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Paleoseismic evidence for pre-historic earthquakes in the sedimentary record of Botnsvatn Lake on the Húsavík-Flatey Fault, North Iceland

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Lacustrine and marine sedimentary records are crucial to evaluate paleoseismicity of offshore faults, since on-fault trenching methods are not applicable on them. Here, we present a case study from the Tjörnes Fracture Zone (TFZ) in North Iceland. The Húsavík-Flatey Fault, which is a part of the TFZ, is a $\sim$100 km-long dextral strike-slip fault, of which almost 80% is offshore. The fault has produced magnitude 6-7 earthquakes in the past and poses a threat to the town of Húsavík, located on the fault, and the surrounding communities. However, information about historical earthquakes in the area is mostly limited to the past 300 years and even for that time period, the size and locations of major earthquakes are uncertain. We collected several piston cores from a small and a shallow lake called Botnsvatn, located on the fault to seek improving the knowledge about past earthquake activity. The longest and most complete core is 4.1 m long and provides a 2500 year-long sedimentary record. The physical and geochemical properties of the sediments along the cores were investigated by means of magnetic susceptibility, gamma-ray density, radiographic images on u-channels and micro-XRF scanning. The chronology of the sediments was constructed from four radiocarbon dates and 67 tephra layers. Five sedimentary events have been detected in the cores. Four of them can be attributed to increased sediment influx, probably due to seismically-triggered landslides in the catchment. The fifth event appears as a stratigraphic horizon of soft sediment deformations and is detected in multiple cores. The youngest event in the sequence temporally coincides with the historical 1872 AD earthquake (M=6.5) in the region. Based on the current preliminary data, we argue that “at least” five large earthquakes took place during the last 2500 years on this section of the fault. However, additional earthquakes may be detected after further sedimentological analyses that are planned in the coming months.