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MACROSCALE ZONES OF HIGH BIOLOGICAL PRODUCTIVITY IN THE SOUTH PACIFIC OCEAN AS A PROBABLE EXPLANATION FOR THE EXISTENCE OF RELATIVELY ISOLATED JACK MACKEREL *(Trachurus murphy)* STOCK UNITS

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INTRODUCTIONS

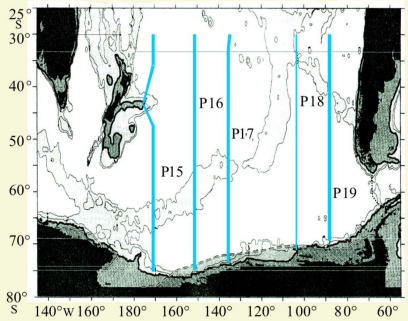
Based on analysis of the data on water dynamics (from the international projects WOCE and Argo) and satellite altimetric measurements of the ocean surface level and chlorophyll concentration in the surface layer, macroscale zones of high biological productivity have been identified. These zones are related to closed circulations of intermediate water of Antarctic origin. These waters contain 8–10 times more nutrients than the intermediate water of the northern origin. This means that when upwelled into the photic layer under the impact of mesoscale eddies they form quasistationary zones with high biological productivity located in the western, central, and eastern parts of the South Pacific Ocean. Comparison of the location of these zones with jack mackerel distribution at all life cycle stages (biostatistical and fishery data from catches of research and fishing vessels) allows us to advance a hypothesis on the availability of three relatively isolated stock units of jack mackerel, each of which requires a specific strategy of fishery management.

Keywords: South Pacific, jack mackerel, macroscale zone, stock units.

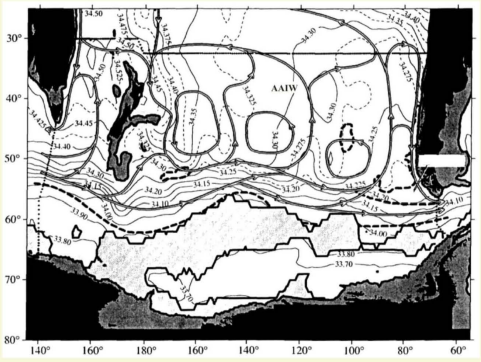
Materials used

Data type	Spatial resolution	Discrecity	Period	Source
Sea surface temperature	1°x1°	month	1982-2008	IGOSS
Climatic temperature and salinity values	1°x1°	month		WOA -2004
World Ocean Circulation Experiment project (WOCE)	Transects	-	1993-2002	WOCE Globale Data 2002
Sea level anomalies	1°x1°	month	1992-2008	AVISO
Experiment "Argo"	-	-	2005-2008	"Coriolis"

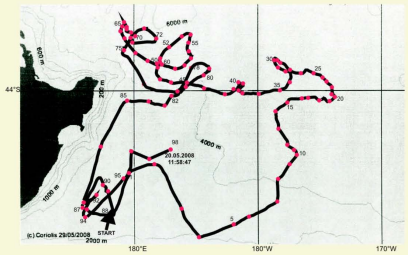
Oceanological transects WOCE 2002



Circulation of the Antarctic Intermediate Water Mass (AAIW) in the Southern Pacific Ocean (Koshliakov, Tarakanov, 2005)



Trajectory of drifting buoy ("Argo"-"Coriolis") 22.10.2005-20.05/2008



CONCLUSIONS

1. Analysis of the principle components and classification (Word`s method) of the atmospheric pressure and sea-surface temperature fields allowed to reveal the areas considerably differed in the seasonal and inter-annual variability pattern in the South Pacific Ocean.·

2. Analysis of the ocean level anomalies on the basis of satellite altimetric data allowed to determine zones of intensive eddies formation associated to the main frontal zones of the ocean upper layers.

3. The results of measurements under WOCE program indicated the existence of 3 closed circulations of the Antarctic intermediate water mass rich in nutrients. This water mass is ascending to the surface with mesoscale eddies facilitating existence of relatively isolated zones with high biological productivity. In these zones the existence of individual jack mackerel stock units is possible.

4. Since the oceanological conditions considerably affect the pelagic ecosystem structure and jack mackerel stock in the Southern Pacific Ocean, the further researches in the following directions are required:

-creation of the uniform data base of retrospective oceanological data applying the advanced methods of the data storage, processing and analysis (e.g. GIS-technologies);

-development of the efficient monitoring system for oceanological conditions, using satellite sounding the ocean surface and measurements from the research and fishing vessels.