



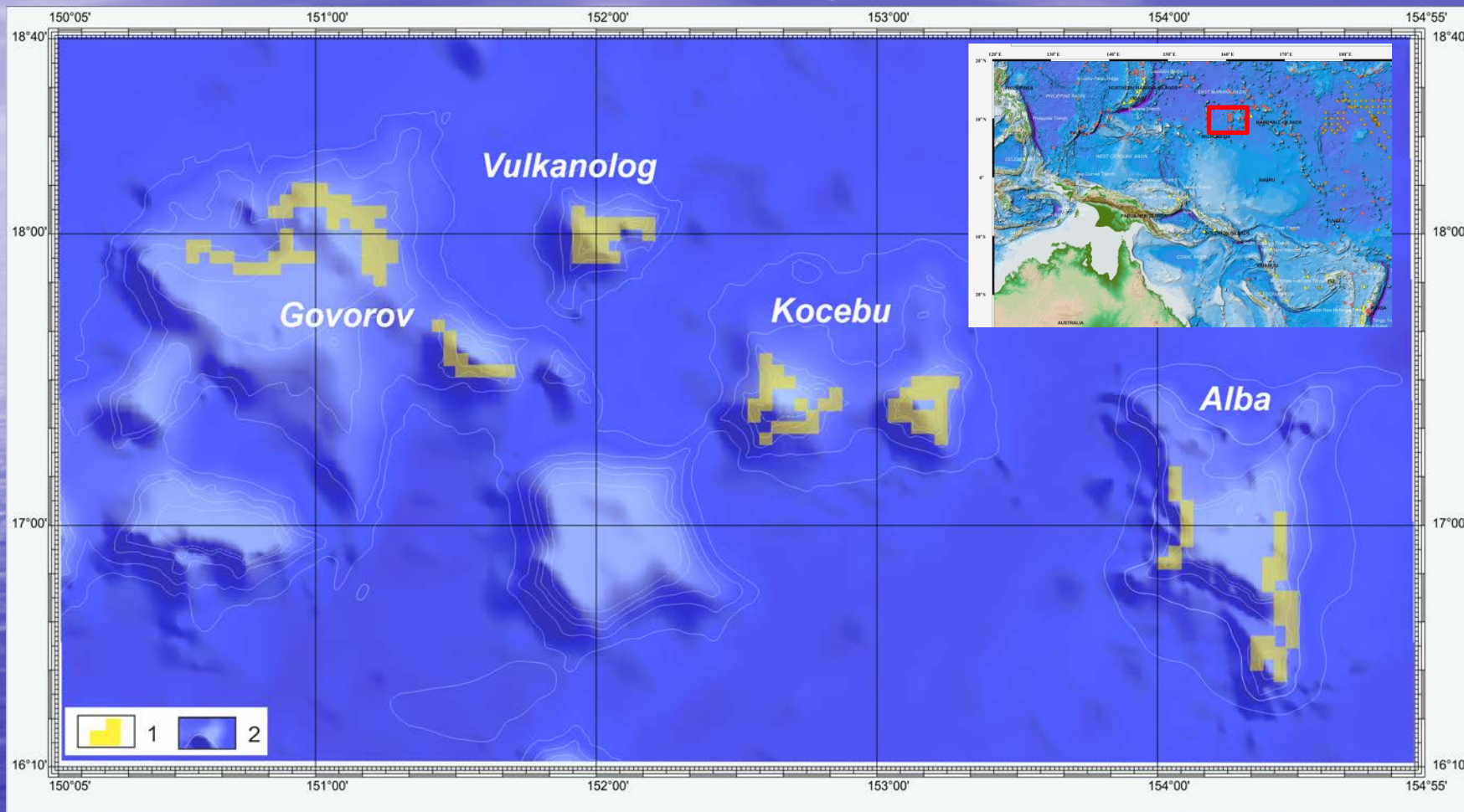
ENVIRONMENTAL STUDIES OF THE COBALT-RICH FERROMANGANESE CRUSTS ON RUSSIAN EXPLORATION AREA

Qingdao, China, 2018





Exploration region



1. Layout of the blocks of Russian exploration area
2. Seamount contour





RV "GELENDZHİK"



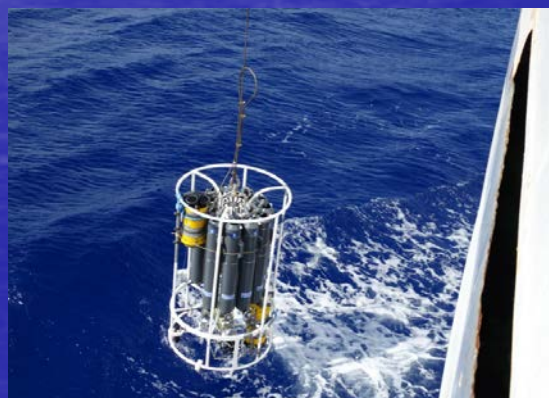
Scientific ship using for seamount exploration (5600 tons, 110 m long)



Deep-sea camera



Boxcorer



Probing system with Rosetta

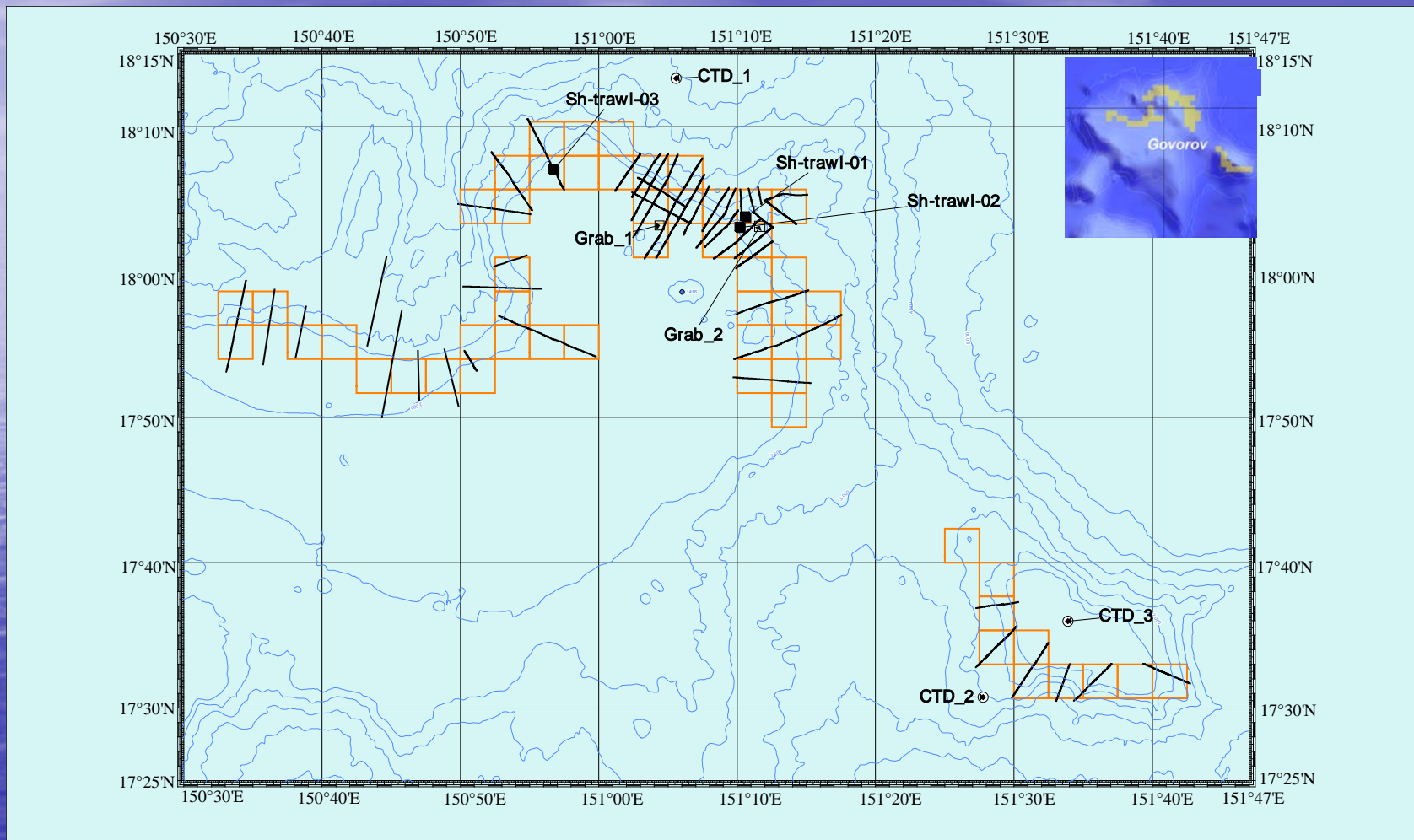


Stone drag





GOVOROV SEAMOUNT



Layout of photo transect, CTD and samplers





Taxon	Position	Number	Feeding type
<i>Anthozoa</i>	Coral polyps (Type <i>Cnidaria</i> , Class <i>Anthozoa</i>)	948	Seston feeder
In that number			
<i>Alcyonacea</i>	Soft corals (Type <i>Cnidaria</i> , Class <i>Anthozoa</i> , Order <i>Alcyonacea</i>)	694	Seston feeder
<i>Actiniaria</i>	Actinians (Type <i>Cnidaria</i> , Class <i>Anthozoa</i> , Order <i>Actiniaria</i>)	179	Seston feeder
<i>Antipatharia</i>	Black corals (Type <i>Cnidaria</i> , Class <i>Anthozoa</i> , Order <i>Antipatharia</i>)	49	Seston feeder
<i>Pennatulacea</i>	Sea pens (Type <i>Cnidaria</i> , Class <i>Anthozoa</i> , Order <i>Pennatulacea</i>)	20	Seston feeder
<i>Zoantharia</i>	Zoantharians (Type <i>Cnidaria</i> , Class <i>Anthozoa</i> , Order <i>Zoantharia</i>)	5	Seston feeder
<i>Ceriantharia</i>	Ceriantharians (Type <i>Cnidaria</i> , Class <i>Anthozoa</i> , Order <i>Ceriantharia</i>)	1	Seston feeder
In that number			
<i>Hexactinellida</i>	Glass sponges (Type <i>Porifera</i> , Class <i>Hexactinellida</i>)	740	Seston feeder
<i>Decapoda</i>	Decapods (Type <i>Arthropoda</i> , Class <i>Malacostraca</i> , Order <i>Decapoda</i>)	591	Carnivores
<i>Ophiuroidea</i>	Ophiuroids (Type <i>Echinodermata</i> , Class <i>Ophiuroidea</i>)	421	Deposit feeder
<i>Holothuroidea</i>	Holothuroids (Type <i>Echinodermata</i> , Class <i>Holothuroidea</i>)	286	Deposit feeder
<i>Crinoidea</i>	Sea flowers (Type <i>Echinodermata</i> , Class <i>Crinoidea</i>)	234	Seston feeder
<i>Actinopterygii</i>	Fishes (Type <i>Chordata</i> , Class <i>Actinopterygii</i>)	217	Carnivores
<i>Asteroidea</i>	Sea stars (Type <i>Echinodermata</i> , Class <i>Asteroidea</i>)	112	Deposit feeder
<i>Echinoidea</i>	Sea urchins (Type <i>Echinodermata</i> , Class <i>Echinoidea</i>)	54	Deposit feeder
<i>Scyphozoa</i>	Jelly fishes (Type <i>Cnidaria</i> , Class <i>Scyphozoa</i>)	30	Seston feeder
<i>Xenophyophoroidea</i>	Xenophyophorians (Type <i>Foraminifera</i> , Class <i>Monothalamea</i> , Suprafamily <i>Xenophyophoroidea</i>)	16	Seston feeder
<i>Gastropoda</i>	Gastropods (Type <i>Mollusca</i> , Class <i>Gastropoda</i>)	14	Deposit feeder
<i>Scalpellidae</i>	Barnacles (Type <i>Arthropoda</i> , Class <i>Cirripedia</i> , Order <i>Scalpelliformes</i> , Family <i>Scalpellidae</i>)	10	Seston feeder
<i>Ascidacea</i>	Ascidians (Type <i>Chordata</i> , Class <i>Ascidacea</i>)	8	Seston feeder
<i>Enteropneusta</i>	Acorn worms (Type <i>Hemichordata</i> , Class <i>Enteropneusta</i>)	7	Deposit feeder
<i>Pantopoda</i>	Sea spiders (Type <i>Arthropoda</i> , Class <i>Pycnogonida</i> , Order <i>Pantopoda</i>)	5	Deposit feeder
<i>Polychaeta</i>	Polychaetes (Type <i>Annelida</i> , Class <i>Polychaeta</i>)	4	Deposit feeder
<i>Octopoda</i>	Octopods (Type <i>Mollusca</i> , Class <i>Cephalopoda</i> , Order <i>Octopoda</i>)	3	Carnivores
<i>Hydrozoa</i>	Hydroids (Type <i>Cnidaria</i> , Class <i>Hydrozoa</i>)	1	Seston feeder

Megafauna animals on Govorov seamount (44 phototransects) (17200 bottom photo)





Environment factors influencing on megafauna composition, density and distribution

1. Depth

2. Characteristics of bottom deposition

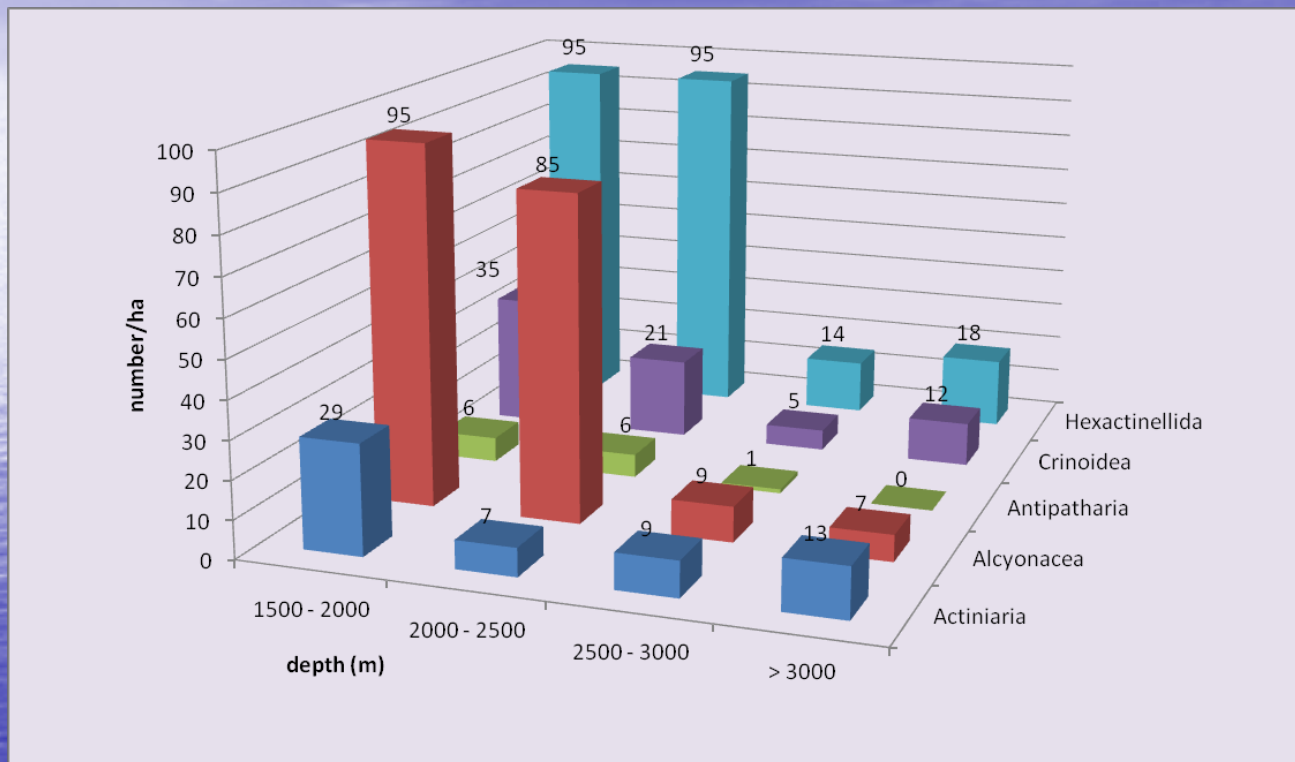
3. Layout on the seamount





Depth

Distribution by depth for seston feeders



Primnoid coral



Glass sponges

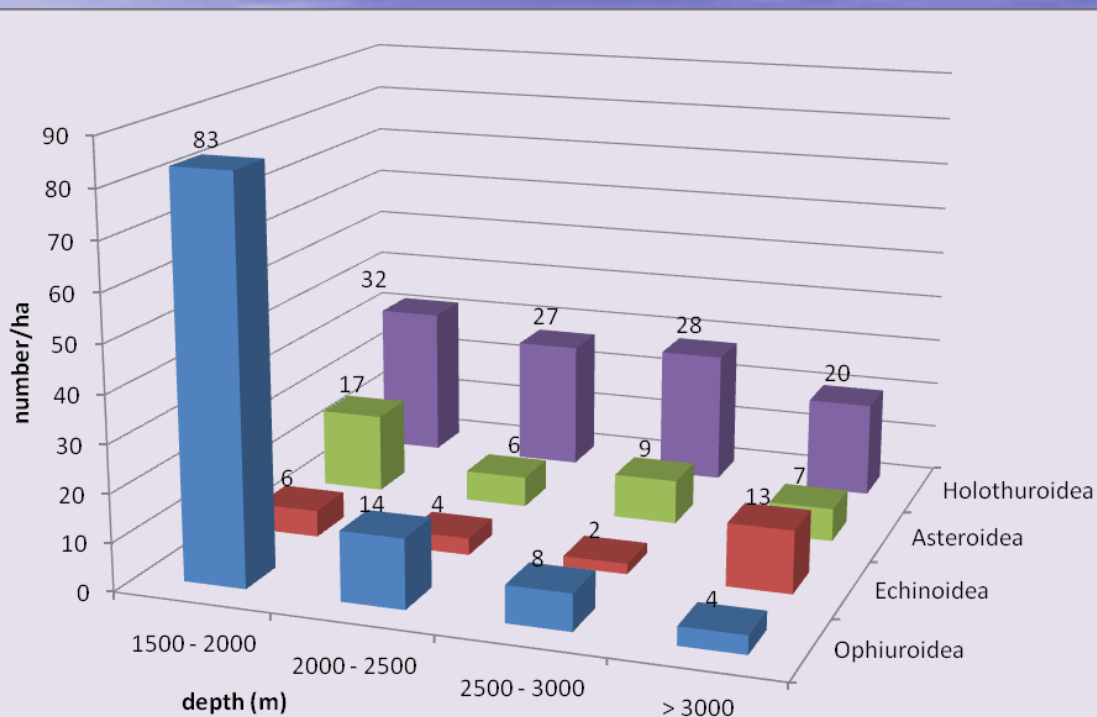
Most part of seston feeders inhabit zone up to 2500 m



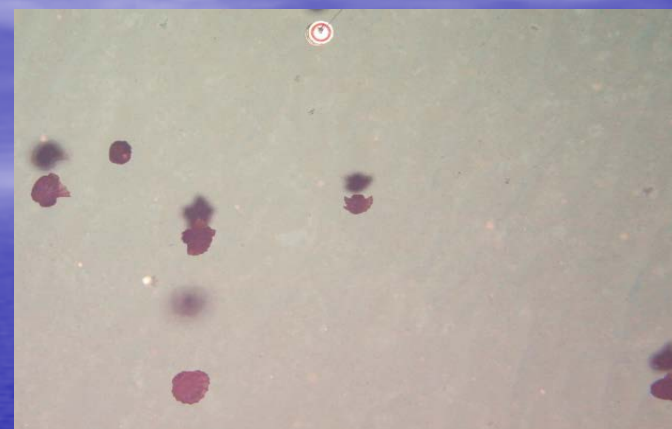


Depth

Distribution by depth for deposit feeders



Only most part of ophiuroids inhabit zone up to 2000 m
Distributions for others deposit feeders are more or less even



group of elasipodid holothuroids



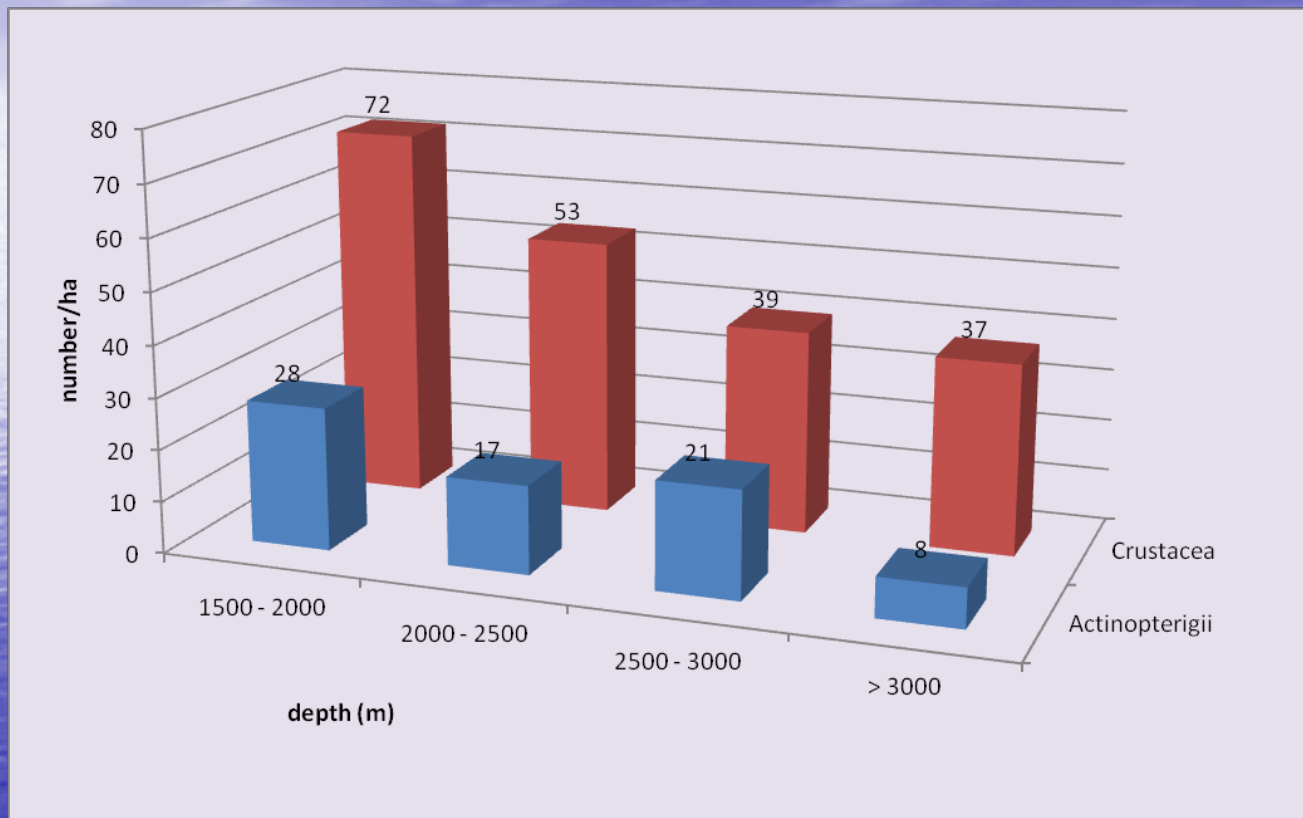
Elasipodid holothuroid





Depth

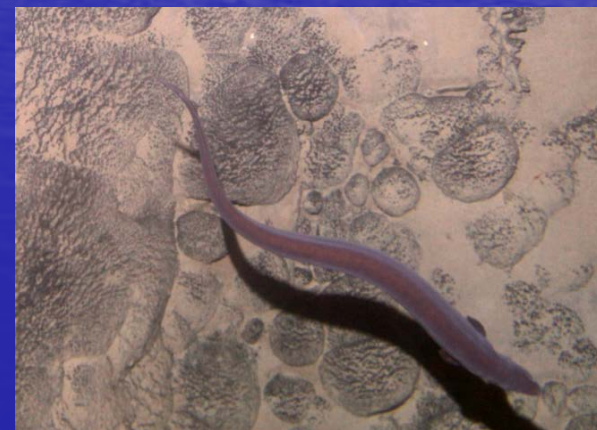
Distribution by depth for carnivorous animals



Numbers of carnivorous animals decline with depth gradually



Decapod crustation



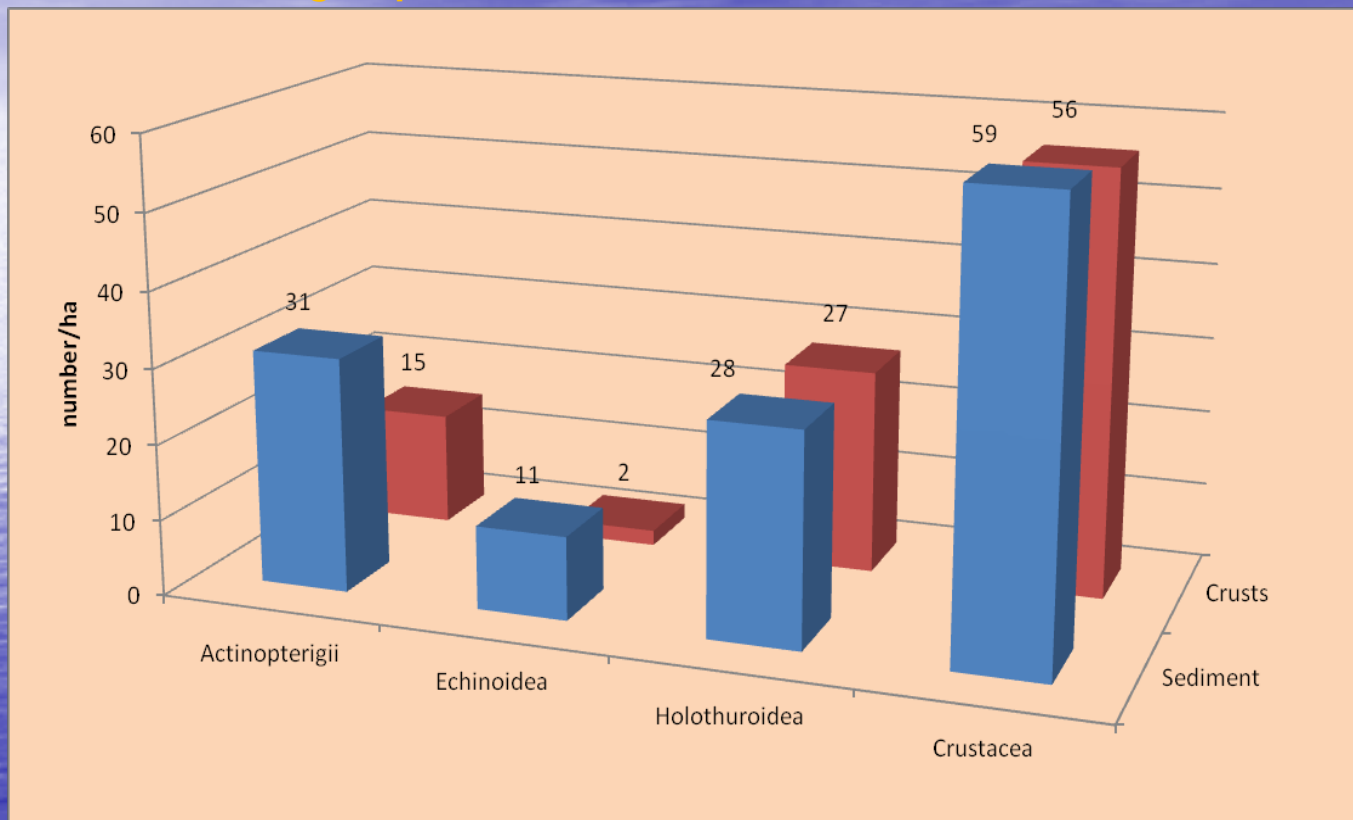
deep-sea eel





Bottom deposition - sediment

Animal groups more abundant on sediment zone



Decapod crustation



echinotaurid sea urchin

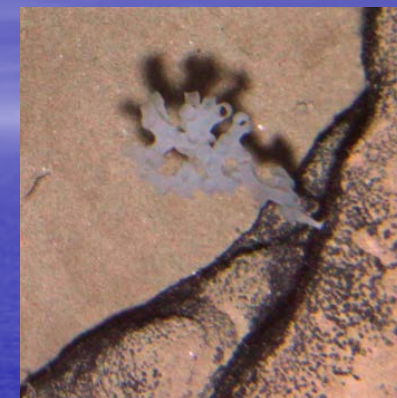
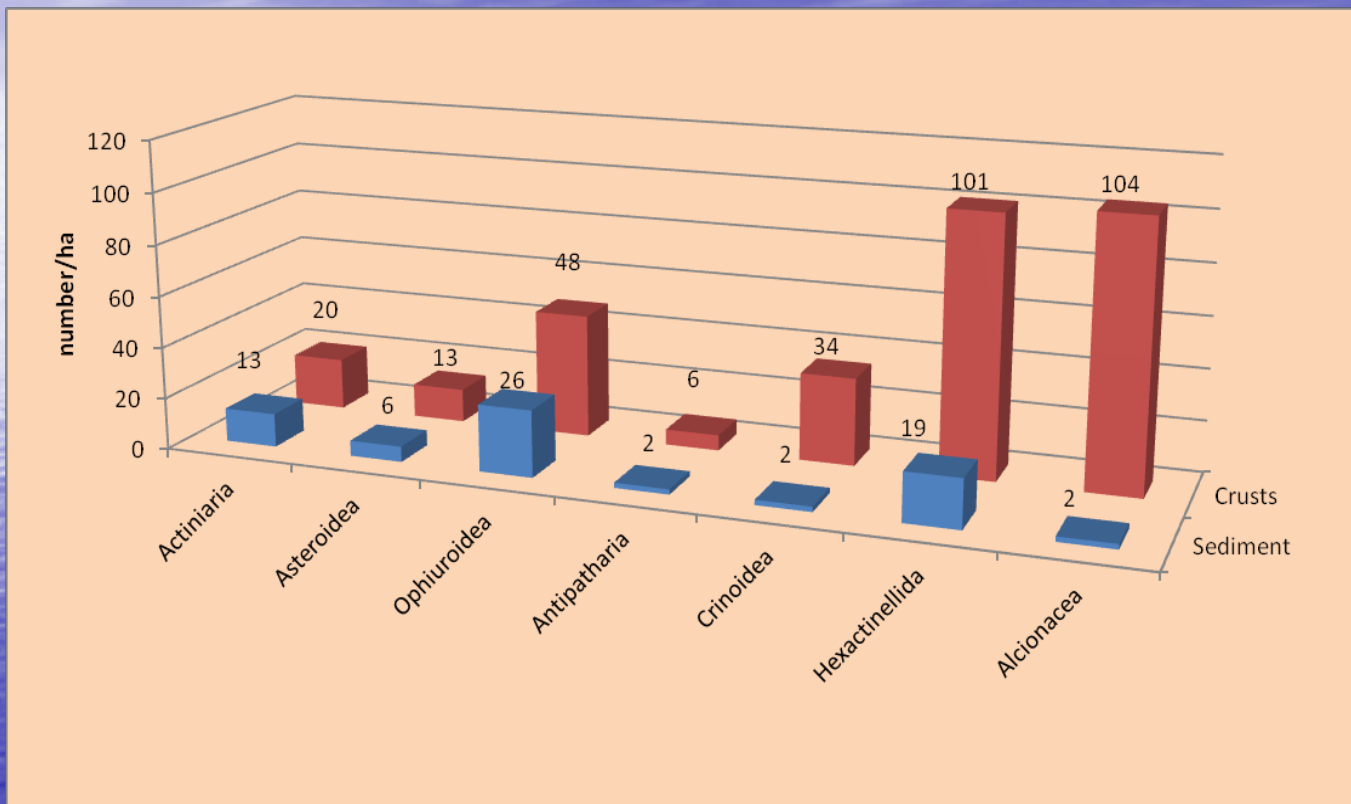
Fishes and sea urchins prefer bottom with clear sediment





Bottom deposition - crusts

Animal groups more abundant on bottom with hard substrate



Glass sponges



Soft coral

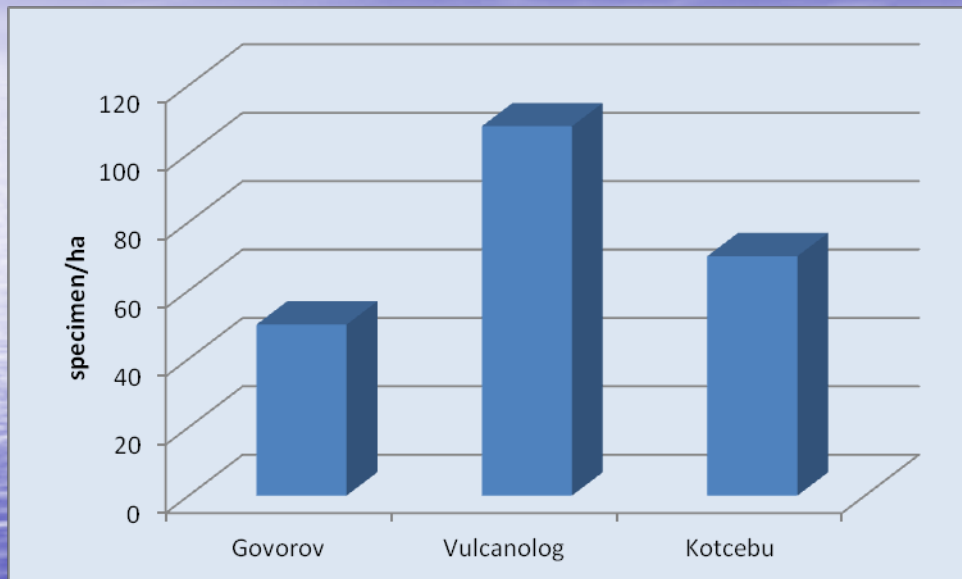
Corals, glass sponges and sea flowers prefer bottom with hard substrate



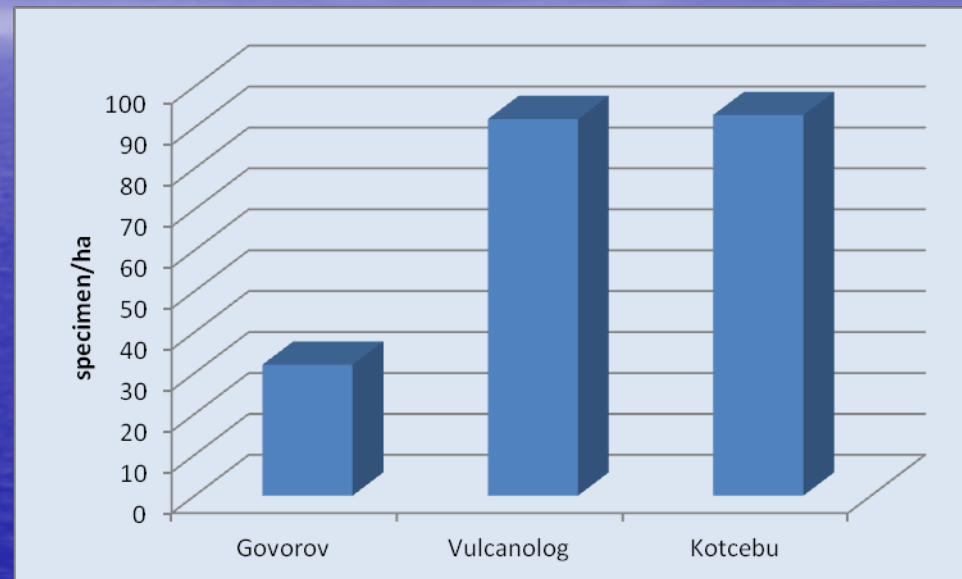


Differences between numbers of the main megafauna groups on seamounts

Hexactinellida



Alcyonacea





Animals collected in bottom trawl



Soft coral



Soft coral, sea flowers, glass sponges, ophiuroids



Fragments of glass sponges and corals

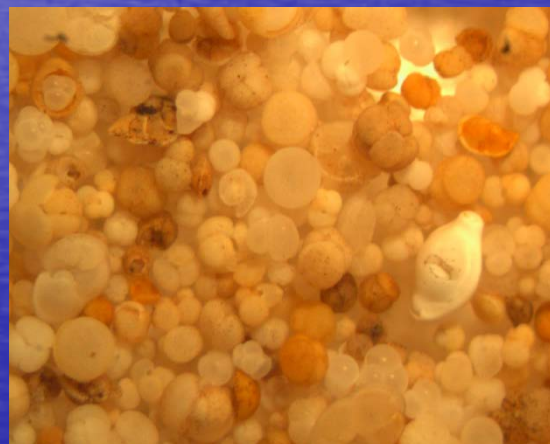
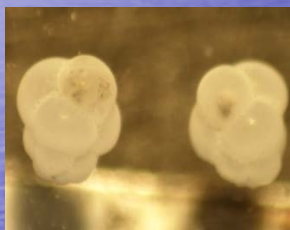
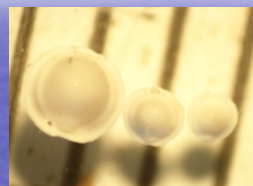


Fragments of glass sponges and sea star





Sediment on the top of seamount consists mostly from calcareous foram shells and their fragments. Soft clay and silt practically are absent.





Macrofauna animals collected in sediment samples

Polychaeta



Isopoda



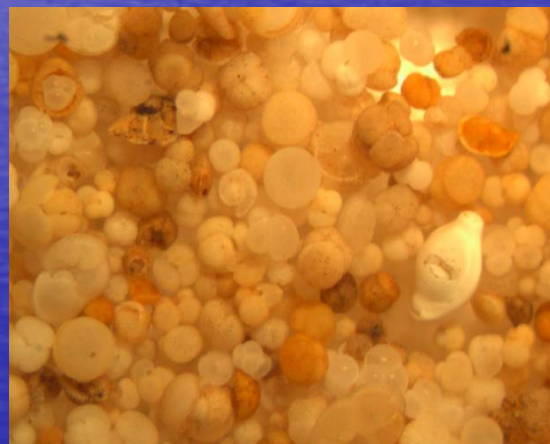
Bivalvia



Gastropoda



Isopoda



Isopoda



Ophiuroidea



Priapulida



Scaphopoda



Sipunculida



Amphipoda



Aplacophora





Meiofauna animals collected in sediment samples

Foraminifera



Harpacticoida



Foraminifera



Harpacticoida



Halacaridae



Nematoda



Ostracoda



Ostracoda





Conclusions

1. **Seamounts are places on the ocean bottom with diverse and unique benthic communities**
2. **Photo transecting is a main source of information about background characteristics of megafauna**
3. **It is very difficult to get undisturbed sediment samples for macrofauna and meiofauna background characteristic**
4. **It is necessary to modify the document ISBA/19/LTC/8 (Recommendations for the guidance of contractors for the assessment of the possible environmental impacts arising from exploration for marine minerals in the Area) with a glance of the new ecological data derived on seamounts**
5. **Regional Environment Management Plan for the Cobalt-Rich Ferromanganese Crusts is a good proposal and is needed a further detailed examinations**





THANK YOU
FOR YOUR ATTENTION

