

Scientific Cruise **SO 314** with RV SONNE:

T-SECTOR Southeast Pacific Rise

13.08.2025 (Papeete/Tahiti) –
05.10.2025 (Antofagasta/Chile)



Scientific Cruise SO 314, 1. Weekly Report: 13.08.-17.08.2025

Scientific Cruise SO 314 started according to schedule and under excellent weather conditions on 13 August 2025 in Papeete (Tahiti). In the days before the containers were unloaded, the scientific equipment was brought on board and distributed in the laboratories and all scientific participants arrived in Papeete after a long journey. The SONNE started to head directly to the working area at 14°S, 112°W on the Southeast Pacific Rise, which will take the research vessel 9 days. This period of time is used by the cruise participants to prepare the instruments for the geophysical investigations (50 ocean bottom seismometers) and the devices for the recovery of sediment cores of up to 20 m length.

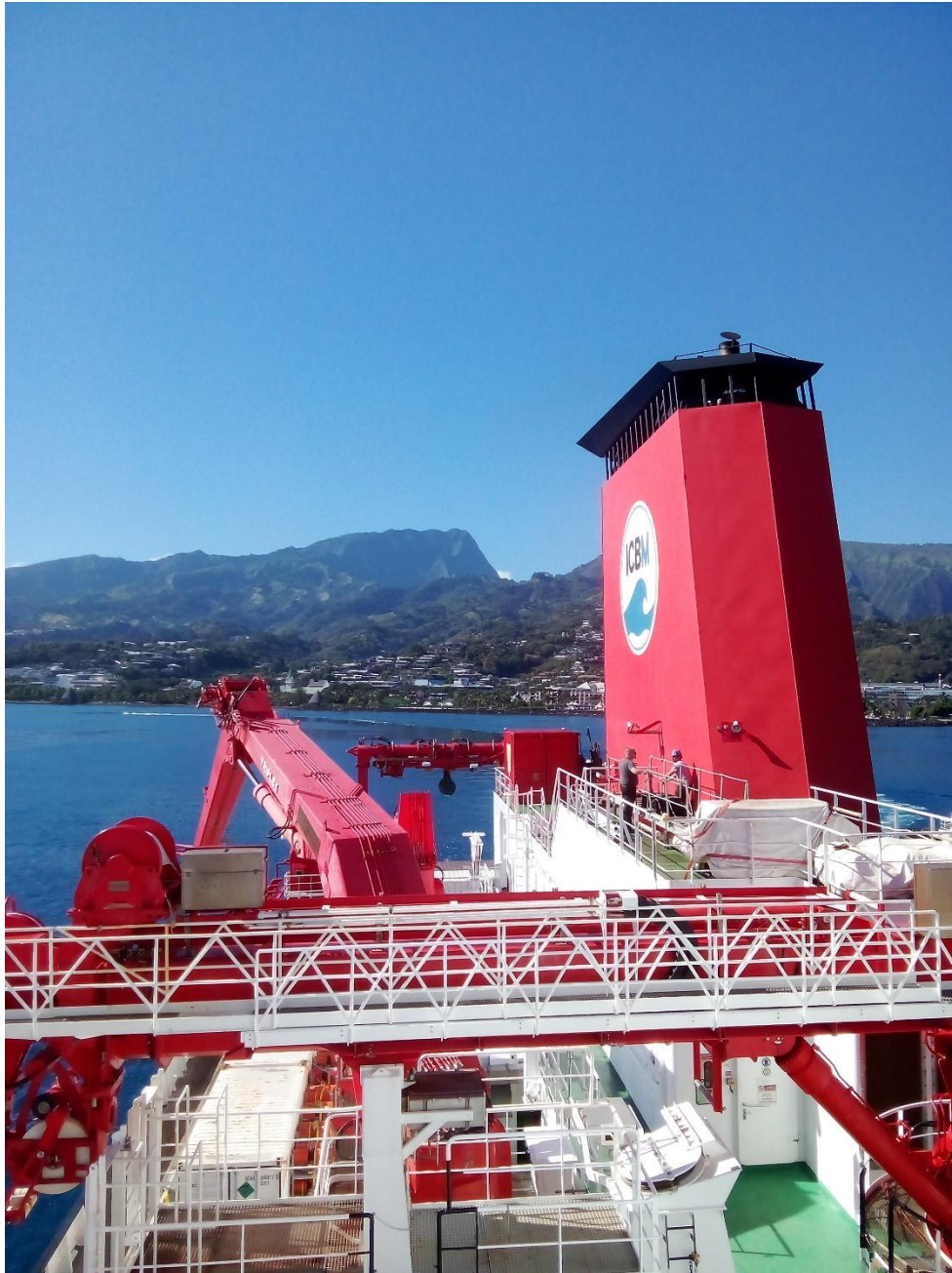
During Cruise SO 314 the relationships between the climate of the Earth (sea level changes) and the geochemical composition and thickness of newly formed oceanic crust, as well as the directly coupled hydrothermal activity of the Southeast Pacific Rise will be investigated. Modeling results have shown that mid-ocean ridge (MOR) volcanism (crustal thickness, lava chemistry and hydrothermal activity) is sensitive to pressure changes originating from sea level variations as a consequence of the waxing and waning of continental ice sheets on glacial/interglacial time scales. To test this hypothesis detailed time series of sea level changes are available but there are no time series of the process controlling the formation of new oceanic crust and hydrothermal activity given that their archives are difficult to access or not accessible at all.

Cruise SO 314 will close this gap through investigations of the variability at the fast spreading Southeast Pacific Rise of the past 1,5 Myr. Through closely spaced coring of the sediments perpendicular to the ridge axis on both sides of the ridge, high-resolution time series of variations in mantle melting (derived from the chemistry of volcanic glasses preserved in the sediments) and hydrothermal activity will be obtained, while seismic techniques will be used to determine variations in crustal thickness over time.

The expedition is part of the Synergy Project T-SECTOR financed by the European Research Council (ERC) which tackles the question how processes in the atmosphere, the ocean and the solid earth are connected. In this project the working groups of Martin Frank, Heidrun Kopp and Kaj Hoernle of GEOMAR Helmholtz Centre for Ocean Research Kiel and of Charles Langmuir of Harvard University (USA) are involved. In addition, scientists of MARUM Center for Marine Environmental Sciences at the University of Bremen and the University of Hamburg participate in the expedition.

Everybody on board is doing well and we are looking forward to the station work and the upcoming expedition to one of the areas on Earth most remote from land.

Best regards from Martin Frank (Chief Scientist SO 314), Heidrun Kopp (Co-Chief Scientist SO 314) and the entire team of SO 314.



Leaving port of Papeete (Tahiti) on 13.8.25