



SO265 SHATSKY EVOLUTION Weekly Report No. 6 (01.10. - 07.10. 2018)



F.S. Sonne

Expedition SO265 is slowly coming to an end. We have begun our long transit to the port of destination Kaohsiung in Taiwan, which we plan to reach on Wednesday (Oct. 10). The typhoon "Kong-Rei" was, until recently, located between us and Taiwan thus blocking our path, finally turned north. Therefore, nothing stands in our way for a punctual arrival. This past week was spent processing the last samples, demobilizing the labs, and professional packing of our equipment. Also, efforts were ramped up to have the elaborate cruise report finalized before entering port. The time was also used for thoroughly taking inventory of all brought GEOMAR equipment including consumables. And finally, like at every ship expedition, the labs needed to be cleaned and well-swept.

In the middle of the week, a test dive of the ship's new OFOS (Ocean Floor Observation System), a video sledge that is connected to the ship by a cable, provided the welcomed opportunity to watch a live feed of pictures from the sea floor that we had only "blindly" sampled by our dredge hauls in previous weeks. The OFOS surveyed the 1340 m deep summit platform of Katayama Seamount (25°48' N, 147°50' E) while transmitting brilliant video footage of the sea floor structure to the packed conference room of the SONNE.



Manganese crusts and stalked crinoids on the summit of Katayama Seamounts at 1350 m water depth. The orange fore-runner weight in the center of the picture measures 15 cm. Photo: OFOS-team SO265.

At the end of such an expedition it is time to draw a first conclusion and to come up with a résumé of SO265. Well, when entering Kaohsiung port we will have covered a total distance of c. 7300 sm (= 13.500 km). More than 5800 eggs, 400 kg potatoes and 500 kg meat were prepared by the two excellent chefs of the SONNE and consumed by the cruise participants. And 2400 bread rolls were baked! Besides 3 CTD stations we have conducted 72 dredge hauls of which 49

(=68%) recovered *in situ* (=locally occurring) volcanic rocks. No deployed device was lost or damaged. Most important in these raw numbers is that we managed to get sample material suitable for the planned geochemical analyses from all critical areas/structures and in spatially well-distributed intervals from all working areas to address all the scientific objectives of the project.

The northeasternmost extension of Papanin Ridge (east of 165°30'E), where the ridge was no longer formed at a spreading center but, based on paleomagnetic data, originated by pure intraplate volcanism, proved to be particularly difficult to sample. Only five of fifteen dredge hauls returned suitable volcanic rocks. Luckily, we got well-preserved and feldspar-rich lavas (suitable for age determination) from the easternmost end of the extension. If Papanin Ridge represents a classical hotspot track, the volcanism at this site should have the youngest age. Macroscopically (e.g. in terms of mineral composition), however, no principal difference could be recognized between volcanic rocks obtained from west and east of 165°30' E. It will be interesting to see then, if the geochemical composition of the lavas indicate any differences, i.e. a lower degree of melting compared to Papanin lavas that formed at the spreading center.

Regarding the second main working area, the Ojin seamount province, it can already be concluded, that the number and size of the individual volcanic centers decrease and the width of the province tapers out towards the east: Whereas the province reaches a N-S extension of over 370 km at the edge of Shirshov Massif, the province tapers toward the east and terminates as a small cluster of medium-sized, pan cake-shaped seamounts at 170° East (see last weekly report). If the planned age dating demonstrates that the ages of the volcanoes get progressively younger towards the east, we have probably found the postulated hotspot track!

Regardless if Papanin Ridge or the Ojin seamount belt (or both?) turn out to represent a Shatsky hotspot track, this finding would mean a crucial step forward to solve the riddle of Shatsky Rise plateau formation (origin by interaction of a deep mantle plume with a spreading center or exclusive formation by an unusually productive spreading center without mantle plume involvement) (See first weekly report for more details).



In conclusion, the scientific party is satisfied with what was accomplished during SO265 and always felt very comfortable on board of the SONNE. Our sincerest thanks go to Captain Mallon, his officers and the entire crew, whose help and full support we have always been able to count on.

*Saying goodbye to Shatsky Rise.
Photo: J. Geldmacher*

All cruise participants are doing well and send greetings to everybody at home.

Jörg Geldmacher and the scientific party of SO265