



RV SONNE cruise SO258 Leg 2 is also part of the research project INGON, as the previous SO258 Leg 1 was. The project is cooperation between the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research (AWI) Bremerhaven and the GEOMAR Helmholtz Centre for Ocean Research Kiel and is funded by the German Federal Ministry of Education and Research. The INGON objectives are to investigate principal mechanisms and magmatic processes in the Earth's mantle that are active during the breakup of continents, the formation of ocean basins and the drift of lithospheric plates.

We have chosen the continental margin of India/Sri Lanka and the adjacent part of the Indian oceanic plate. 150 Ma India/Sri Lanka was located in immediate vicinity to Enderby Land in East Antarctica. Since the Ocean close to Antarctica is difficult to access for scientific investigations due to the ice coverage, we as polar researchers from the Alfred Wegener Institute decided to study the conjugate continental margin south of Sri Lanka, which is located at the equator. Whereas SO258 Leg 1 was dedicated to volcanological-geochemical investigations, we will study the ocean floor by means of various geophysical methods.

In the afternoon of July 9, 2017, an initial small group of scientists went on-board the RV SONNE that just arrived from the previous cruise leg. This group started the installation of the gravity meter. Before gravity can be measured the instrument has to be heated up to a certain temperature. And this takes about one to two days. The visit was also a good opportunity to discuss with members of the scientific party of cruise SO258/1. On July 10, 2017 we started to unload our scientific equipment from the containers that were loaded to the vessel before. Also we did a first visual inspection of our streamer winch. In the afternoon, Master Oliver Meyer and Chief Scientist Wolfram Geissler participated in a meeting to discuss important details of the planned measurements with local cooperation partners and authorities. This was necessary, since one important part of the study area is located within and close to one of the most frequented shipping routes south of Sri Lanka. July 11, 2017, all members of the scientific party embarked and continued the preparations for the expedition. Thanks to the support of master and the crew, it was possible that five additional participants from Sri Lanka could embark on short term.

Altogether we are now 31 crewmembers and 26 scientists on-board. The foreign participants are from Sri Lanka (7), the United Kingdom (2), Japan (1), France (1), and Austria (1).



*RV SONNE set sail in Colombo in the morning of July 12, 2017.  
(Photograph: Wolfram Geissler)*

Our expedition started July 12, 2017, leaving the port of Colombo at 09:45 local time. While the sun was shining we sailed southwards slightly off the shallow coastal waters. A minor swell just out of the harbour caused some participants to feel unwell for some time. But once the sea became calm, everybody soon felt better. Already in the late afternoon we arrived at our first scientific station. The first cast was a CTD to measure temperature and conductivity within the water column. This data is used to calculate the speed of sound in the water to calibrate our echo sounder systems. Afterwards we successfully tested the release units of our ocean-bottom seismometers (OBS). We will use the OBS later during the cruise to conduct seismic measurements.

These tests continued until the early morning of July 13, 2017. After we had passed the sea route at Dondra Head, we deployed the towed magnetic system and started the measurements along the first profile at 07:30. The systematic survey of the Earth's magnetic field to the south of Sri Lanka has the highest priority during cruise SO258/2. With the collected data we plan to reconstruct the timing of the continental break-up and the drift speed of the Indian plate. This is possible measuring characteristic magnetic anomalies frozen within the oceanic crust, which allow relating them to a specific age.

July 14, 2017, we passed the equator for the first time. This will happen more often in the upcoming six weeks. Mareen deployed the first mobile sound velocity probe to update the sound velocity profile necessary for the echo sounders. Since the profile was similar, no corrections had to be made. The mobile probes are manufactured for a maximum deployment depth of 2000 m. With 1935 m, Mareen reached a new depth record.

In the morning of July 15, 2017, magnetic measurements had to be interrupted unexpectedly, since the towed sensor had to be changed. Since then, all systems are running without problems. Still we are measuring along the first profile heading southwards. During these days we want to test a hypothesis about very high drift speeds of the Indian plate over a short time interval about 65 million years ago.

In the afternoon we will deploy another mobile CTD. Afterwards we will go for double loops to calibrate the magnetometer of our Japanese colleague. This instrument is installed on the vessel. Using data recorded on the calibration loops will allow correcting for the influence of the magnetic vessel.

Since we left the harbour, three marine mammal observers watch out from the observer deck which animals are present within our study area. During the last days there were sightings of whales, dolphins, whale sharks, turtles and birds. These observations are necessary to adjust mitigation procedures planned for the seismic measurements.



*A pod of Spinner Dolphins travelling through the Indian Ocean.  
(Photograph: Marcus Bridge)*

While continuously measuring we start to prepare the instruments that will be used in the upcoming week. All people on board are in a good mood. The meals are excellent. And finally, the weather and the sea are in favour of us. For us as polar researchers, the sun is almost too intense.



*Preparation work for the seismic measurements.  
(Photograph: Mareen Lösing)*

Wolfram Geissler and the SO258/2 Science Party