SO264 SONNE-EMPRESS

Weekly Report Nr. 5
(July 23-29, 2018)

Empress Suiko was the first empress and thirty-third monarch of Japan, followed by seven other empresses in Japanese history. She came to power at the age of 39 in 593 AD until she died at the age of 74. The huge volcano, which we intensively mapped and geologically sampled in the course of this week, is named after her: Suiko Seamount. The Suiko volcano belongs to the Emperor Seamout Chain in the North Pacific, became already inactive about 60 million years ago and sank below sea level. Fossil shallow-water corals of the same age were found on the summit and witness the turbulent history of this volcano.

Previously we had sampled several, mostly younger, volcanoes during the last weeks: Kinmei, Soga, and Yomei, named after family members of the Empress. Suiko was the third daughter of Emperor Kinmei and his wife Soga, and she was the younger sister of Emperor Yomei. Yomei was only in power for two years before he died due to illness. A long and traditional history in Japan, long before the Vikings had their high time in Northern Europe.

The Suiko volcano is located at about 45° north and 170° east and is within the area of the Subarctic Front, which is defined as the 4°C isotherm in 100 m water depth and the approximate boundary between the wind-driven subtropical and subarctic vortex systems. The volcano is interesting in the sense that we continue to hope to be able to recover good sediments on the summit areas located in relatively shallow water. In fact, we are not the first to do geological studies here. The drill ship "Glomar Challenger" already carried out a drilling campaign here in the late seventies with the intention to study the volcanic development of the Emperor seamount chain. In 2001, the French research vessel "Marion Dufresne" retrieved a first paleoceanographically interesting sediment core of ~44 m core length, which had not been worked on until now.

Empress Suiko (554–628 years AD), third and youngest daughter of Emperor Kinmeia and his wife Soga (en.wikipedia.org)

Modern drone technology makes it possible: photographed from 500 m height FS SONNE draws its tracks in the vastness of the North Pacific.

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So far we carried out ten busy stations on Suiko exclusively for sediment sampling. With core recoveries of 80% on average, we brought ~120 m of sediment core to the working deck. These sediment cores were obtained from water depths of 1800 m to 3200 m. A quite successful action, after conditions were significantly worse on the previous volcanoes with their flat and barren summit areas. Although core locations from water depths of ~1800 m are rather too deep to reach into the modern North Pacific Intermediate Water, they should still be ideal for reconstructing the glacial conditions, when North Pacific Intermediate Water was clearly deeper then. The North Pacific Intermediate Water contributes to the ventilation of the deeper Pacific.

The so-called "bananas", gravity cores which bent or partly broke when hitting the seabed, are rare so far, but then make the deck crew very busy. Fortunately, these "bananas" still contain short high-quality sediment sequences.

The sediment cores, some of which are more than 19 m long, are being extensively analyzed on board before they are sent home packed in reefer containers. After sawing the sediment core into pieces of 1 meter, the exact labeling and the division of the sediment cores into work and archive halves continues. Then, the core segments are first logged by various methods, that is: every centimeter geophysical parameters of the sediment are measured, which help determine the characteristics of the sediments, correlate sediment cores from different areas, and get initial ideas on the age of the sediments. Subsequently, the core segments are photographed and described by experienced geologists. Working and measuring in a large number of on-board laboratories requires many hours and above all, a well-coordinated team working hand in hand. This also presupposes that route planning and station planning is carried out in a forward-looking manner in order to be able to use ship, crew and the scientific group effectively.

Our first assessment of the logging data is promising. The different sediment sequences, which contain biogenic calcite down to large water depths, can be correlated very well within the study area. Distinct volcanic ash layers provide additional information for cross-regional correlation and approaches to age dating.

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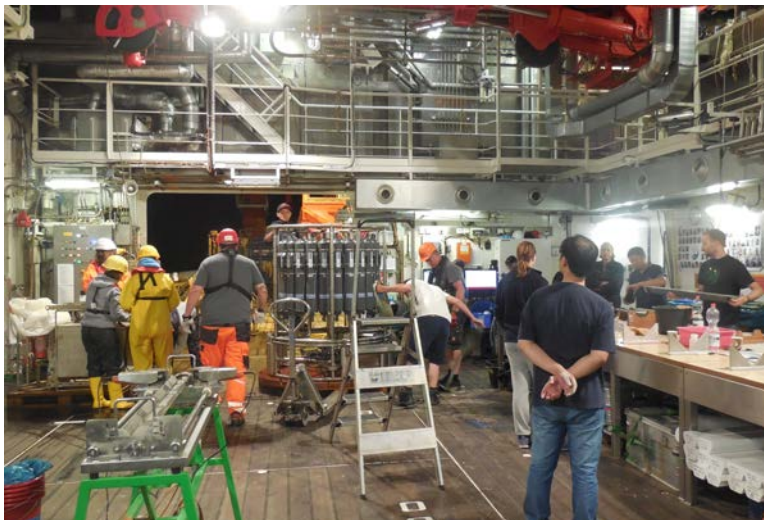
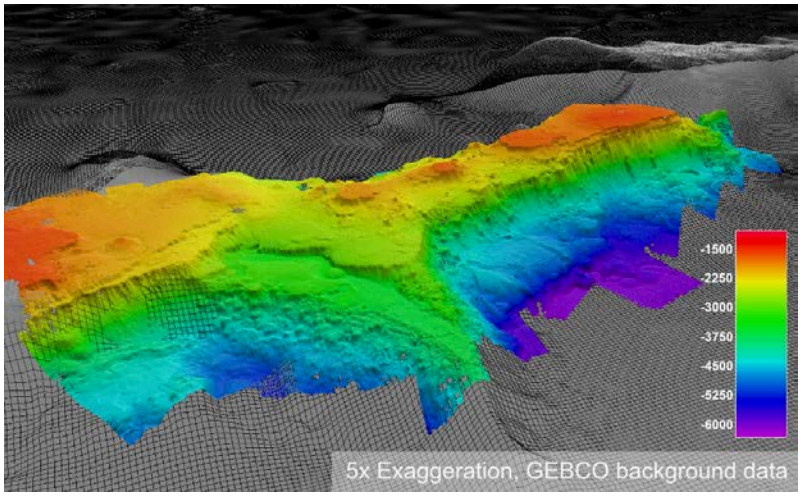


High activity in the geology laboratory. Geologists and biologists work hand in hand on the night station and share the laboratory space.

Apart from sediment coring, a major focus of our work during the last week was bathymetric mapping and profiling with the sediment echosounder. We have significantly expanded this work at Suiko to optimize the difficult search for suitable coring stations. Our work on the previously sampled volcanoes had shown that a systematic recording of the very complex bathymetric conditions and the documentation of existing sediment packages makes the selection of potential core locations much more successful.

On Saturday we had a little celebration: Half of the SO264 expedition is already over and experience shows that the second half will just go by quickly. Nonetheless, there is still much to be done. The next volcano is calling: Jimmu. According to legend, Jimmu is the first emperor of Japan, with a regency from 660 to 585 BC. He should have turned 126 years old. Well, legends! With the best mood and support from the SONNE crew we send warm greetings from 45 ° N 170 ° E to those who stayed at home. On behalf of all cruise participants

Dirk Nürnberg



Three-dimensional presentation of the Suiko volcano based on bathymetric datasets created during SO264.