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A 6000-year sedimentary record of earthquakes from the Fuji Five Lakes, Japan

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The Fuji Five Lakes (Lake Motosu, Lake Shoji, Lake Sai, Lake Kawaguchi and Lake Yamanaka) are distributed along the northern flank of the Mt. Fuji Volcano, in central Japan. These lakes are situated close to the triple junction, where the North American Plate, the Eurasian plate and the Philippine Sea Plate meet. Therefore, the region can be impacted by megathrust earthquakes generated along the Nankai-Suruga and the Sagami subduction zones. In addition, intraplate earthquakes may affect the Fuji Five Lakes region. In the framework of the QuakeRecNankai project, we investigated Lake Motosu, Lake Sai, Lake Kawaguchi and Lake Yamanaka. In total, we acquired more than 120 km of seismic profiles and 60 m of sediment cores.

Here, we present the paleoseismological record of Lake Motosu over the last 6000 years. Event deposits were identified from sediment cores based on magnetic susceptibility, XRF, grainsize and SEM analysis. Turbidites were dated by 14C dating and correlated with historical earthquakes. For prehistorical earthquakes (i.e. before the 6th century CE), turbidites were correlated with geological evidence recorded along the Honshu coastline (e.g., tsunami deposits and emerged coastal geomorphology such as marine terraces). Over the last 6000 years, earthquake-triggered turbidites occurred with an average recurrence interval of 184±8 years. The near total absence of large mass-transport deposits in the sedimentary record during the last 6000 years suggests that earthquake shaking mostly induced the remobilization of thin veneers of sediments in Lake Motosu. Imprints of earthquakes as well as the earthquake sensitivity vary in each lake. In Lake Sai, over the last 1200 years, past earthquake shaking induced turbidites, delta collapse and liquefaction (mud volcanoes). By contrast, the impact of earthquake shaking in Lake Yamanaka and Lake Kawaguchi is minor. In this presentation, we also discuss the factors controlling earthquake recording in the Fuji Five Lakes.