

THE PECULARITIES OF THE COASTAL UPWELLING IN THE PETER THE GREAT BAY

E.A. Vilyanskaya, G.I. Yurasov

Pacific Oceanological Institute, the Far Eastern Russian Academy of Sciences,
Vladivostok, vily05@mail.ru



Peter the Great bay is the area of the most developed shelf in the Sea of Japan. Monsoonal winds influence the superficial waters of a gulf.

Inlet, Sea of Japan (East Sea), northwestern Pacific Ocean, in extreme southeastern Russia. It extends for 115 mi (185 km) from the mouth of the Tumen River northeast across to Cape Povorotny. The bay reaches inland for 55 mi (88 km) and contains the port of Vladivostok. The bay freezes from early December to mid-April.



Coastal upwelling is the best known type of upwelling, and the most closely related to human activities as it supports some of the most productive fisheries in the world.

Coastal upwelling is a dramatic event during which warm nearshore water is replaced from below by cold nutrient-rich water. The most prominent upwelling areas are located at the western coasts of continents where an equatorward wind, due to the subtropical high, forces an offshore Ekman drift of the surface water

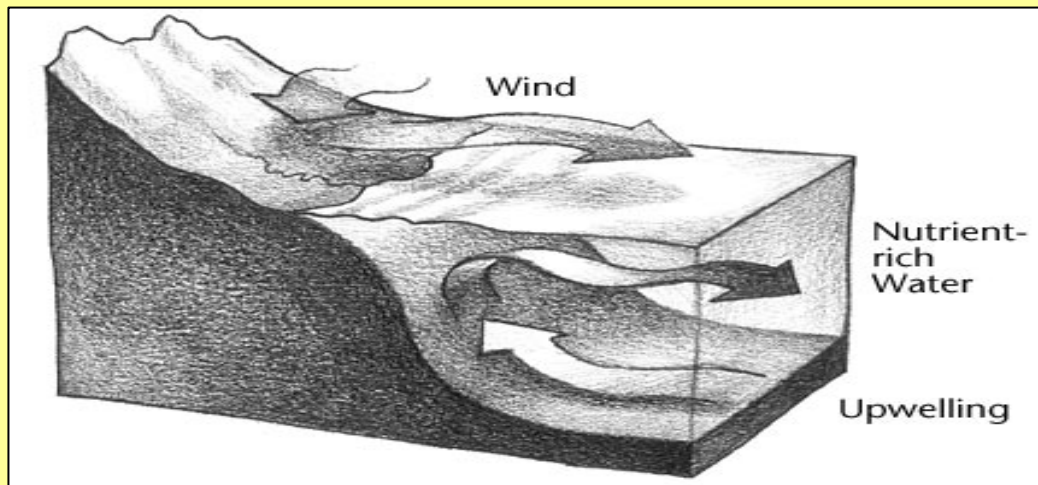
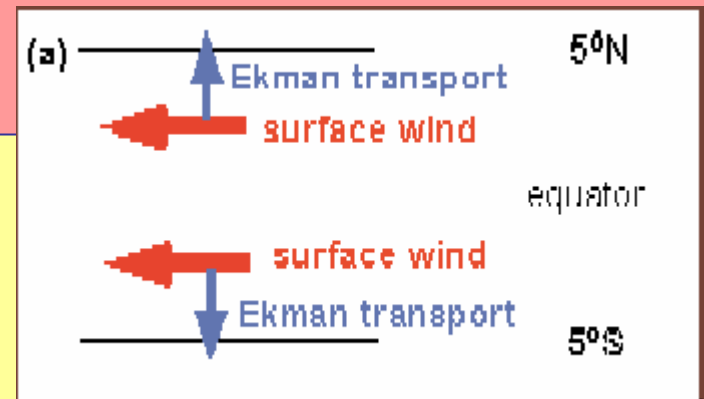


Fig.2 Seasonal upwelling

Equatorial upwelling. Imagine a steady easterly wind along the equator (Fig 1). Since the Ekman transport is to the left of the wind in the south, and to the right in the north, this wind induces a perpendicular flow of water away from the equator, in both hemispheres.



- **Fig 1.** Ekman pumping along the equator shows a plan view of the prevailing surface wind and resulting water transport in the ocean's Ekman layer.

Seasonal upwelling

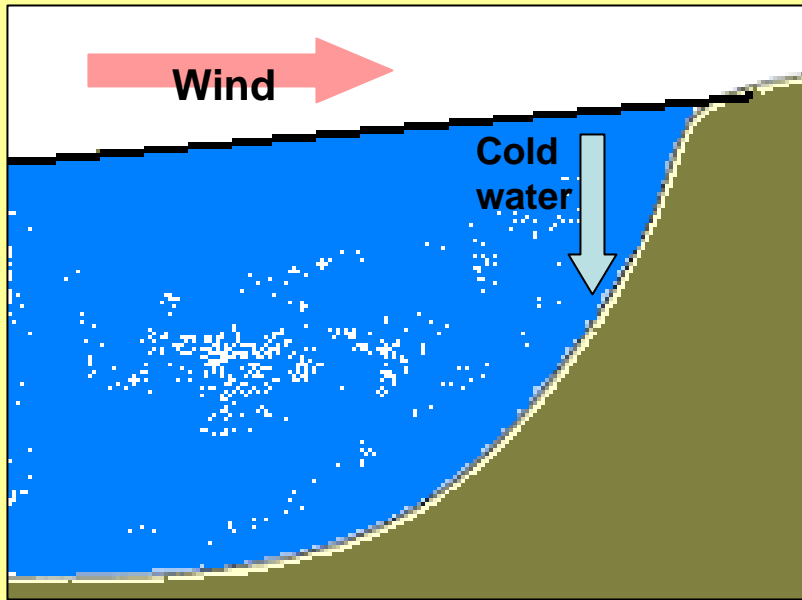


Fig.3 Downwelling.

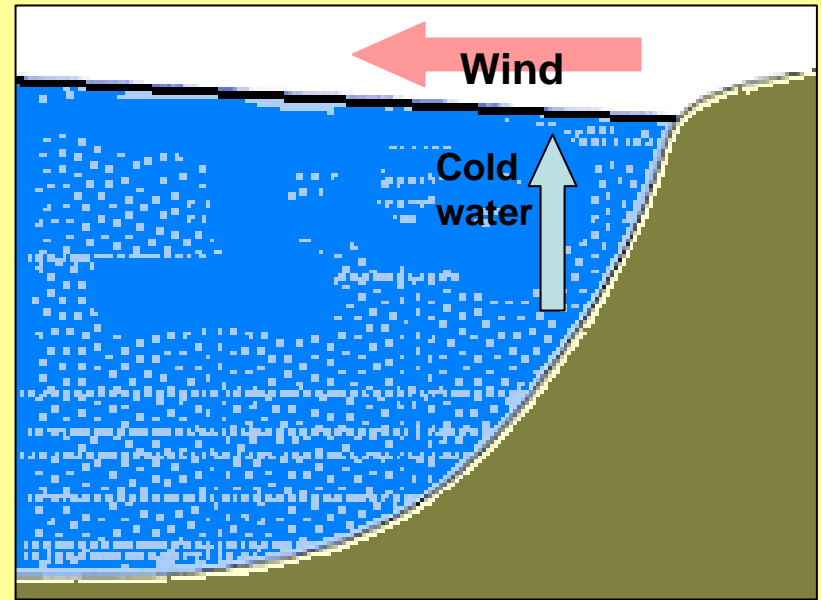


Fig.4 Upwelling

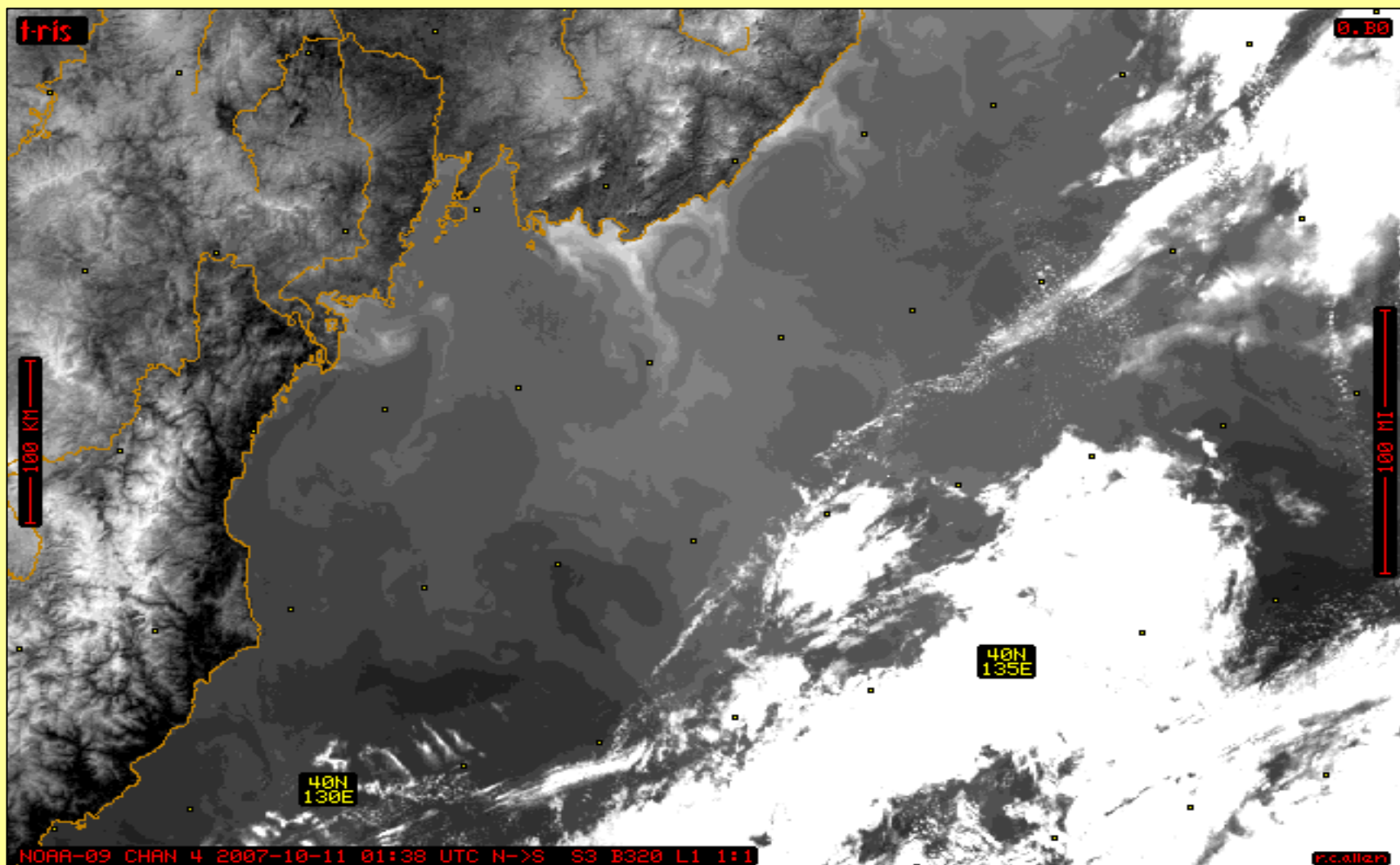


Fig. 5 Position of cold zones in Peter the Great bay in the satellite-picture for 11.10.2007 г.
(Light areas in a picture – cold waters; dark – warm waters).

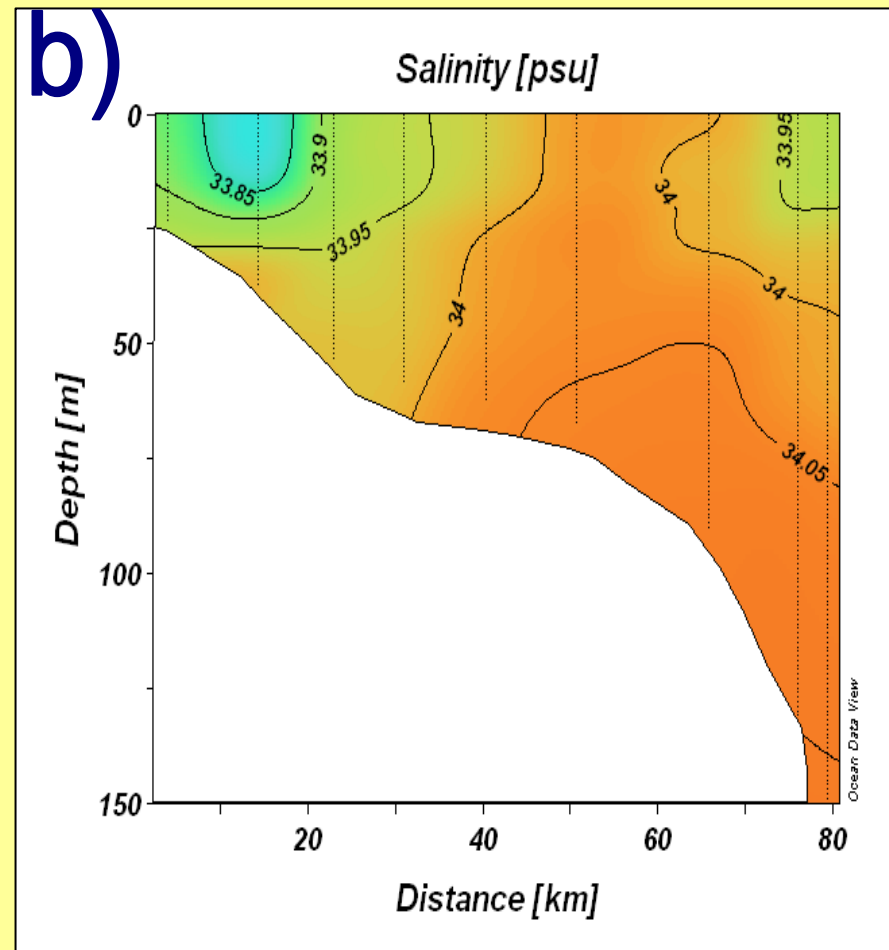
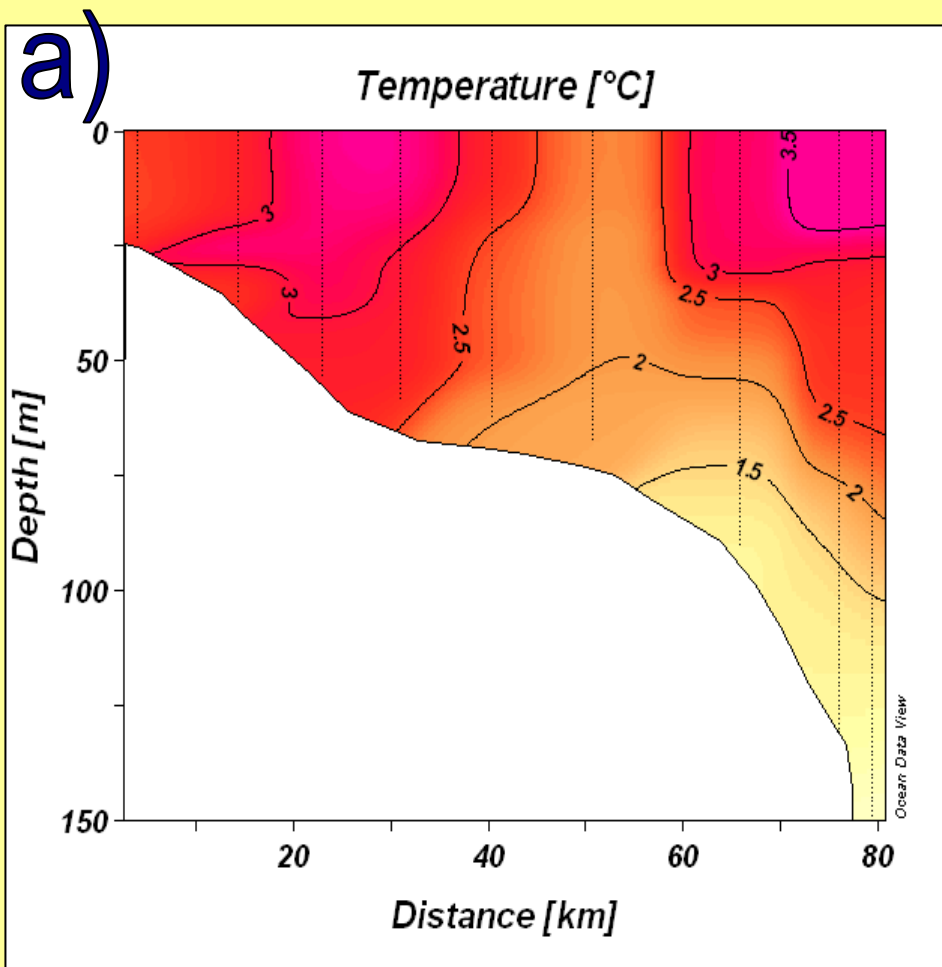


Fig.6 Distribution of temperature and salinity on a section along 132°E (November, 30th 1999r.) **Initial stage of upwelling development.**

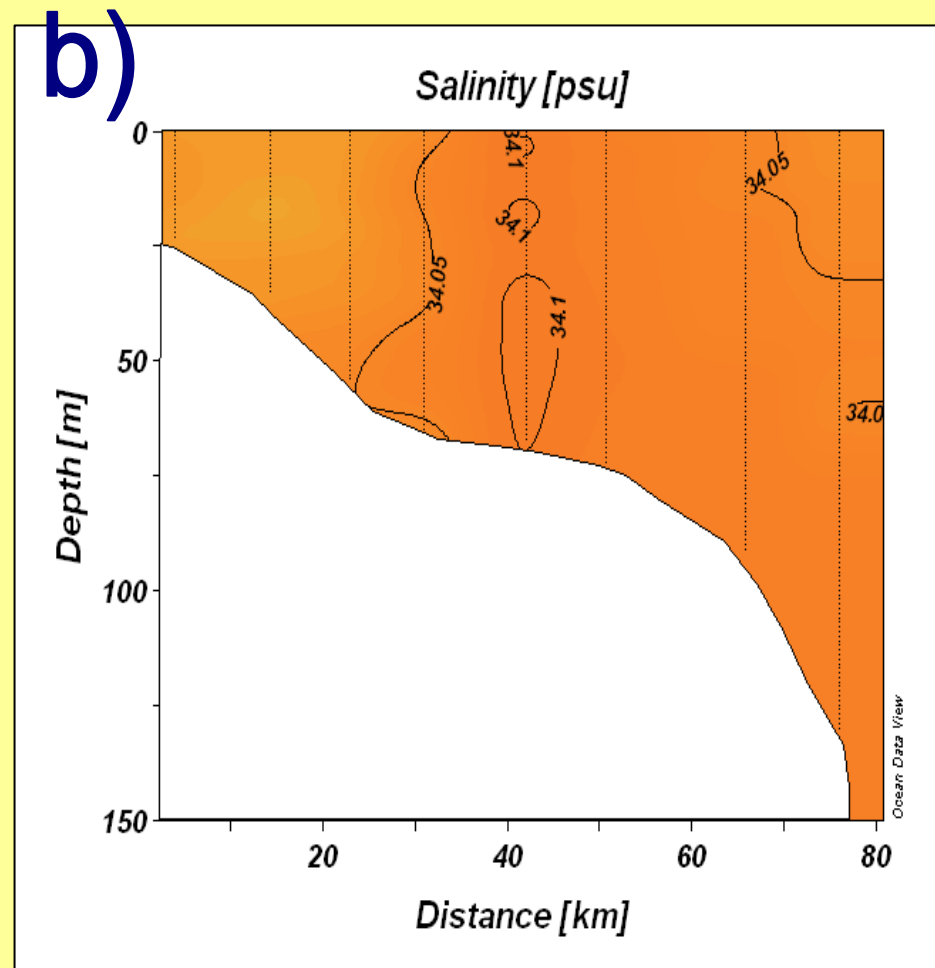
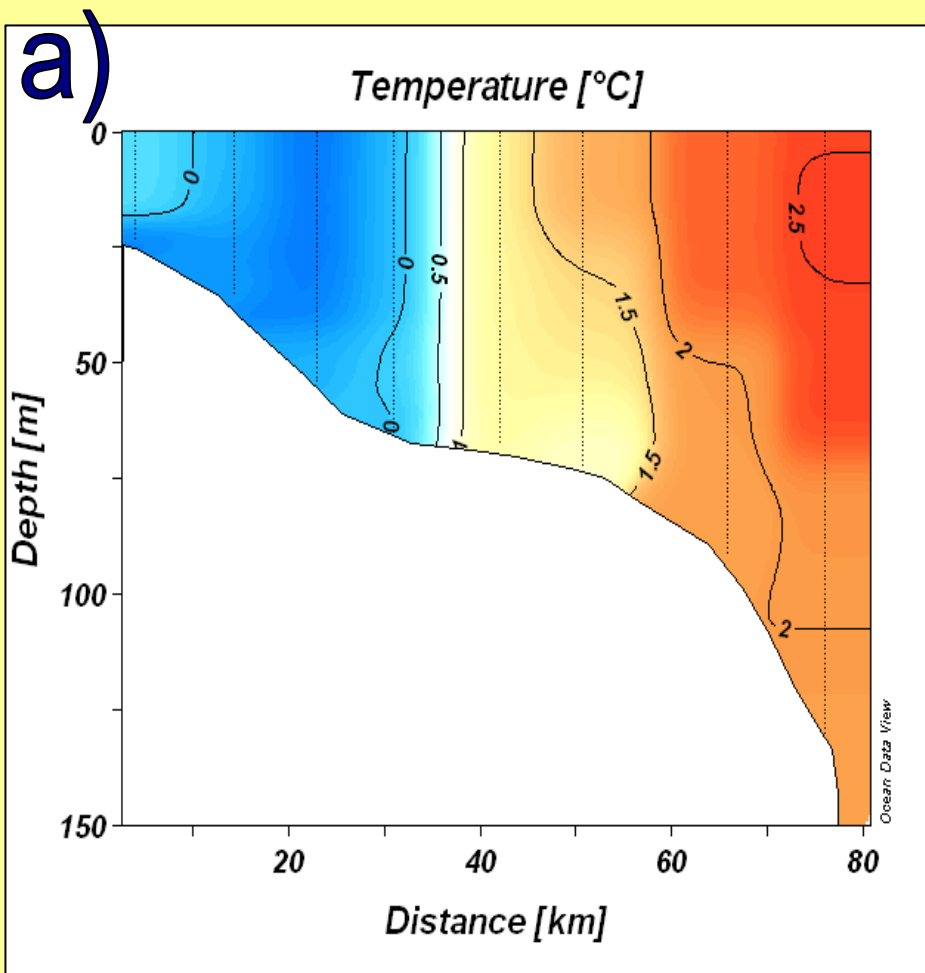


Fig.7 Distribution of temperature(a) and salinity(b) on a section along 132°E (December, 29th 1999r.) **The developed upwelling.**

Table 1. The maintenance of biogene elements on a surface of the sea according on the section along 132°E (November (above) and December (in the bottom of) 1999 year).

Width and Depth, m	43.08°E 23 m	43.00°E 35 m	42.83°E 65 m	42.67°E 70 m	42.43°E 150 m
· Si, mkM/L	14.1 12.9	13.7 12.5	12.5 16.1	17.3 20.2	11.5 16.4
PO ₄ , mkM/L	0.46 0.52	0.39 0.48	0.39 0.64	0.55 0.72	0.41 0.60
NO ₂ +NO ₃ , mkM/L	6.21 5.60	4.88 4.89	5.82 7.15	8.88 12.81	6.51 9.94

Conclusion

- During the time of the wind survey (November, 23 till November, 30), within the bay was registered strong wind fluctuation from 5 m/s to 15 m/s with the west-northern wind direction.
- This can approve an existence of conditions causing coastal upwelling activity development.
- Upwelling phenomenon causes considerable lowering of the water surfey tempreture. During upwelling process biogenic substance concentration increseases in 1.5 times.