COOWAR Thierry Maël (2019): Measuring the erosion rate of the Japanese Alps using OSL-Thermochronometry

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The Japanese Alps have elevations of up to 3,000 m a.s.l. but are thought to have only uplif- ted within the past 1–4 Ma. The very young age of these mountains means that established ther- mochronometry methods like AFT or AHe dating cannot resolve their most recent phase of exhumation (Sueoka et al. 2012). However, a new technique entitled OSL-thermochronometry—OSL T—can provide data at a sufficient resolution to constrain the latest uplift of the Japanese Alps. OSL-T constrains only the last 1–2 kilometres of rock exhumation towards the sur- face because of its low closure temperature. Consequently, the interactions between tectonics, climate and Earth surface processes can be investigated. However, the OSL T which is a trapped charge dating method is subject to a major limitation: it experiences signal saturation after around one Ma. As a result, no exhumation history can be determined beyond this age (King et al. 2016).

In this perspective, the aim of the project was to collect samples from the Hida and the Kiso ranges in central Japan, Japanese Alps, along an elevation transect to determine their asso- ciate local erosion rate with the help of OSL T. Data from the Kiso range indicate that four of the five samples are saturated. However, the most elevated sample has a thermal signal, indi- cating a slightly higher rate of exhumation than the other samples. This rate may be coinci- dent with a higher erosion process on top of the mountain due to glaciation in this region, rather than the latest phase of mountain uplift, which has been suggested to have occurred 800 ka.

Data from the Hida range, sampled in a glacial cirque, indicates higher erosion rates from samples at the top of a glacial valley. Downward samples are nearly or completely saturated which indicates high erosion variability in a common structure. However, high uncertainty is presumed in the dataset because the dose rate of this work was estimated by reason of unconstrained grain size distribution in samples. As a result, even though the results might not be exact, the opportunity to learn more on the OSL-T saturation process and to know where the data are not saturated is a good start for further studies in the area.