Essential bottom ecosystems (VME) of the Emperor Chain

based on the results of the marine expeditions
organized by the National Scientific Center of Marine Biology, FEB RAS, Russia
2019-2021

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Background

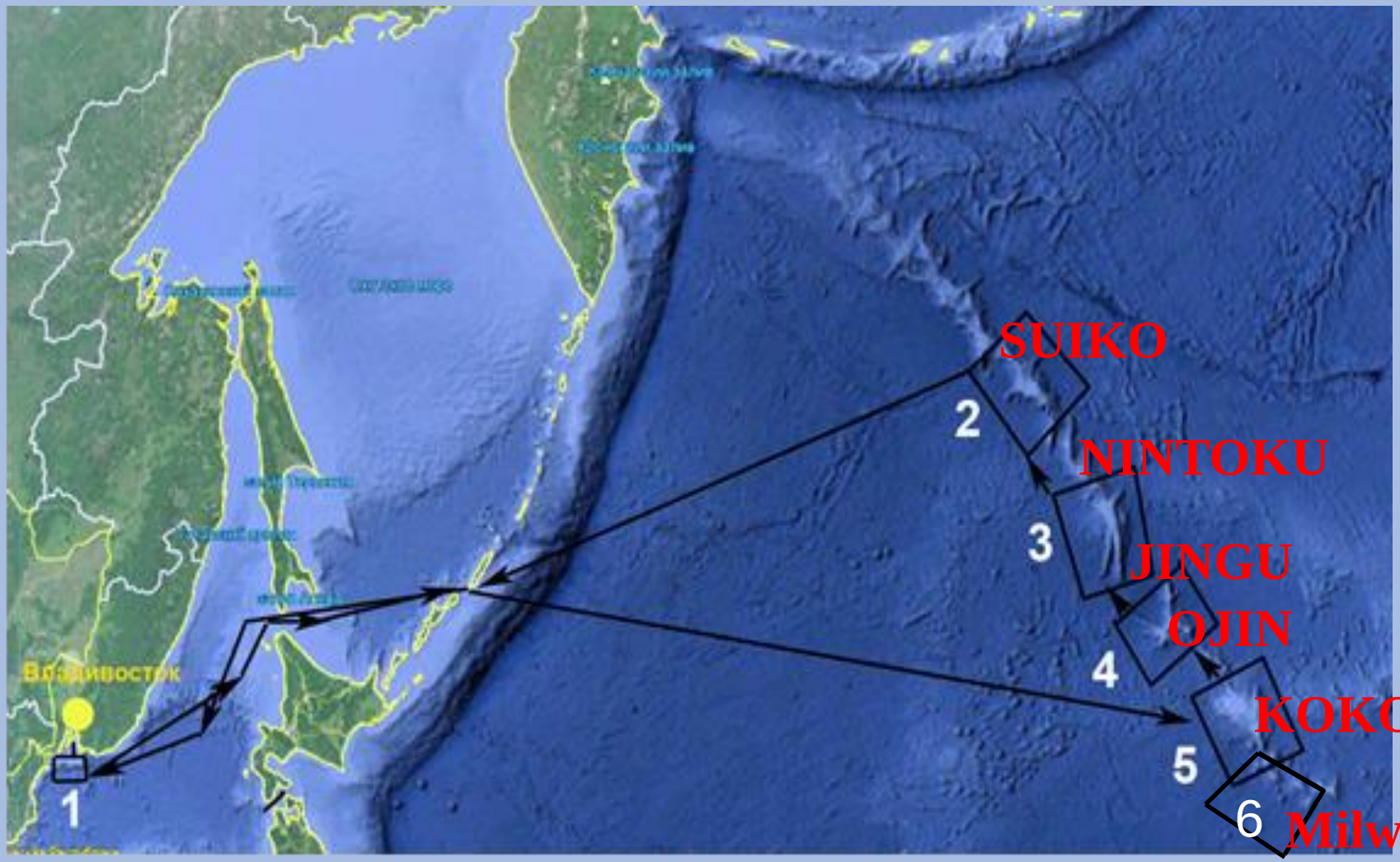
Numerous useful mineral resources are associated with seamounts - ferromanganese nodules, cobalt-manganese crusts and phosphorites, which are attracting more and more due to the possibility of soon depletion of land mineral resources.

Seamounts, including the Emperor Chain - areas of high biological productivity of benthic and pelagic communities, including commercial accumulations of bioresources.

Seamounts are important from a biogeographic point of view since they are associated with diverse communities of bottom and pelagic fauna.

Urgent task - to develop scientifically based approaches to reasonable exploitation and conservation of biological resources of the Emperor Chain.

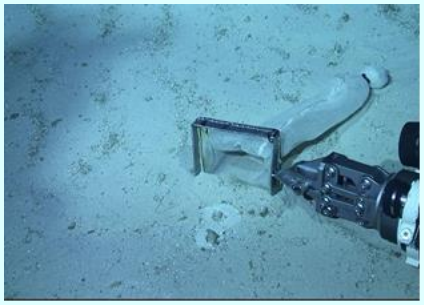
2019-2021

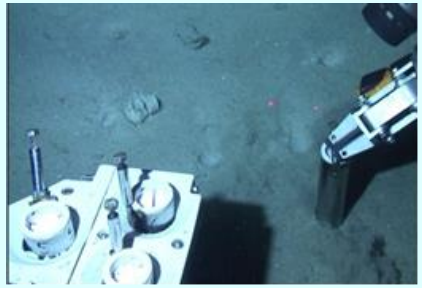


Main equipment:

ROV Comanche 18

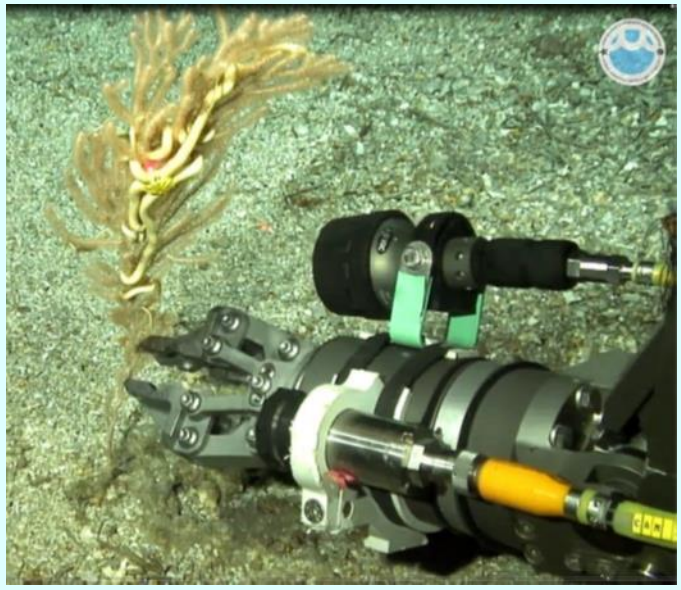
33 dives of the ROV :
video filming, photography, sampling, depth from 2182 to 338 m;



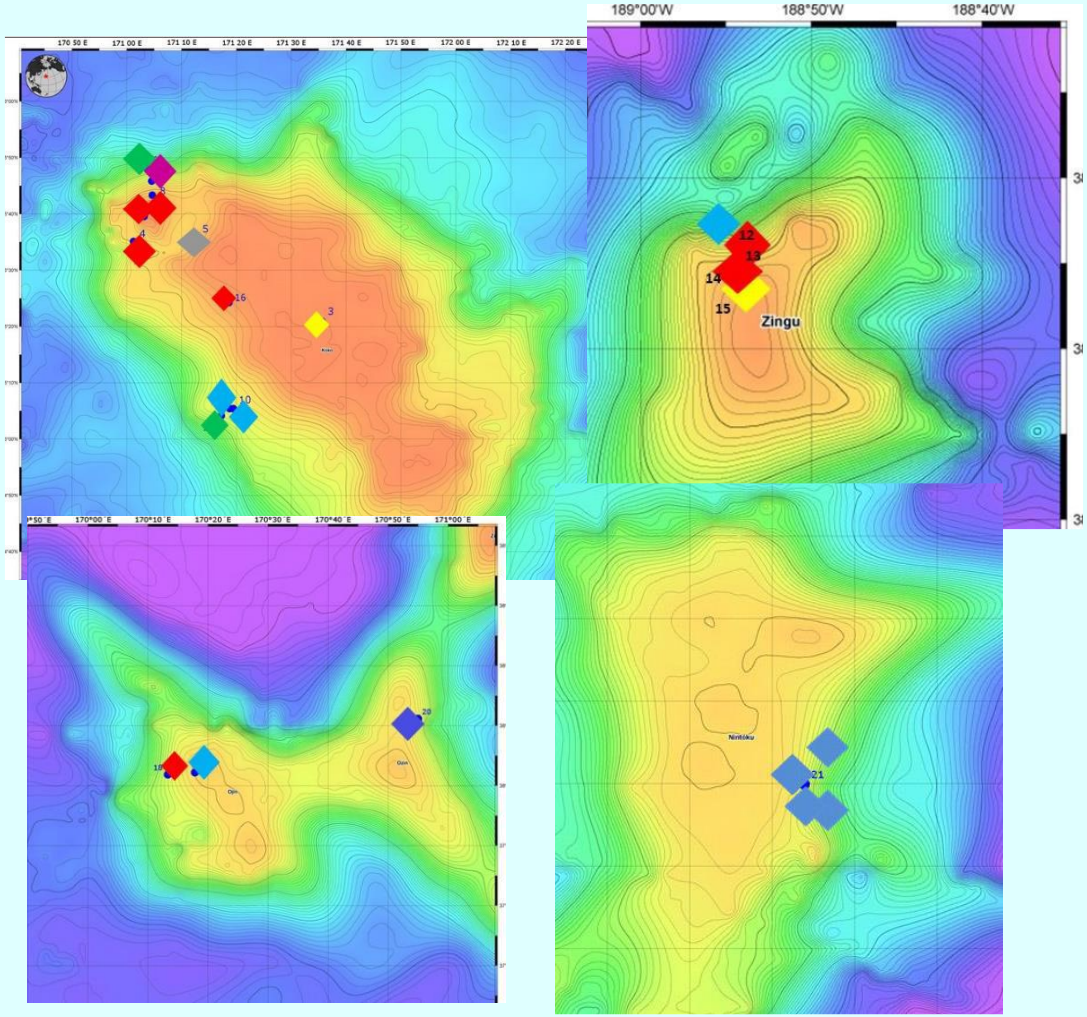


Others:

Automatic Niskins "Rosette"
Plankton nets
Geology dredges and gravity tubes
Mineral-processing machines
CTD zonds
Spectrophometers
Meteorology complex Davis VantagePro2
Gas chromatographs
Plasma-ionic detectors for methane and other hydrocarbons
Sterile microbiology laboratory
Zoology, geology laboratories, etc



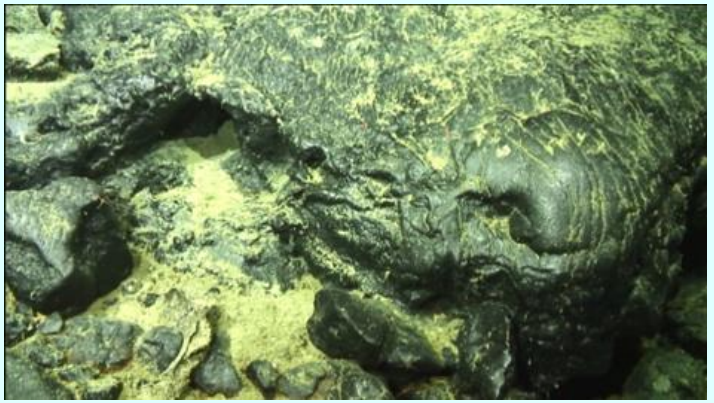
Some stations for the collection of bottom organisms and geological samples



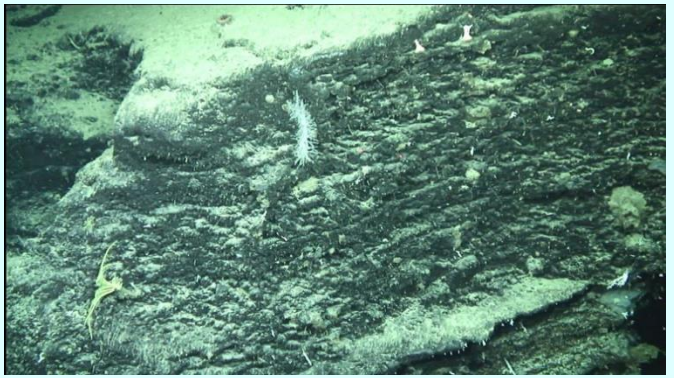
- 158 sampling stations, 979 individual animal samples.
- 2789 5MP photos and 96 hours of video recordings in Full HD format.

JINGU

Slopes at a depth to 2048 m are covered with lithoclastic tuffs with ferromanganese crust.



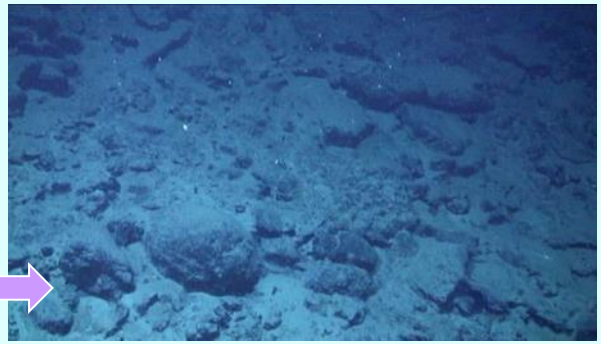
Lava flows covered with ferro-manganese crust, 2042 m



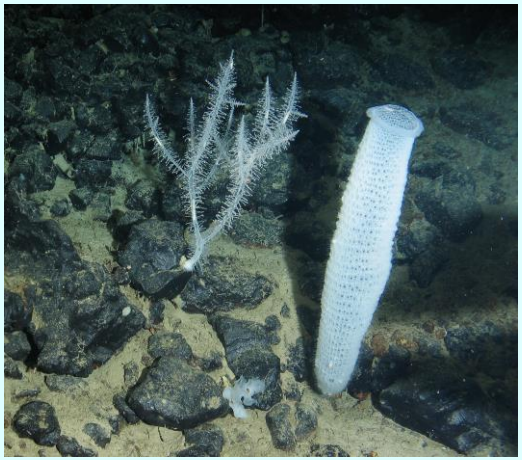
A block of lithoclastic tuff, saturated with volcanic bombs, 2012 m

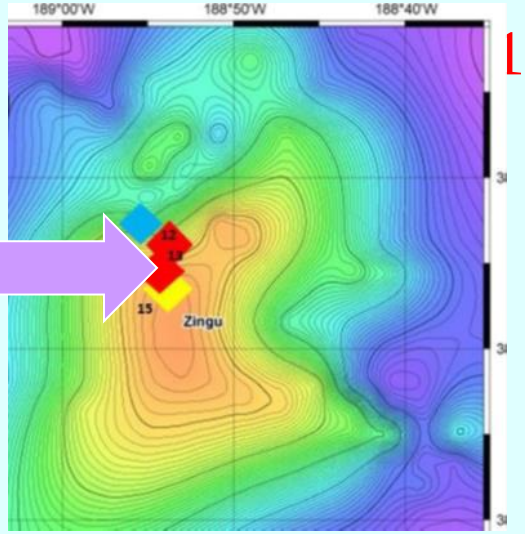
Also developed active bottom hydrodynamics, as a result of which the bedrock outcrops have a polished surface.

Separate young volcanic bombs in the slope deluvium, 2058 m

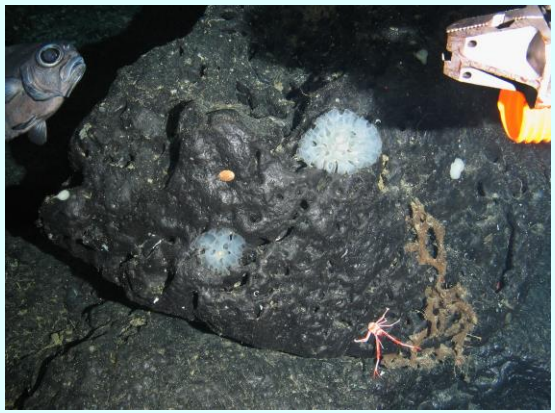


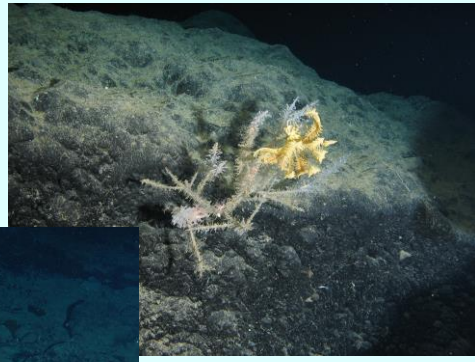
JINGU : high diversity of the Hexactinellidae sponges

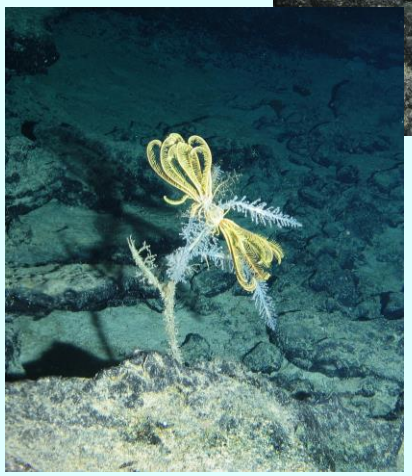




stations made from 2048 to 850 m depth,,
2 new genera, 6 new species.



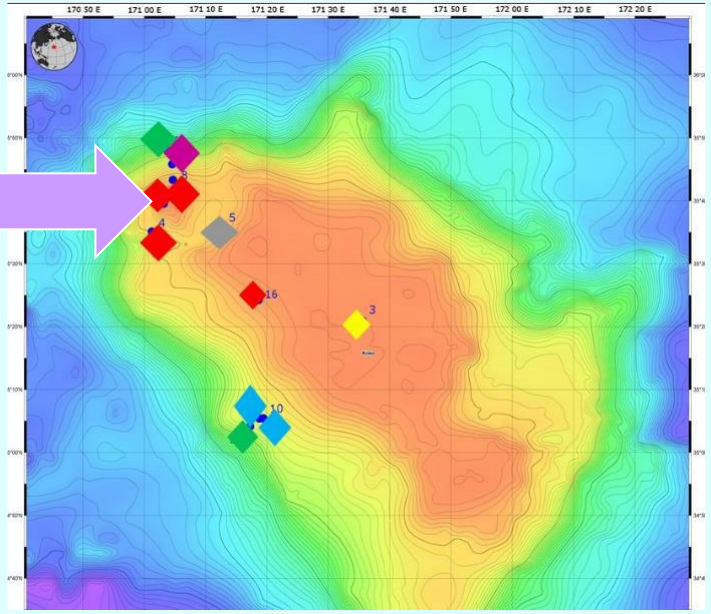


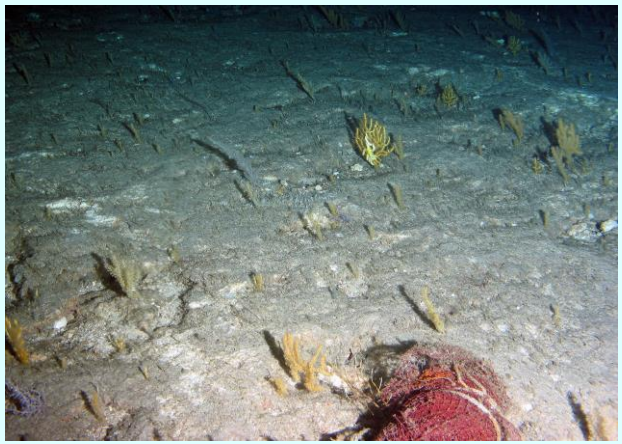


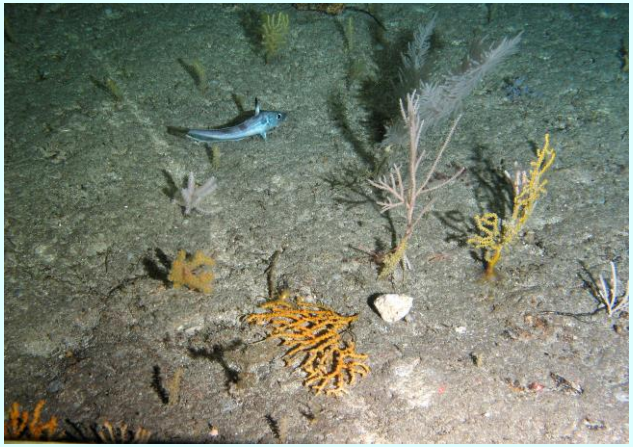
High diversity and substrata-making function.
High abundance (to 5 ind/m^2)

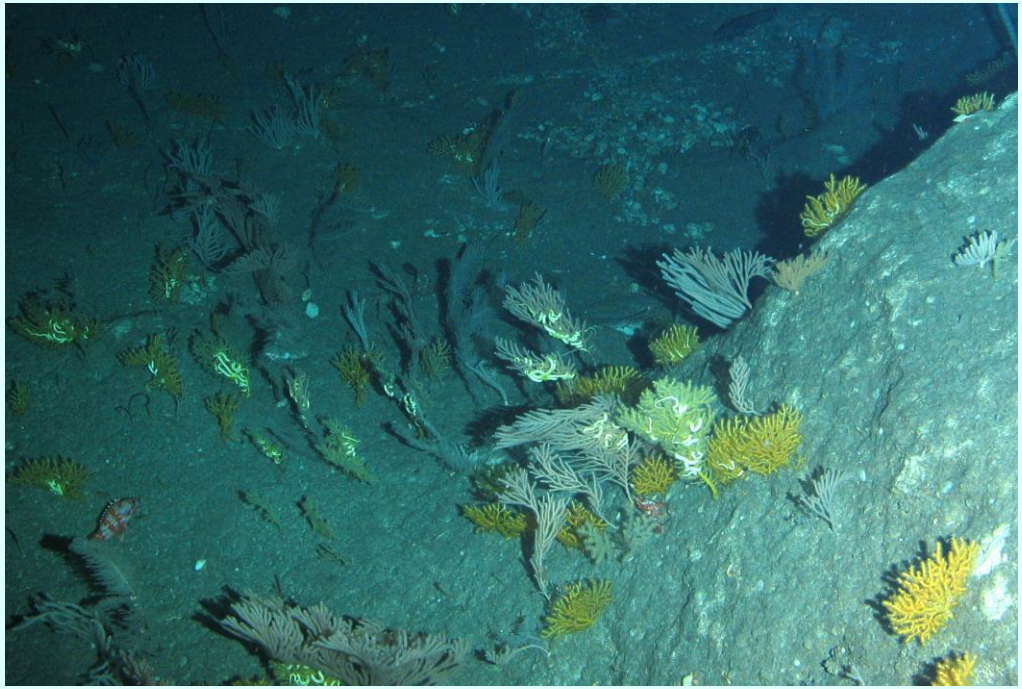
KOKO – the coral gardens

387 m depth.
station 9



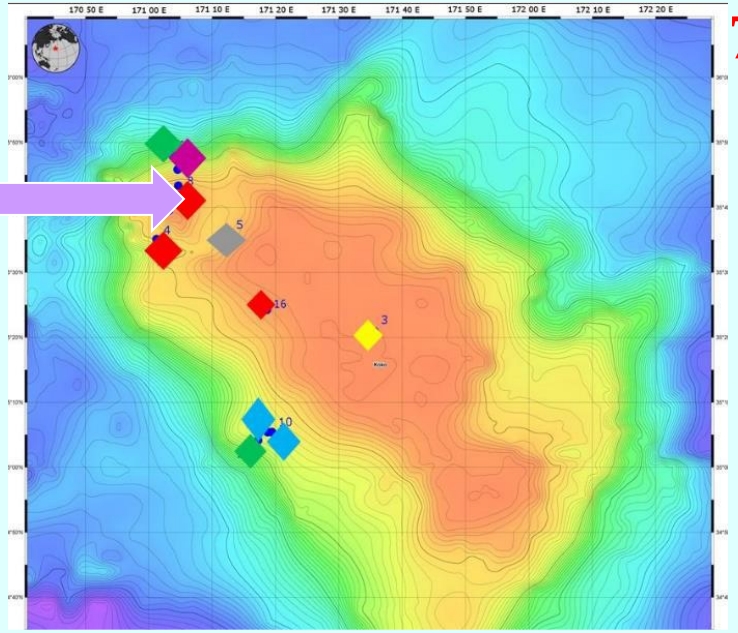


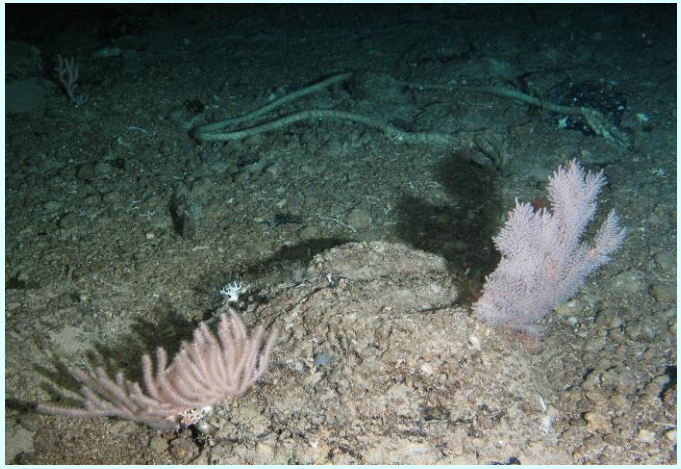




KOKO – the coral gardens

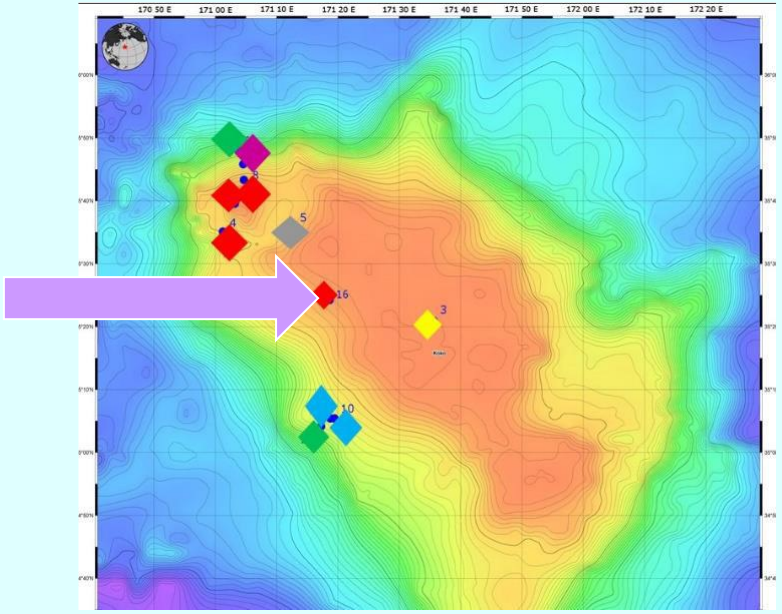
587 m depth,
station 8

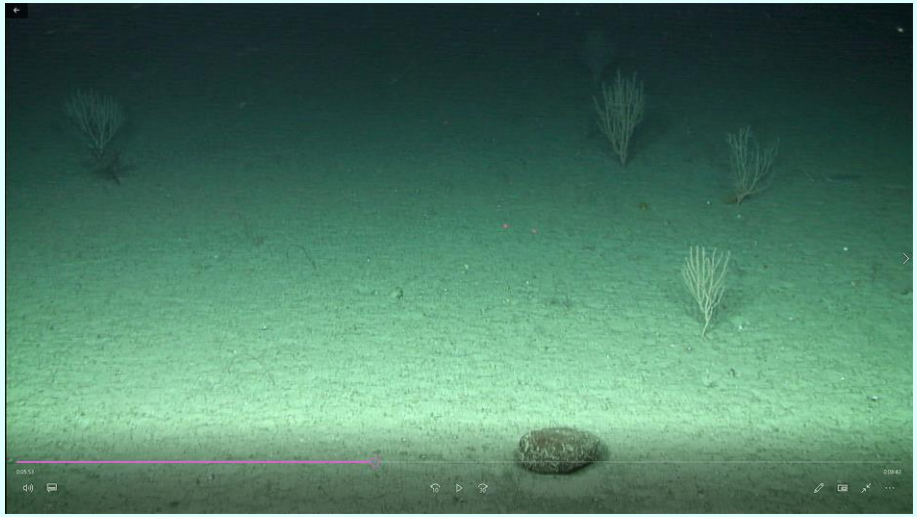




KOKO – the coral gardens

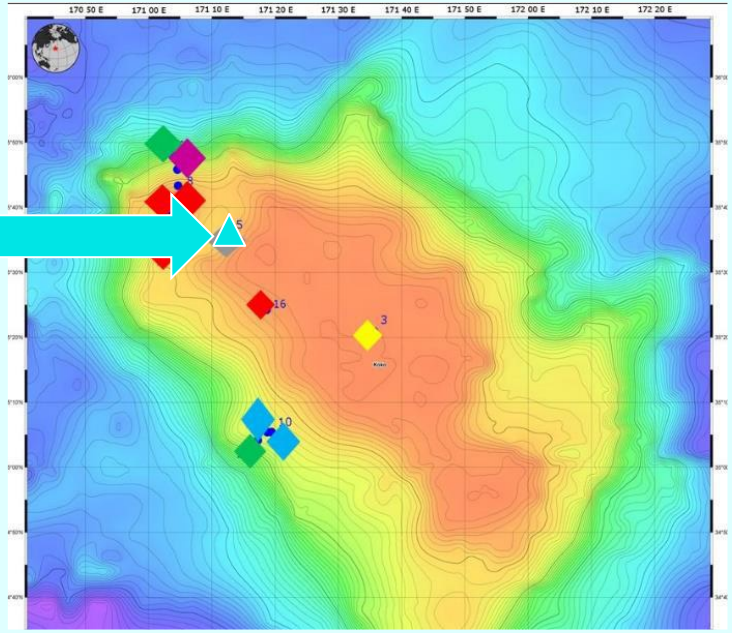
395 m depth,
station 16



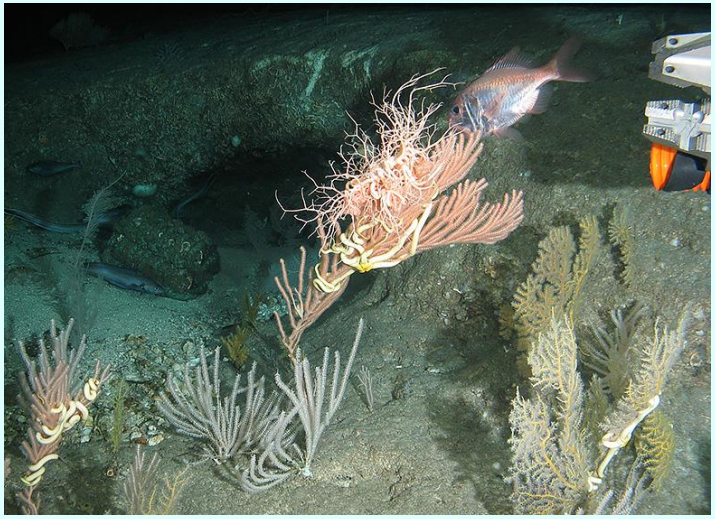


KOKO – Echinodermes' community

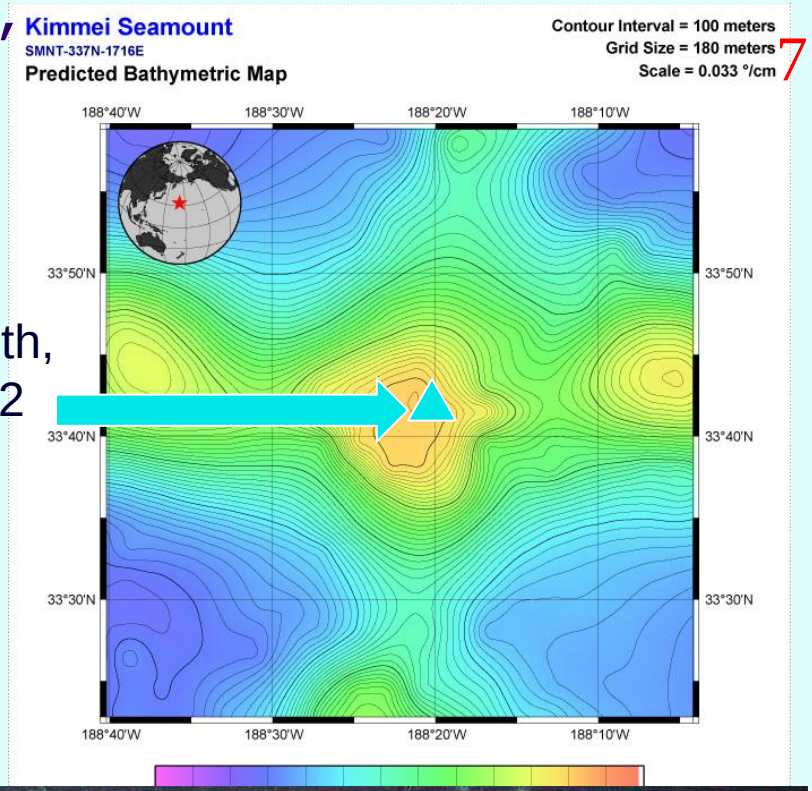
779 m depth, station



KIMMEI (MILWAUKEE) – Echinodermes' community



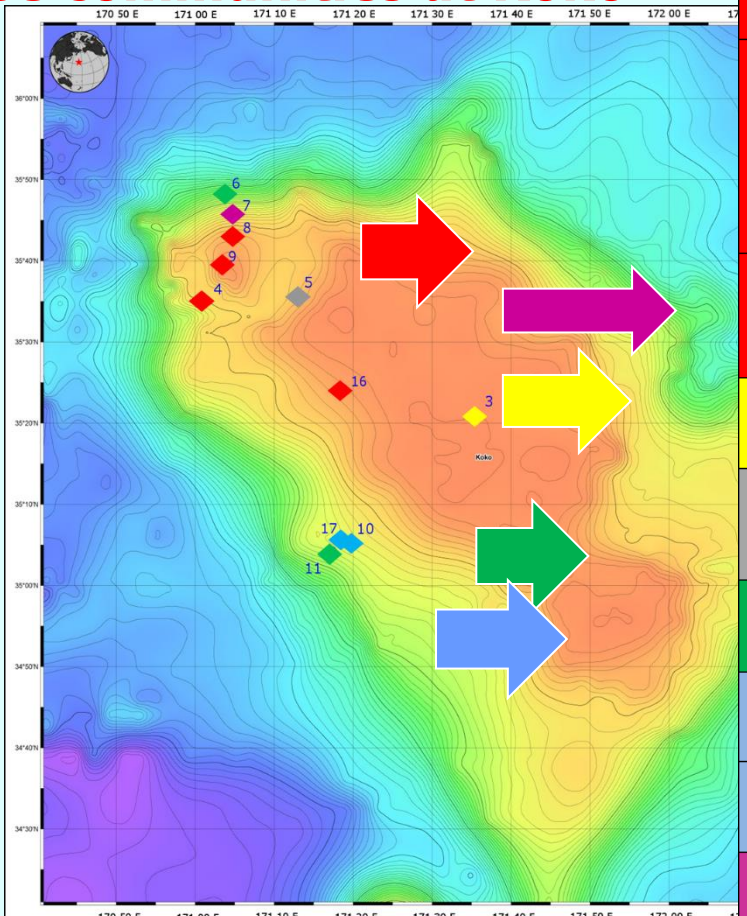
864 m depth,
station 5-22



Macrobenthic communities

The data obtained indicate the **very mosaic pattern of distribution of the biotic complexes** and key taxa (**Octocorallia and Porifera**) which means **greater importance of local conditions than depth.**

Diverse communities at Koko



погружение	глубины	доминанты
4	492 - 507	Octocorallia + Stylasteridae + Decapoda Brachiur с фиолетовым панцирем
8	593- 581	Octocorallia + Stylasteridae + Scleractinia Echinothurioida + Decapoda Brachiura фиолетовым панцирем
9	386-365	Octocorallia + Stylasteridae + + Decapoda Brachiur с фиолетовым панцирем
16	391-397	Octocorallia + Stylasteridae + Scleractinia Echinothurioida + Decapoda Brachiura фиолетовым панцирем
3	338 – 341	Decapoda Brachiura: Portunidae + Echinoidea Cidaridae + Asteroidea: Goniastridae cf. *Ceramaste*
5	779 - 768	Ohiuroidea мелкие Holothuroidea: Elpidiidae мелкие
6	2182-1969	Ophiuroidea крупные + Holothuroidea varia
11	1882-1853	Ophiuroidea крупные + Holothuroidea varia
10	1366-1383	Octocorallia varia + Echinoidea: *Caenopedina* sp. Holothuroidea: прозрачные
17	1429-1358	Octocorallia varia + Echinoidea: *Caenopedina* sp. Holothuroidea: прозрачные
7	1621-1341	Ophiuroidea мелкие белые+ Echinoidea: *Aspidodiadema* sp.

RESUME:

1. Several stations containing the abundant coral populations (coral gardens) are recognized and reported at Koko and Milwaukee.
These coral gardens are inhabited with the very rich fauna of invertebrates and fish.

Gorgonians are the main component of these communities which communities should be suggested as VMEs.

2. Hexactinellidae' (glass sponges) dense populations were recognized at Jingu (from 2048 m to the top, at 850 m depth). Having the unique rich and diverse fauna of glass sponges, these communities deserve significant attention.

The ferro-manganese cover of the Jingu may be estimated as a commercial supply in the future. Due to it, the special attention could be paid for some areas of the Jingy, but the additional research is needed.

3. The very promising Echinodermes' communities were recognized at Ojin, Koko and Kimmei. These local ecosystems contain both the coral patches and Echinodermes dense populations. The last have the dominant role in these ecosystems.

MANY THANKS FOR YOUR KIND ATTENTION!