FS SONNE

Expedition SO320/2: Hess Evolution

19.06. – 03.08.2026, Honolulu (USA) – Vancouver (Canada)

2. Weekly Report (22.06 – 28.06.2026)

After a transit of about three days in good weather and calm seas, we reached the edge of our first working area on the Liliuokalani Ridge (the southeastern extension of the Hess Rise) on June 22. After leaving the Exclusive Economic Zone (EEZ) of the United States, the hydroacoustic and geophysical recording instruments were activated, and shortly thereafter, a CTD (Conductivity, Temperature, Depth) rosette was deployed and lowered to a depth of 3,500 m (Fig. 1). The device contains several sensors that record parameters such as temperature, salinity, oxygen content, and fluorescence across the entire depth range (Fig. 2). The measured data is transmitted in real time to the ship, and changes in the water column can be tracked live. The water samplers attached to the rosette can then be remotely triggered to close at specific depths, to collect the water. On our SO320/2 expedition, the CTD data is primarily used to calibrate the multibeam echo sounder. Since water depth is measured using sound waves whose propagation speed depends on the parameters mentioned above (especially salinity), specific sound speeds must be calculated for each geographically distinct working area in order to determine the correct depth.

Fig. 1a, b: Retrieving the CTD. Left panel: The crew (left) and the scientific team (right) work hand in hand (Photo: J.G.).

The recorded profile shows how these parameters change with increasing depth within the water column (Fig. 2). The surface water in the upper approximately 400 m generally exhibits the highest temperatures, the highest salinity and elevated oxygen concentrations. Intermediate water masses of the North Pacific can be identified by their significantly lower salinity, a minimum oxygen concentration and temperatures below 10 °C. As depth increases, salinity and oxygen content rise again, while the decrease in temperature at

greater depths is only slight. From a depth of around 2200 m, the temperature remains below 2 °C, which demonstrates the influence of North Pacific deep water.

After completing the CTD deployment, the ship continued its transit to the first rock sampling station. A chain-bag dredge is used to recover the rocks (for more details, see future weekly reports). Accordingly, the rest of the week was marked by a constant alternation between more or less brief mapping surveys (to locate suitable sampling sites) and dredging operations. So far, we have been quite successful: Out of 16 dredge hauls, 11 returned volcanic rocks. This is a very good result for such a geological old area. Although the rocks have been exposed to seawater for many millions of years, several samples are well-preserved and thus well-suited for the planned geochemical analyses at our home institutions.

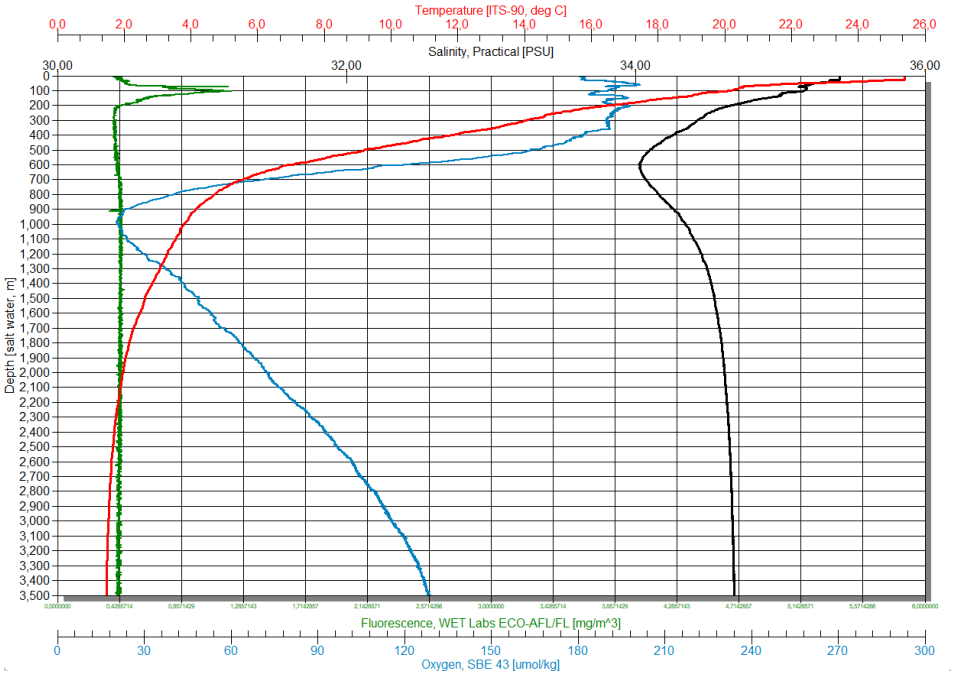

Fig.2: CTD measurement data down to a water depth of 3,500 m at 28°29,988'N and 168°33,884'W (red: temperature, black: salinity, green: fluorescence, blue: oxygen content).

After working our way northward in this manner for about 240 nautical miles (445 km) along the Liliuokalani Ridge, it was necessary to update the velocity sound profile and thus to conduct another CTD deployment at the end of this week. Over the weekend, we finally arrived at the southern rim of the Hess Rise plateau itself.

Greetings on behalf of all cruise participants from FS SONNE,

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