



## SO-249 Leg 2

### BERING

Weekly Report No. 9  
(01.08. – 07.08.2016)



R/V SONNE  
54°17'N / 162°04'E

During the fourth week of R/V SONNE cruise SO-249 Leg 2, our studies focused on the southwestern margin of the Bering Sea and there mainly on the Komandorsky Block. This more than 400 km long and up to 110 km wide structure forms the submarine base of the two Russian Aleutian Islands Bering and Medny. The grave of the discoverer Vitus Bering, the eponym of the Bering Sea and straits, is located on Bering Island who dies here at a hibernation in 1741 during his second Kamchatka expedition. The Komandorsky Block is the westernmost section of the Aleutian Island Arc. At its northwestern tip the junction of the Aleutian Trench and the Kurile-Kamchatka subduction zone is located. On the one hand SO-249 Leg 2 mapping and sampling aimed to get new insights in this geodynamically highly complex area. On the other hand we hoped to retrieve old rocks that can provide us with new data on the inception and early geological history of the Aleutian Arc - one of the major goals of the research project SO-249 BERING.

Before we started our investigations at the Komandorsky Block, we studied a chain of small enigmatic structures that emanate from the Volcanologists Massif in southeastern direction. Old maps based on single beam echo-sounding data show these features as nearly cone-like edifices. Therefore we hoped to discover a chain of young volcanic cones which may be the missing link between Piip Volcano and the further to the east located "Western Cones", which represent the westernmost recent volcanic structures in the US-part of the Aleutians. SO249 leg 2 multi-beam mapping, however, revealed that these structures are tiled blocs with a very smooth morphology. Nevertheless we made two dredge attempts at these features which returned besides a few lava fragments mainly semi-consolidated mud. Now it is almost sure that Piip is the only recent volcano in the Russian section of the Aleutian Arc since we also did not discover any young volcanic structures in the area to the west of Piip Volcano.

By contrast, our studies of the Komandorsky Block proceeded very successful. The dredge hauls at its southeastern flanks yielded a large amount of volcanic rocks besides sedimentary rocks which obviously form the lower portions of the slopes in this part of the block. Andesites dominate along the volcanics. At its northeastern flank we mainly dredged partly metamorphized and tectonized diorites and gabbros. At the northeastern tip of the Kommandorsky Block the dredges delivered a particular broad variety of volcanic rocks. These include aphyric, ol-plag-phyric, and cpx-ol-plag-phyric basalts and a broad spectrum of andesites including highly hornblende-phyric spessartites (see photo) and maybe also Adak-type high-Mg andesites (adakites). Furthermore the dredges contained metamorphically overprinted volcanics, ignimbritic rocks (see photo), tuffs and other volcanoclastic rocks. With that we have an excellent sample set available for further studies and analyses in the home labs.

The last week of active sampling was, like the previous eight weeks, characterized by a broad spectrum of marine animals. In addition to sediment samples from over a dozen stations, we obtained representatives from almost all major marine taxa, such as lamp shells (Brachiopoda), sponges (Porifera), cnidarians (Cnidaria), bristle worms (Polychaeta), spiny-skinned animals (Echinodermata), sea squirts (Tunicata), sipunculans (Sipuncula), moss animals (Bryozoa), arthropods (Arthropoda), leeches (Hirudinea), mollusks (Mollusca), and even a representative of the vertebrates (Vertebrata). Although a detailed analysis of the sediment samples will reveal an entire microcosm, it is usually the macroscopic specimens that attract attention on deck. Among the larger specimens dredged during this week were several different representatives of the Majidae, also called sea spiders (see photo). Apart from these, a rather unlikely catch was made this week using the chain bag dredge (SO249-DR155): an almost 1 m long grenadier fish (Macrouridae) was hauled on deck - these animals are also called rattails (see photo). The grenadiers are usually benthopelagic fishes that act as apex predators in deep sea habitats by feeding on other fishes, crustaceans, and cephalopods. All animals collected in the course of the scientific cruise SO-249 were fixed using specific chemicals (see photo) and have been placed in sampling vials according to their size for the transport to Berlin (see photo).

In the early morning of Sunday, August 7th, we finished the SO-249 Leg 2 station work and data recording as scheduled and R/V SONNE headed towards Petropavlovsk-Kamchatsky. On

Monday morning, here we will say good be the most of our Russian colleagues. Afterwards we will sail to our final destination Tomakomai on Hokkaido (Japan). We will use this transit for demobilization, cleaning, maintenance and packing of our equipment and for a first evaluation of the data yielded on this journey.

Besides extensive multi-beam mapping and sediment echosounder profiling, a total of 52 dredge hauls in an average water depth of 2,900 m were carried out on SO-249 Leg 2. Of these, 36 delivered *in situ* samples of which 24 obtained volcanic rocks and/or intrusiva, 11 volcanoclastics, 5 metamorphic and 18 sedimentary rocks. No equipment was lost or seriously damaged.

All participants send greetings from the Northwest Pacific to everyone at home.

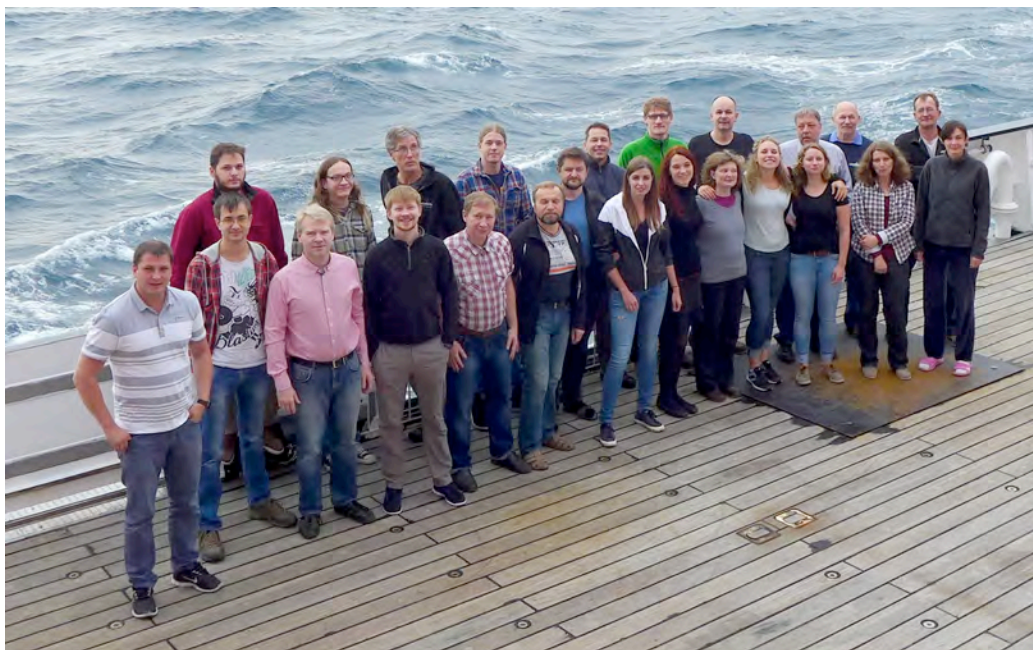
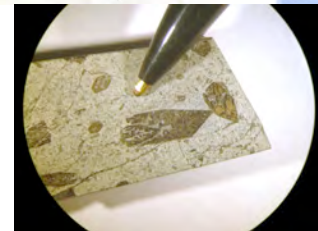
Reinhard Werner (chief scientist SO-249 Leg 2) and the cruise participants



An ignimbritic rock dredged at the northern slope of the Komandorsky Block in ~3,400 m water depth. Ignimbrites are deposits of a highly fluid suspension of hot gas and ash particles formed during explosive volcanic eruptions or dome collapse. (photo GEOMAR)



A highly hornblende-phyric spessartite, a typical rock of the Komandorsky Block dredged in ~2,100 m water depth at its northern tip. The huge hornblende crystals are clearly visible under a microscope (small picture). (photos: GEOMAR)



The SO-249 leg 2 Scientific Party after most of the work is done. (Arnold Ernst)



This sea spider was caught at about 2,500 m depth on Piip volcano. Several leeches and skeleton shrimp were attached to this specimen. (Alexander Ziegler)



A member of the Macrouridae (grenadiers) was hauled on deck from about 2,600 m depth near the Komandorsky block. (Natalia Gorbach)



Common fixatives for zoological specimens include (from left to right) 4% solution of formaldehyde (or formalin), mixture of acetone and methanol (ACME), 4% solution of paraformaldehyde (PFA), RNALater, and 100% ethanol (EtOH). (Alexander Ziegler)



All specimens obtained during the scientific cruise SO-249 have been prepared for the long transport back home by placing them into plastic containers or watertight bags. (Alexander Ziegler)