

	<h1>MSM 82</h1> <h2>Rio Grande Rise</h2> <p>2nd Weekly Report 25.03. – 31.03.2019</p>	<p>MARIA S. MERIAN 32°18'S / 32°09'W</p>
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The second week started just like the end of the first with further success in dredging rocks from the northern flank of a deep graben structure located on the southeastern side of the Rio Grande Rise. This graben structure, the Cruzeiro do Sul Lineament, extends from northwest to southeast across the entire plateau. The steep northern flank in particular exposes rocks at depths that normally can only be reached by expensive deep drilling. Good weather conditions and the right wind direction resulted in seven successful dredge hauls. Only one haul failed, the dredge returned empty back to deck. On deck, rocks are broken into smaller pieces so that can be cut by a saw into manageable samples that can be used for initial inspection and petrographic description.



(c) Stefan Krumm, 2019

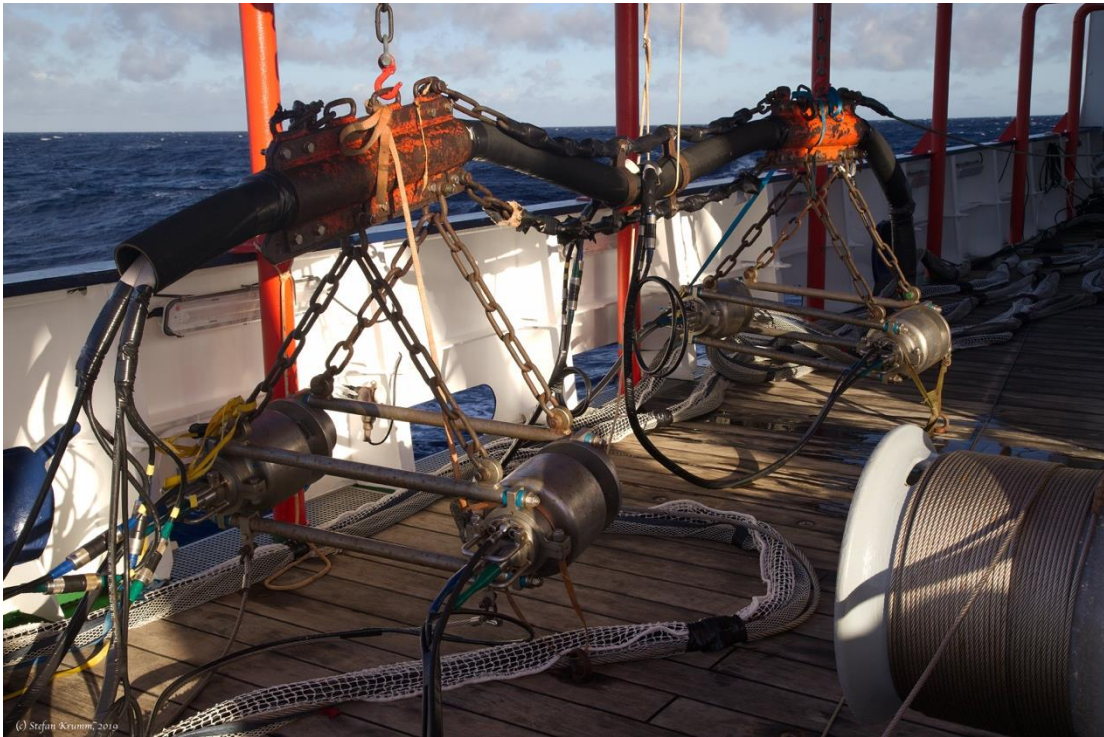
*Recovery of the sediments and rocks that just arrived from the deep sea.
(Photograph: Stefan Krumm)*



Patrick and Jan break the rocks into small pieces. (Photograph: Kristina Nöbel)

The original plan was to give the petrologist the opportunity to get as many rock samples as possible to process and for the geophysicists to collect data for the remainder of the week. However, this did not work out as planned. The work on the samples was finished at a fast pace that is more usual on an exclusively rock sampling cruise. But still, the geophysicists could use the whole week to collect their data.

Starting Monday afternoon (25.3.) and continuing until Tuesday early morning (26.3.), another eleven ocean bottom seismometers were deployed along the first seismic profile. At about 6 o'clock we started to deploy the streamer, a 3000 m long cable with 240 hydrophones. Since, it was not clear if and how well the streamer would operate, we used some hours set aside for contingencies to test some of its sections and modules. Unfortunately, the test was not successful. Therefore, we decided to deploy the airguns and shortly after to start with the seismic measurements. The first airgun was put into operation only after we got the "Go" from the marine mammal observers from Seiche Environmental Limited. No whales or other marine mammals were observed close to the vessel. The airguns are filled with compressed air (200 bar) and the sudden release of the air is triggered by the seismic measurement system. The expansion of the air bubble in the water causes a pressure (acoustic) wave that propagates through the water layer into the seafloor. There, the waves get reflected and refracted. The returning waves are recorded with the hydrophones in the streamer and with hydrophones and seismometers at the ocean bottom stations (OBS). Later analysis will produce images of the seafloor extending to a depth of several kilometers. Unfortunately, we could only record data with the streamer sporadically. Further testing indicated that most probably the tow cable of the streamer, the lead in, is causing the malfunction. We are not able to solve that issue here on board. So, we will have to rely solely on the recordings of the OBS. We will also use bathymetry, gravity and magnetic data for our analyses.



The airguns are ready for deployment. (*Photograph: Stefan Krumm*)

After two days without a break we arrived at the end of the first seismic profile on Thursday (28.3.) shortly after lunch. Magnetometer, airguns and streamer were recovered without problems. Now, the most exciting part of the week began. Would all OBS safely arrive back to sea surface? Could they be recovered? And would they in the end contain high-quality data? Now, we would learn if the test of the release units in the first week was really successful. As we approached the positions where we had deployed the OBS we sent an acoustic signal to the seafloor. The release units then turn a hook and release the OBS from the steel anchor and they rise due to their buoyancy at about 1.2 m per second. About one hour later, the OBS reach the sea surface. They can be located by flags, flash lights and radio beacons. After a couple of minutes, the instruments are recovered along the starboard side of the vessel.

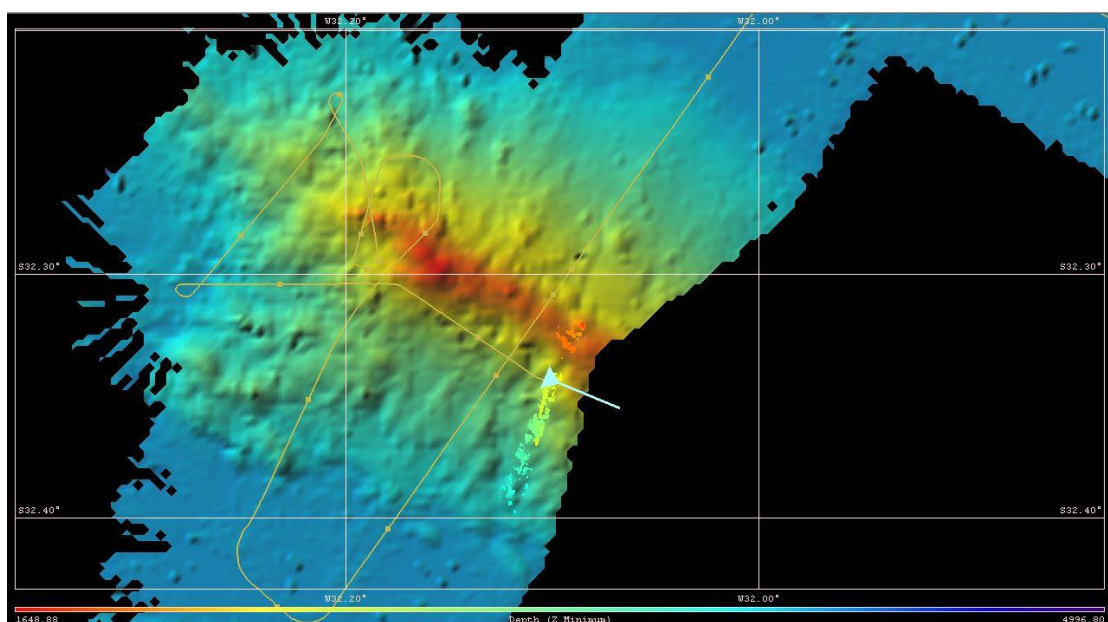
Early Saturday morning (30.3.) the last of the 27 deployed OBS surfaced and was successfully recovered. The OBS team was delighted because it is never 100 percent sure that all instruments will be recovered. We are now proceeding with the retrieval and first quality checks of the OBS data.

We have finished all our tasks in the first working area. We are now on transit towards the second working area in the central Rio Grande Rise. On the way we will make measurements with the towed magnetometer and all available onboard measurement systems such as the swath multibeam echo sounder and sediment echo sounder. Also, there are two stops at nearby seamounts on the schedule.



*The 27th OBS at the sea surface. You have to look carefully to identify it. Luckily, the search is supported by flash lights and radio beacons.
(Photograph: Karsten Korsch).*

The first dredge haul in the morning failed because the dredge got stuck. But it was freed and recovered successfully thanks to the master and the crew. The dredge was empty, with the exception of some sediments. The second dredge also got stuck, and was again freed. This time the dredge recovered a large sample that turned out, unfortunately, to be carbonate material rather than basalt, which we were expecting to sample.



Ongoing mapping of a previously unnamed seamount.

The crew is at our side at all times whether we are working on the deck or deploying and recovering our instruments or sampling equipment and helping us with any problems we have be they large or small. Actually, we are at the side of the crew as they do this, often quite difficult work, in cooperation with the officers on the bridge. Not forgetting the people working in the engine room day and night to ensure that *MARIA S. MERIAN* is always able to complete our tasks and transit rapidly to our next working area.

We are all in a good mood. Watching movies or just sitting together in the evenings brings some welcome diversion for the busy work program.

We all send our best regards to Wilfried. He is one of the initiators of our expedition. Wilfried has published important papers about the interplay between tectonics and mantle plumes in the South Atlantic that have raised the key questions we are trying to answer with the data and samples we are collecting during the cruise. We will do our best to return with exciting samples and results. We have no doubt that Wilfried will continue to pursue his scientific interests and stand at our side as a mentor and friend even though he is now finished with his official work.

Wolfram Geissler & Scientific Party of MSM82



*Here is the solution to where the OBS surfaced.
(Photograph: Karsten Korsch).*