

M154-1

1. Weekly report



Mindelo-Point a Pitre 03.-07.04.2019

Meteor voyage M154-1 SEKT (Sector collapse kinematics and tsunami implications) will investigate the functioning of large-scale volcano collapses. Volcanoes do not only pose a natural hazard because of their volcanic activity, but also because they sometimes fail catastrophically as a result of gravity. Although such events are rare - on average only every once in 100,000 years for any given volcano - they can cause enormous damage when they happen, because they can carry away most of the volcanic edifice and cause tsunamis. Recent



examples are the collapse of Krakatau volcano in Indonesia during Christmas 2018 killing several hundred people. However, this was only a very small collapse and there are well documented examples of volcanic island collapses that triggered tsunamis that were higher than 160 m. Because such events are rare and we do not know where they will strike next it is difficult to set up experiments that directly monitor and measure the physical parameters that control volcanic island collapses. Therefore, it is necessary to investigate sites of past island collapses to derive the parameters such as landslide velocity, acceleration, and viscosity indirectly. These can then be used to assess the threat that already slowly collapsing volcanoes such as Mt. Etna on Sicily and Kilauea on Big Island, Hawai'i pose to the neighbouring coasts.

During M154-1 we will survey a well-known sector collapse deposit off the Caribbean Island of Montserrat using high-resolution 3D seismic imaging, ocean-bottom seismometers and seafloor surveying. This will be followed by seafloor drilling using MeBo on the second leg (M154-2) to check the interpretations of the seismic data and provide further information on the nature of the rocks that were involved in the sector collapse. Montserrat is a unique place in the world where these processes can be studied; primarily because the landslide was deviated during its run-out by a seamount complex that made it bend its course. From the amount of run-up on this seamount we will be able to derive the landslide velocity. Secondly, the area off Montserrat has been extensively studied before, because the island was erupting from 1995 until 2012 and colleagues from the UK and France have carried out several surveying campaigns that provide important a priori information for this study.

As R/V Meteor was located in the eastern Atlantic we had to mobilize the ship in the port of Mindelo on the Cape Verde islands. After taking on board all our equipment (2x 20' and 1 x 40' container) and setting up the heavy gear such as paravanes for the 3D seismic equipment, we departed on April 3. Since then we are sailing across the Atlantic with a fresh trade wind pushing us from behind making the old lady go up to 13 kts. At the moment we expect to reach the survey area of Montserrat around lunch time on Wednesday. This leaves us with good time to prepare all the equipment, while the echosounders are running and produce a nice data set that presently images the mid-Atlantic ridge 5000 m below us.

All on board are well and look forward to get started with the scientific work.

Christian Berndt
(Chief scientist)