape Levenshtern (Fig. 1, Table 1). It was in this area that coastal radar measurements of ice drift were made in 1992–1995 and thus, there was information about the pattern of flows (Tambovsky and Shevchenko, 1999). The ADP was fixed on a special stainless steel frame which was held on the substrate with the aid of two anchors. The depth of the sea at the point of deployment was 78 m. Current measurements were performed in 18 layers with a thickness of 4 m each, except for a “blank zone” approximately about 5 m above the sensor heads where no measurements were taken. The distinctive feature of the Doppler profilers established on the bottom is that the measurements in the near-surface layer are usually contaminated by surface waves. We will have this in mind when we discuss the observations.

For observations, three different layers were selected: the near-bottom (1st layer from the ADP), intermediate (9th layer from the ADP) and upper (surface) layer (18th layer from the ADP). The measured velocity vectors of the currents are represented in Figure 2. The north–south meridional component of the currents clearly predominates for all the horizons. This is due to the orientation of coastline where the KV block is almost parallel to the meridian. Observations show that diurnal tidal currents prevail. Characteristic of them is a two-week changeability where there is a sharp weakening on

August 1–3 and on August 14–16. This is expressed especially in the intermediate and near-bottom layers. At the surface, due to an increase in the role of winds, the contribution of the residual component generally grows with the intensity of total flows. It is possible that, to a certain extent, the high speed of the residual component and the less regular nature of the tidal currents are caused by the distorting influence of the free surface, which was discussed above.

Let us examine the results of the calculated distributions of current velocities at different horizons (Fig. 2). In the surface layer, the highest repetition (34.4%) is obtained in the northern direction where maximum speeds (more than 180 cm/s) are prevalent. The repetition of the flows of the southern direction is somewhat less (21.8%), while maximum speeds are also high (180.9 cm/s); in this direction, the average speed is the highest (75.4 cm/s). In the middle layer the situation is quite different—here the currents are predominantly in the southern direction—their repetition is the highest (42.5%); in this direction speeds attain maximum values (134.7 cm/s), and greatest average values (63.7). The near-bottom layer is also characterized by a separation of currents to the southern direction (30.9%), but the greatest repetition in the flows is in the northwestern direction (37.4%). Here, we note an increase in the portion of the currents in the southeastern direction (14.6%). This indicates that in the near-bottom layer, the currents flow counterclockwise in comparison with the upper layers. The maximum speeds are in the southern (100.3 cm/s), southeastern (95.6 cm/s) and north-western directions (76.4 cm/s), which are substantially less than in the intermediate and surface layers. The average speeds are 40, 39 and 35 cm/s, respectively.

According to the observational data at each station, the velocity vectors of the currents on the parallel and on the meridian are usually determined from harmonic constant amplitudes and phases of 8 basic tidal constituents: 4 diurnal (Q_1, O_1, P_1, K_1) and 4 semidiurnal (N_2, M_2, S_2, K_2). At the N-1 mooring, in addition to the very fast diurnal tidal currents, two additional diurnal waves ($2Q_1$, HI_1) were determined. For other points in this area, measurements are negligibly small. Tidal currents are traditionally characterized by ellipses, which are designed on the basis of the calculated harmonic constants. Figure 3 shows the current ellipses for the two main tidal constituents: diurnal K_1 and semidiurnal M_2.

Starting from the origin in each panel in Figure 3, the current vector arising from each constituent traces out an ellipse over that constituent's period. The rhombs on each ellipse denote the end positions of the vector at each successive hour for the diurnal constituent and half-hour for the semidiurnal waves. In the surface layer the ellipses of diurnal tidal constituent are compressed and have a bi-meridian orientation. The ellipse of the semidiurnal constituent is less compressed, major semi-axes

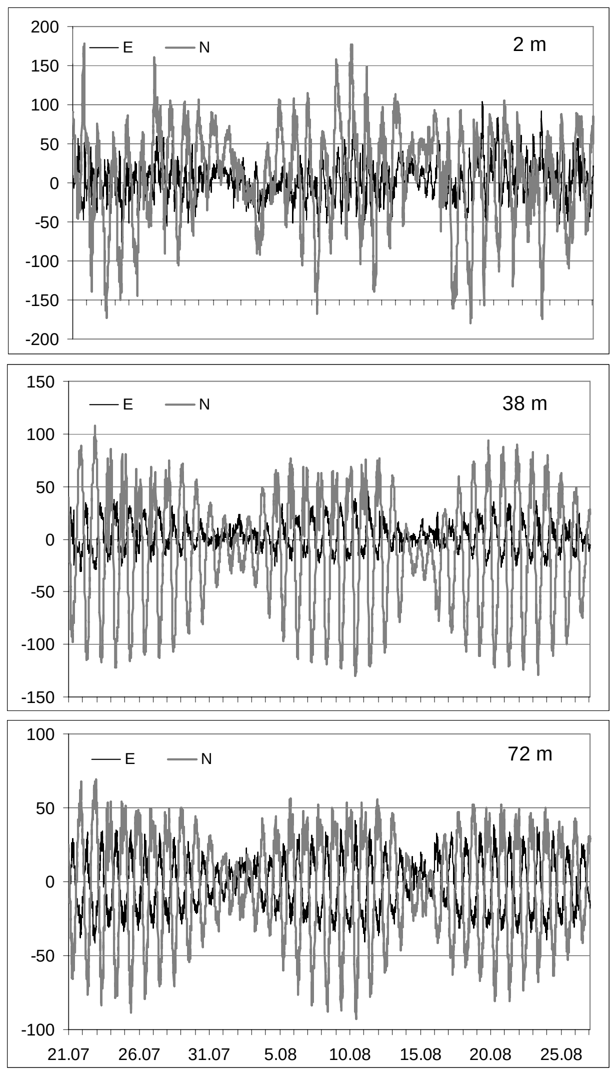

Fig. 2 Meridional (N) and zonal (E) velocity components (cm/s) at depths 2, 38 and 72 m obtained at Mooring N-1, KV block (July 21–August 26, 2006).

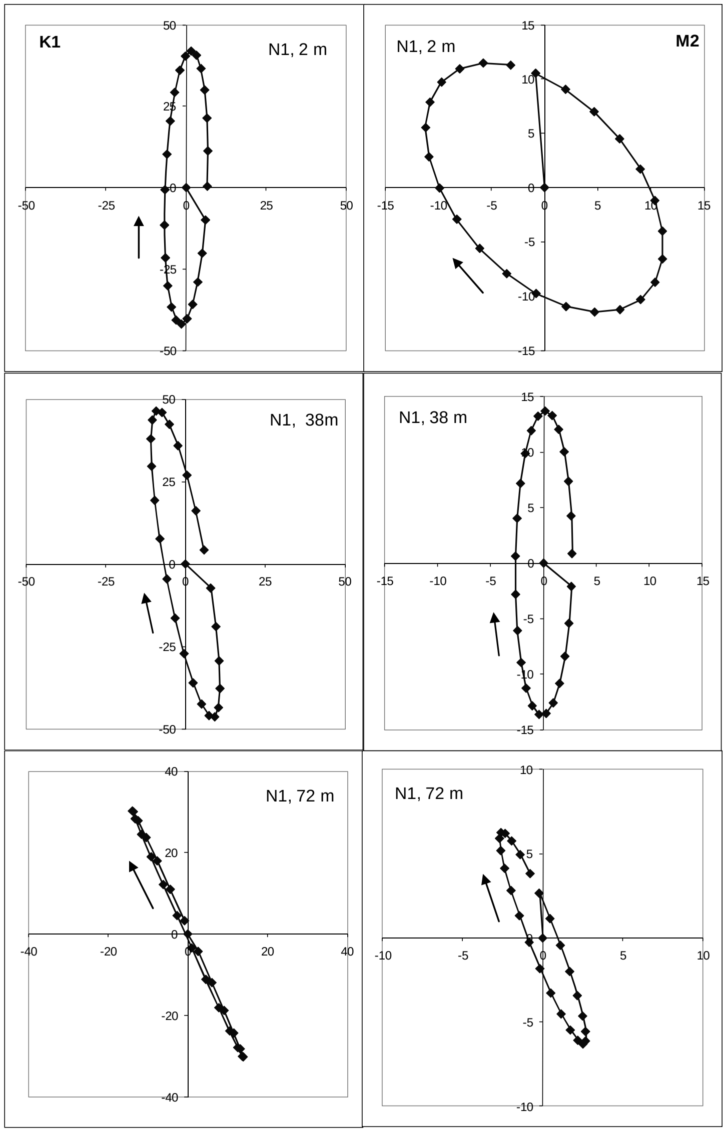

Fig. 3 Current ellipses of the major diurnal K_1 and semidiurnal M_2 tidal constituents at Mooring N-1, KV block at the surface, middle and near-bottom layers, respectively (July 21–August 26, 2006).

are oriented along the axis southeast–northwest. In the middle layer the ellipse of the diurnal harmonics is somewhat turned clockwise, their major semi-axes somewhat more than in the surface layer. The ellipses of semidiurnal currents are highly compressed, their major semi-axes are greater than in the surface layer, and they are elongated along the meridian.

This difference in the characteristics of tidal currents at different depths can be related to the influence of baroclinic effects in the thoroughly heated upper layer (Putov and Shevchenko, 2001), and is more applicable to the semidiurnal constituent whose period is lower than the Coriolis period in this region. In the near-bottom layer the ellipses of all waves are highly compressed, their major semi-axes decrease in comparison to the intermediate layer and are turned clockwise. Such changes are typical when ground friction plays a role, and they agree well with the results for the Piltun–Astokhskaya area, northeast Sakhalin (Popudribko *et al.*, 1998). The obtained estimations of major tidal constituent make it possible to estimate different characteristics of tidal currents, in particular, the maximum speeds, based on astronomical conditions.

It is well known that for this region to account for the inter-annual fluctuations of tide ranges, it is necessary to consider variations with the period of 18.6 years (usually rounded off to 19 years) (Putov and Shevchenko, 1998). To adequately describe the distribution of tidal components, it is necessary to construct distributions in the gradations of speed and the directions, pre-calculated for the 19-year period. In the surface layer intensive fluctuations with periods of 1–2 weeks were observed, which is typical for currents caused by the action of wind. Variations in the meridional component were especially great; their amplitude reached 80 cm/s, which is uncharacteristic for the summer period, when synoptic processes are expressed relatively weakly (Kochergin *et al.*, 1999). In the middle and near-bottom layers the speeds of residual currents noticeably decrease, the meridional components have a similar nature, and the zonal components are distinguished more substantially. The distribution of the residual flows in the gradations of speed and the directions (Fig. 4) reflect these changes. Thus, in the intermediate layer, the main flow is oriented south–southeast (repetition 48.6 and 21.1%, respectively); in the near-bottom layer the greatest repetition is in the southern (27.4%) and southwestern directions (20.1%), followed by increases in the western (13.5%) and northwestern (15.1%) directions.

Similar differences were found in the Piltun–Astokhskaya area (Krasavtsev *et al.*, 2000; Shevchenko, 2004) where an increase in the near-bottom layer of the repetition of flows oriented along the coast was connected to coastal upwelling, which occurs on the northeastern shelf of Sakhalin due to the action of the winds from the south, and characterized the summer season.

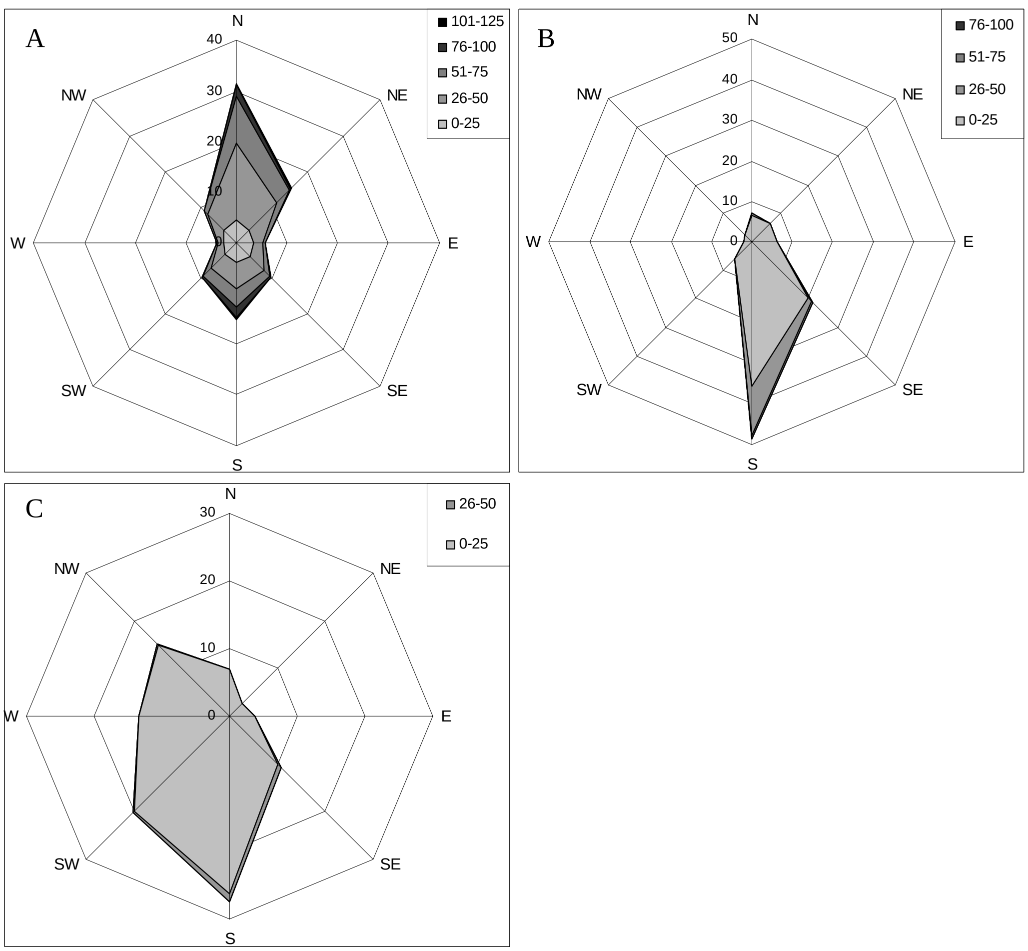

Fig. 4 Distribution of residual currents (%) by speed (cm/s) and direction gradations in (a) surface, (b) middle and (c) near-bottom layers at Mooring N-1, KV block.

VS Block (N-2) Mooring Results

Let us examine the current measurements obtained on the VS block collected by the N-2 mooring. At this mooring, three single-point current meters, SonTek Argonaut-MD, were fixed at horizons of 8, 49 and 94 m. The mooring depth reached 97 m (Fig. 1, Table 1). The vertical tension of the rope was ensured by plastic subsurface buoys, and the mooring was fixed on the bottom by two anchors.

The velocity vectors of the currents at different horizons are presented in Figure 5. Similar to the KV block, diurnal tidal currents prevailed; however, they differed from the KV block in that their intensity was considerably less and there were no essential differences between meridional and zonal components, although the speed of meridian currents were slightly higher, especially in the upper two layers.

Distributions of speed and direction show that in the surface layer, the highest repetition (16–17%) was less for the southern and southeastern directions, and for the northern and northwestern directions. Meanwhile, the highest average speed (30–33 cm/s), with a maximum value (65 cm/s) was noted in the southeastern direction. With depth there was an increase in the proportion of southeastern and north-western flow directions (particularly in the near-bottom layer, where the repetition of southeastern direction increased to 31.2%). Differences in the distributions in the surface and middle layers were insignificant.

The harmonic constants of 8 major tidal constituents, defined in the same way as for the N-1 mooring, were used for constructing the tidal ellipses for the main diurnal and semidiurnal constituents represented in Figure 6. The harmonic constants of the main diurnal constituents are very similar at different horizons. There is only an insignificant reduction in the amplitude of meridian with an analogous increase in the amplitude of the zonal component, which indicates a certain turn of ellipses in the cyclonic direction with the depth. The vector direction in the tidal cycle was clockwise for both constituents (except for M_2 at 49 m depth). Vertical changes in the ellipses of semidiurnal harmonics are more apparent. Compared to the surface, the middle layer has compressed ellipses with a decrease of the major semi-axis. The direction of rotation of the vectors in the tidal cycle changes to the cyclonic. In the near-bottom layer ellipses are even more compressed; in this case, they turn significantly, and have an almost zonal orientation. The observed differences in the orientation of the axes of diurnal and semidiurnal constituents, even in spite of smaller velocity of the latter, are the reasons for the fairly complicated picture of the distributions of tidal currents in the gradations of speed and the directions.

First of all, in the surface layer the northern (21.9%) and southern (20.3%) directions are separated; in the intermediate layer this is also southern (23.5%) and northwestern (26.9%). In the near-bottom layer these are already southeastern (28.9%) and northwestern (25.5%) directions. Non-tidal currents at the VS block were comparatively small, with fluctuations of periods 1–2 weeks. High-frequency variations

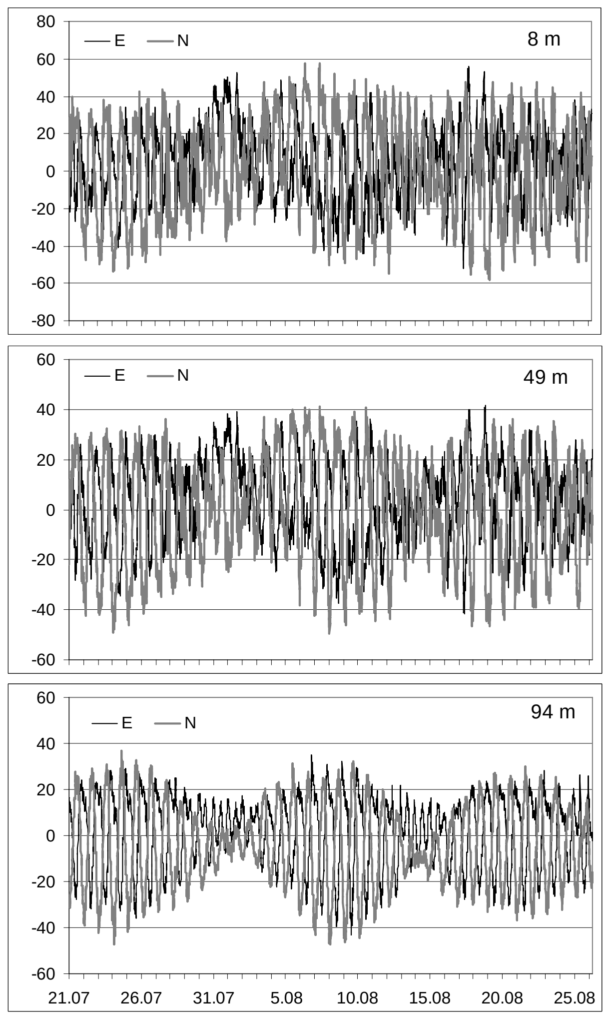

Fig. 5 Meridional (N) and zonal (E) velocity components (cm/s) at depths 8, 49 and 94 m obtained at mooring N-2, VS block (July 21–August 26, 2006).

occurred, which are characteristic of regions with developed turbulence. The pattern of residual flows in the surface and intermediate layers was identical, in the near-bottom layer the rate of flows were noticeably lessened. Moreover, variations in the synoptic time range were manifested more distinctly.

The distributions of residual flows in the gradations of speed and the directions (Fig. 7) reveals a predominance in the surface layer of the flows of northern (15%), northeastern (16.3%) and eastern (16.3%) directions. In the middle layer, the eastern direction (18%) is separated more clearly from the northeastern and southeastern directions which are similar (about 15%). In the near-bottom layer there is a noticeable turn in the main flow, with the greatest share of repetition in the southern (34%) and southeastern (33.5%) directions. The difference between the surface and near-bottom layers is most likely due to the influence of the winds from the south predominating during the summer season. On the surface, therefore, a large proportion is in the northern direction, which is analogous to that already noted above for the KV block. In this case, a compensating current in the opposite direction appears on the bottom layer.

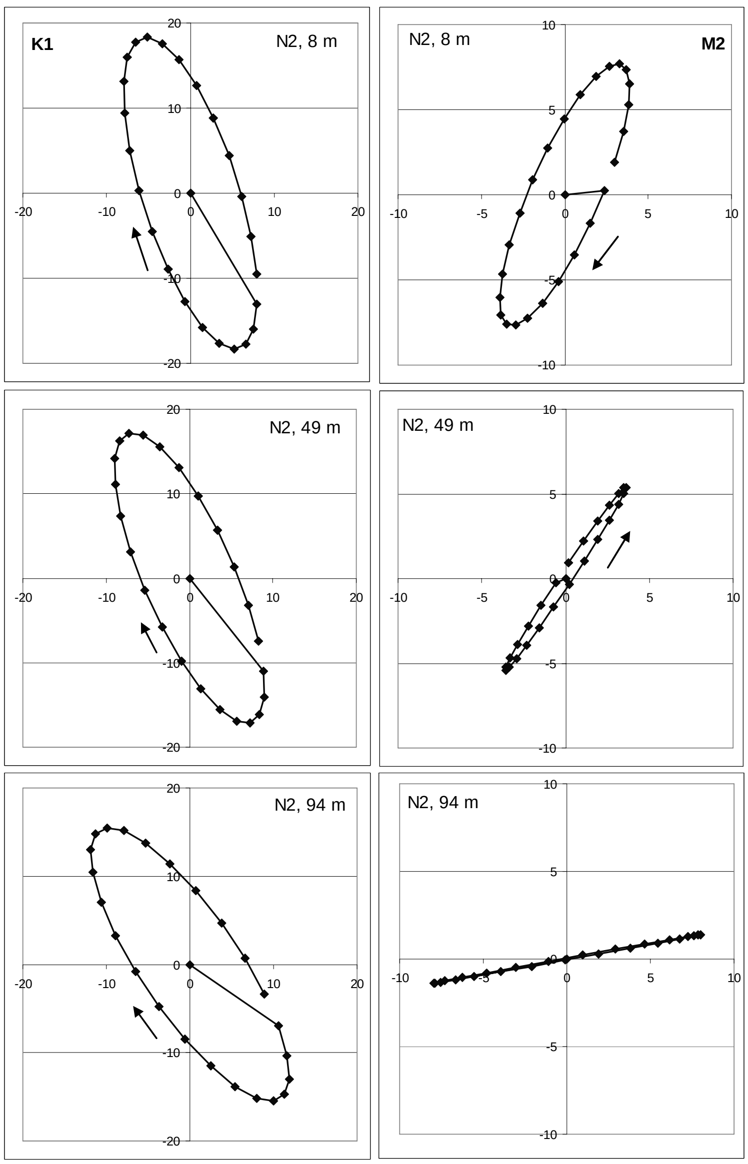

Fig. 6 Current ellipses of the major diurnal K_1 and semidiurnal M_2 tidal constituents at Mooring N-2, VS block at the surface, middle and near-bottom layers, respectively (July 21–August 26, 2006).

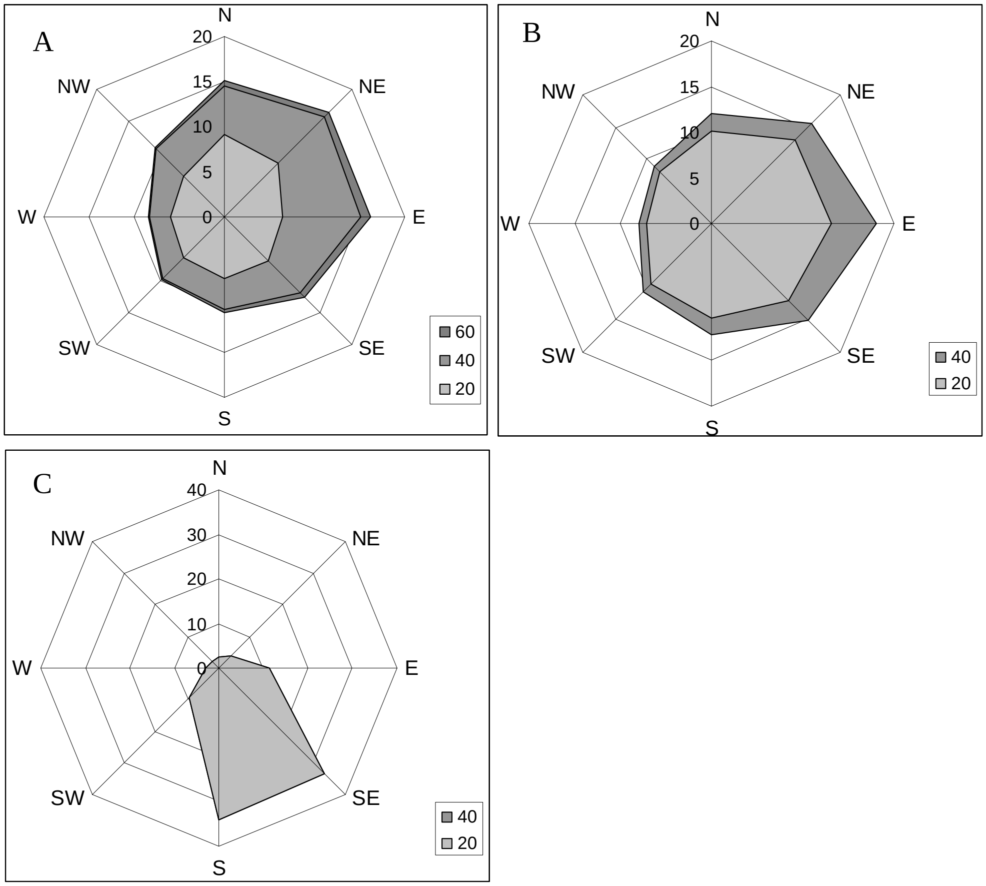

Fig. 7 Distribution of residual currents (%) by speed (cm/s) and direction gradations in (a) surface, (b) middle and (c) near-bottom layers at Mooring N-2, VS block.

ZS Block Mooring Results

Northern (N-3) observations

Here, the N-3 mooring, with the same design as N-2, was deployed. The single-point current meters registered currents at 8, 62 and 127 m horizons. Although the depth on this block is the greatest (130 m) compared to the others, the currents are the smallest. In contrast to cases described above, the zonal component of the currents predominate (Fig. 8), especially in the near-bottom layer. Flow patterns in the gradations of speed and the directions were calculated. In the subsurface layer the highest repetition corresponds to the western (20%), eastern (19.2%) and southeastern directions (16.4%), and maximum speeds are in the western and southwestern directions (about 66 cm/s). The average speeds are approximately the same with respect to all directions. In the intermediate layer the repetition of western and southeastern currents increases somewhat (22.8% and 24.2%, respectively) with a decreasing share in eastern direction (14.1%), but as a whole the nature of distribution does not change. The maximum values of speed also coincide with the western direction, but they decrease more than two times (30.8 cm/s). In the near-bottom layer a change in the nature of distribution is more apparent. Here, the currents in the eastern direction clearly predominate (45.7%), and the share in the western direction sharply decrease (3.5%). The maximum and average values of speed are approximately the same as in the middle layer, with exception of the eastern directions, where they increase somewhat.

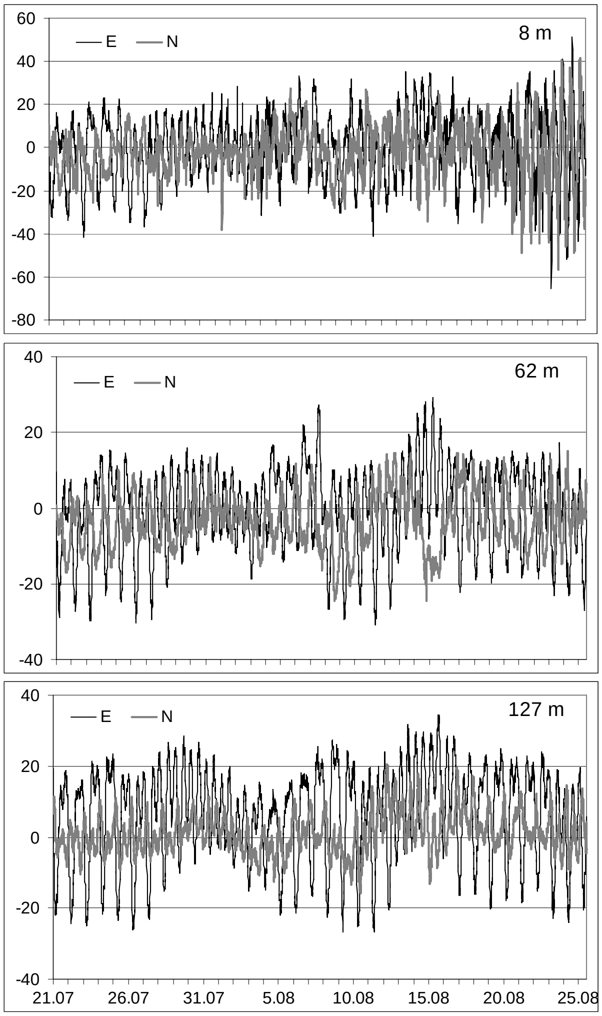

Fig. 8 Meridional (N) and zonal (E) velocity components (cm/s) at depths 8, 62 and 127 m obtained at mooring N-3 ZS block (July 21–August 26, 2006).

Amplitudes and phases of the main tidal constituents were calculated for each horizon, and the ellipses of the main diurnal and semidiurnal constituents are represented in Figure 9. It is most interesting that at 127 m depth the amplitude of the diurnal harmonics increases somewhat in comparison with two upper layers (an analogous phenomenon was observed in the region of Okhotsk port (Sea of Okhotsk northwestern shelf) (Putov and Shevchenko, 2001). Current speeds for the main diurnal and semidiurnal components are approximately the same; in the surface and middle layers the ellipses are compressed and oriented along the axis east–west and northwest directions; and the rotation of vectors in the tidal cycle is counter-clockwise. In the near-bottom layer the ellipses are oriented almost along-latitude, the compression ratio somewhat decreases, and the direction of rotation remains counterclockwise. For the semidiurnal components, in particular S_2, an increase in speed and a decreasing compression ratio of ellipses in the near-bottom layer is also characteristic (not shown).

The intensity of non-tidal flows in the northern part of the ZS block is comparatively small. Against the background flows at all horizons, variations with periods of approximately 1 week are expressed more weakly than on the VS block. A notable strengthening of the flows in the southeastern direction was observed on August 14–16, especially in the middle layer. The most interesting moment was at the end of the observational period when there was a sharp intensification in currents at the surface layer. These currents had a quasi-periodic nature, with a period of approximately 14 hours, which is close to the Coriolis period for deployment at that latitude. This indicates that the inertial flows were the most probable reason for the observed current intensification, with amplitudes reaching 40–45 cm/s. An analogous manifestation of this form of periodic flow, also in the thoroughly heated upper layer, was noted in the region near the port of Okhotsk (Putov and Shevchenko, 2001). Generally, the formation of these flows is connected with strengthening of the wind, which was noted during weather observations taken onboard the R/V *Dmitry Peskov*. At 62 m depth only weak transmissions of these currents are examined, which, as a rule, are most intensive near the thermocline. According to the results of our CTD survey, the thermocline was located at a depth of approximately 20 m, and at depths more than 30 m in this region uniformly cold waters (–1.4ºC) with the sufficiently high salinity (33 psu) were observed.

The flow pattern in the gradations of the speed and the directions (Fig. 10) in the surface layer reveal approximately the same values of repetition in different directions. Flows in the southern (16.7%) and southwestern (17%) directions are weak and separated. In the middle layer, these directions share approximately the same increase (21.2% and 21.4%); in the near-bottom layer the current is well expressed to the east (44.3%).

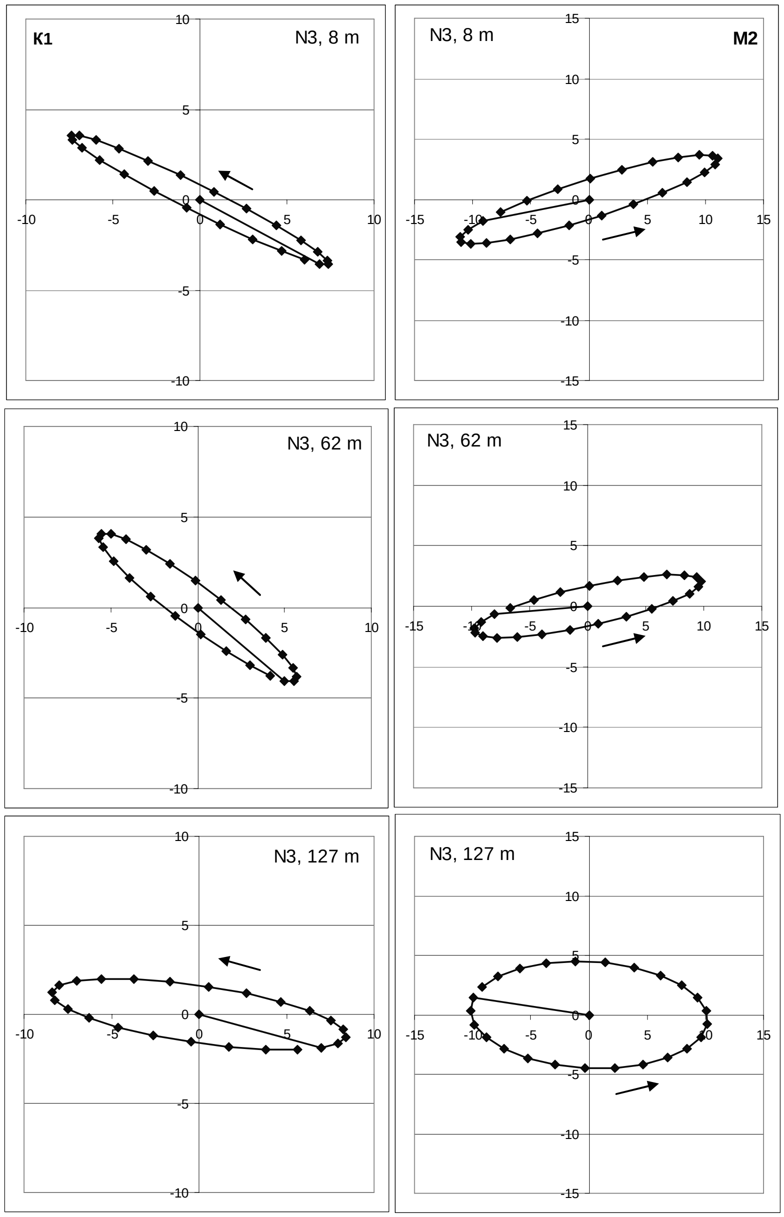

Fig. 9 Current ellipses of the major diurnal K_1 and semidiurnal M_2 tidal constituents at Mooring N-3, northern ZS block at the surface, middle and near-bottom layers, respectively (July 2–August 26, 2006).

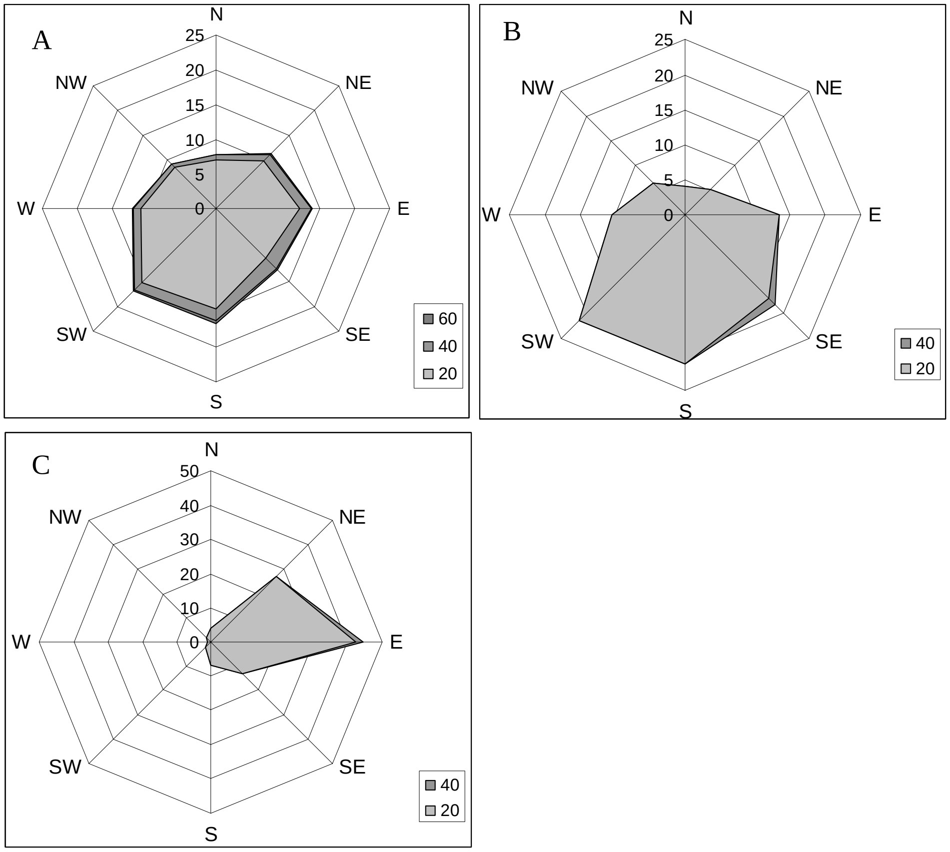

Fig. 10 Distribution of residual currents (%) by speed (cm/s) and direction gradations in (a) surface, (b) middle and (c) near-bottom layers at Mooring N-3, VS block.

Southern (N-4) observations

Mooring N-4 was deployed at a depth of 45 m (Fig. 1, Table 1), and currents measurements were conducted with an ADP in which the water column was divided into the 21 sublayers of 2 m thickness. Deployment conditions were the same as for the N-1 mooring. For observations, the following layers were chosen – the near-bottom (1st layer from the ADP), intermediate (11th layer from the ADP) and surface (21st layer from the ADP). North and east projections are shown in Figure 11.

The role of tides was approximately the same in the N-2 and the N-4 mooring data (in contrast with N-1 and N-3 mooring data). Diurnal tidal currents prevailed, especially in the intermediate and near-bottom layers. To a lesser degree this was characteristic for the surface layer, where the relative role of non-tidal flows is more significant.

The ellipses of the main diurnal harmonic K_1 (Fig. 12) at the surface and intermediate layers are almost identical – they are compressed, elongated along the east–west and south–west axis, and the rotation of vectors in the cycle is clockwise. In the near-bottom layer diurnal flows have a clear reversible nature; their intensity noticeably decreases in comparison with the upper layers. For the O_1 constituent (not shown) the change in rotation is counterclockwise. The ellipses of the main semidiurnal constituent, M_2, are also very similar at the surface and middle layers, with compressed and elongated axes in the northeast–southwest direction. In the near-bottom layer, in contrast to the diurnal flows, the compression ratio of the ellipses decreases, and the direction of vector rotation in all layers is anticyclonic. The contribution to the formation of the tidal currents by another semidiurnal wave, S_2, is insignificant and is not shown.

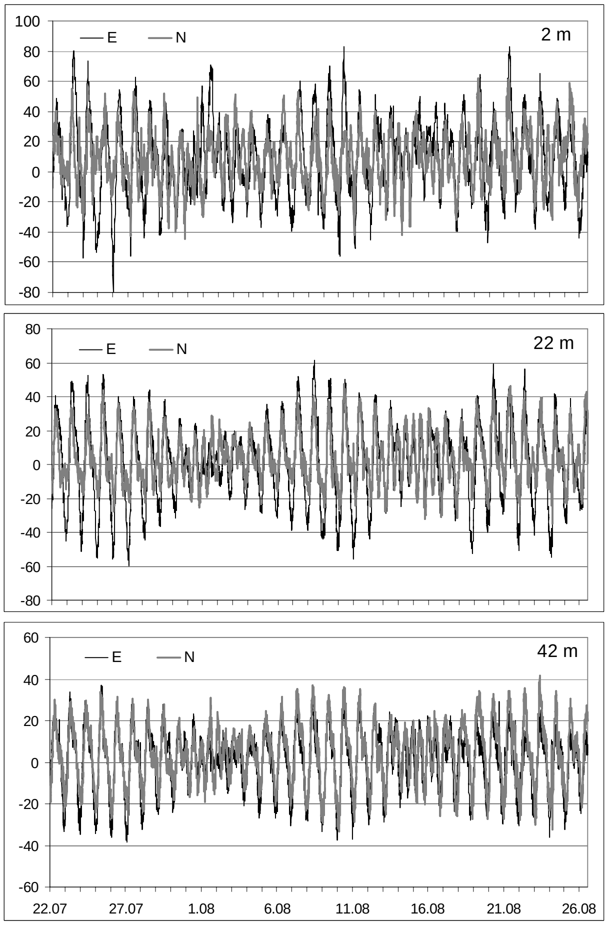

Fig. 11 Meridional (N) and zonal (E) velocity components (cm/s) at depths 2, 22 and 42 m obtained at mooring N-4, ZS block (July 21–August 26, 2006).

Non-tidal flows, similar to other moorings, reveal variations in the synoptic range of periods and high-frequency noise. Their intensity decreases substantially with the depth, with average speeds in the surface layer of about 15 cm/s, in the intermediate layer of approximately 10 cm/s, and in the near-bottom layer of approximately 8 cm/s. The distributions of residual currents in the gradations of speed and direction (Fig. 13) reveal the predominance of flows in the northeastern direction in the upper layer (34.1%). With increasing depth, the flow turns to the north. In the middle layer the portion of northern and northeastern flows is approximately the same (23.7% and 25.2%), and in the near-bottom layer, the flow to the north clearly predominates (31.7%). It is probable that the significant role of the northern component in the distribution of non-tidal currents at the N-4 mooring is connected with the influence of Amur River runoff whose waters, according to the existing knowledge, move as a relatively narrow coastal flow mixing with Sea of Okhotsk waters, and go around the northern part of Sakhalin Island (Shmidt Peninsula).

Conclusions

From current measurements taken in the region adjacent to Shmidt Peninsula, the following conclusions can be drawn.

First, it should be noted that a sufficient amount of high quality data were obtained. This is confirmed by a good agreement in tidal current characteristics at different horizons at each mooring, and are typical according to changes with depth (in particular for the sub-inertia diurnal waves, which are to a lesser degree subjected to baroclinic effects).

Currents on the KV block are different from those located to the north in parameters of higher dynamics. Diurnal tidal currents reach 1 m/s and have characteristics typical at other oil and gas sites of the northeastern shelf of Sakhalin. Non-tidal currents reach 80 cm/s in the surface layer, which exceeds the maximum speeds according to long-term observations in this region in the summer period. The repetition of the flows of southern direction in the middle layer is higher here than over the Piltun–Astokhskaya area for the same season. In the near-bottom layer, the flow is directed to the coast, which should be coordinated with the observations carried out previously.

Diurnal tidal constituents, in spite of their noticeable decrease in comparison with the KV block and at other moorings locations, determine the major role in the formation of currents to the north of Sakhalin. Their influence decreases in proportion to their removal from the coast, and at the deep mooring station at N-3 (ZS block), they are less than semidiurnal currents. In the upper layer at this mooring, intensive quasi-periodic fluctuations (amplitude of approximately 40 cm/s) are also noted.

The oscillatory period is close to the Coriolis period for the measurement sites, which is probably due to the inertial flows. Residual flows, which are caused by the action of variable wind fields, are very intensive in the surface layer. In the lower layers the flow is more consolidated and has a direction predominantly to the southeast in the intermediate layer and south-southeast in the near-bottom layer at the VS block.

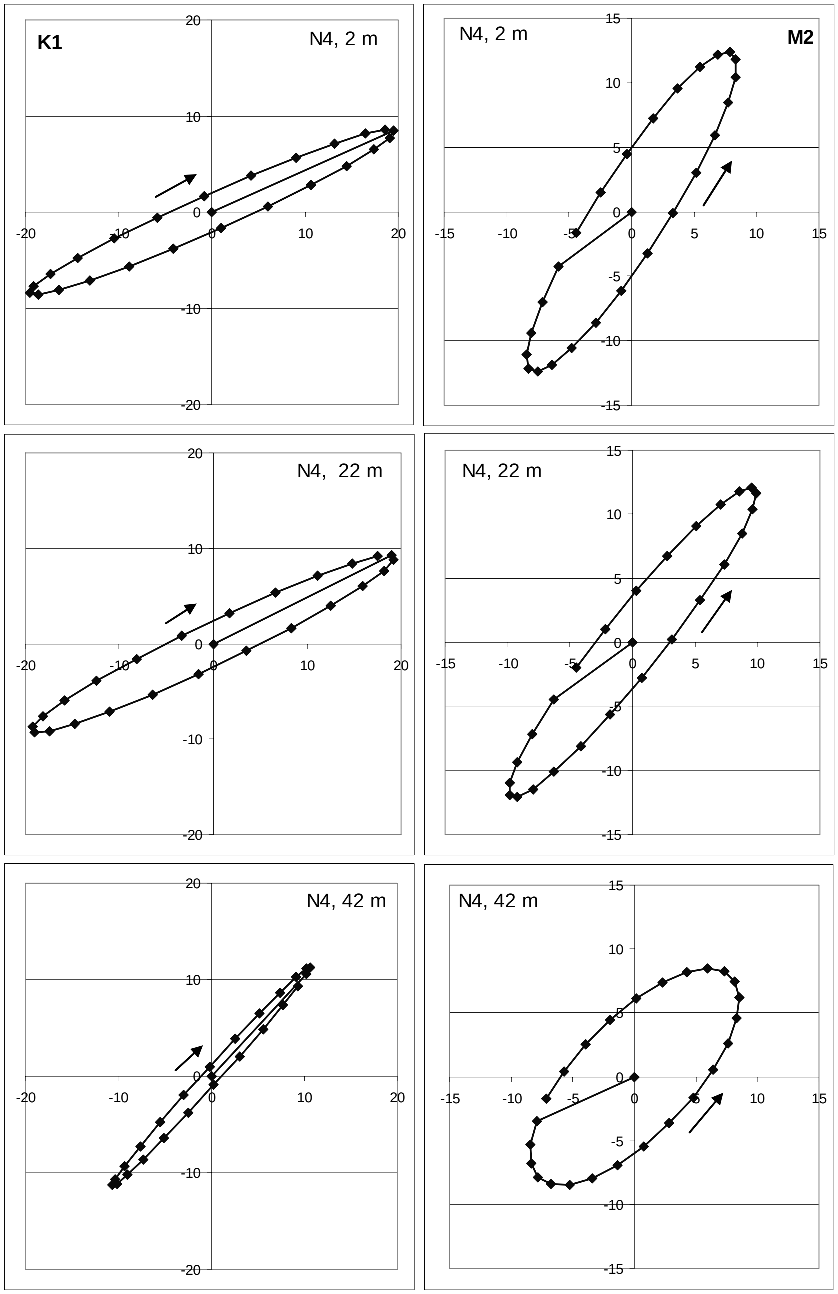

Fig. 12 Current ellipses of the major diurnal K_1 and semidiurnal M_2 tidal constituents at Mooring N-4, southern ZS block at the surface, middle and near-bottom layers, respectively (July 21–August 26, 2006).

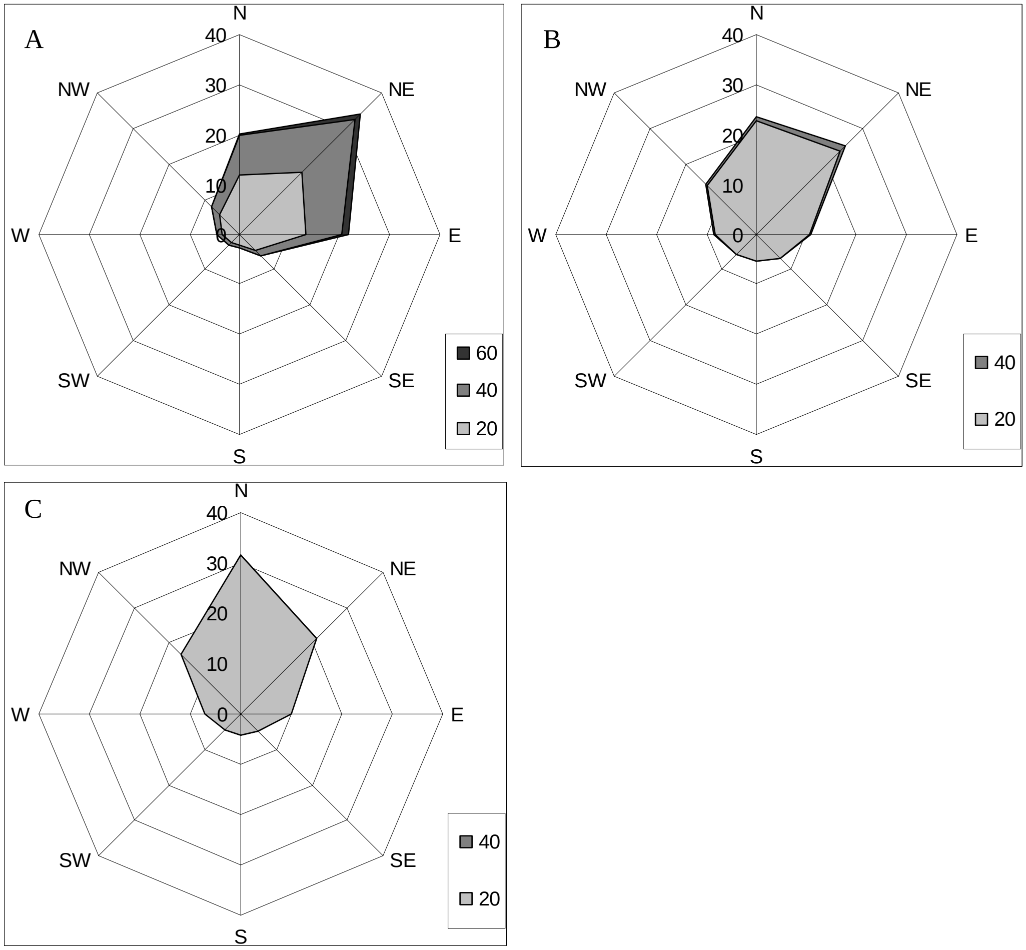

Fig. 13 Distribution of residual currents (%) by speed (cm/s) and direction gradations in (a) surface, (b) middle and (c) near-bottom layers at Mooring N-4.

On the ZS block at mooring N-3, the currents in the southern and southwestern directions are separated in the middle layer, and are oriented to the east in the near-bottom layer. In the southern part of the ZS block (coastal mooring N-4), the currents are oriented to the northeast direction in the intermediate layer and to the north in the near-bottom layer.

The current measurements carried out have made it possible for the first time to collect data on ocean dynamics in the area adjacent to the northern part of Sakhalin, in the place where East Sakhalin Current originates.

There is an additional important practical significance for obtaining these results: for continuing offshore oil and gas development, they will be required for evaluating the possible loads on the offshore constructions and for assessing the most probable direction of propagation of pollutants, which are dangerous for marine and human life.

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