[JJ] Evening Poster | M (Multidisciplinary and Interdisciplinary) | M-GI General Geosciences, Information Geosciences & Simulations

[M-GI25]Environmental changes in mountainous area

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Mountainous areas provide water resources to the populated downstream areas, protecting the diversity of ecosystem and providing tourism attraction. To access the mountain environment changes and mitigate the impacts of global warming influences, a cross-cutting session is proposed to share the scientific knowledge among various fields; such as climatology, hydrology, geography, glaciology, water/carbon/material cycle, eco-diversity, etc.

[MGI25-P03]Sub-Quaternary exhumation rate changes in the Hida range of the Japanese Alps

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The Hida range is one of the largest and highest mountain ranges in Japan. Whilst its exact uplift history remains debated, previous thermochronometric studies imply multiple uplift phases (cf. Sueoka et al., 2016), including within the past 1 Ma when Quaternary climate oscillated between ice-house and green-house conditions. Thermochronometry enables exhumation rates to be determined from the measurement of rates of rock cooling, providing insights into the processes of landscape evolution. A number of higher-temperature thermochronometry ages for the Hida range have been reported previously (e.g. Ito et al., 2013) indicating that the Hida range is undergoing rapid exhumation. We applied two ultra-low temperature thermochronometric methods based on the trapped-charge dating methods of Optically Stimulated Luminescence (OSL) and Electron Spin Resonance (ESR) dating to a suite of 19 bedrock samples collected from the Hida range. These techniques are sensitive to temperatures of as low as ~25 ^{o}C, enabling late-Quaternary exhumation histories to be constrained potentially allowing variations in erosion rates to be correlated with Quaternary climatic cycles. In contrast to OSL which can only be applied over timescales of up to ~400 ka, ESR may be applicable over the whole Quaternary period, significantly extending the applicability of trapped-charge dating based thermochronometric methods.

The ESR and OSL data yield similar cooling histories indicating rapid erosion of the Hida range over the past 100 ka. Inverting the data for exhumation rates, assuming a geothermal gradient of 60 ^{o}C/km reveals a reduction in rates from ~10 mm a^{-1} throughout MIS4, during which the most intense glaciation of the Japanese Alps occurred (Iwata, 2003), to ~1-3 mm a^{-1} over the past 20 ka. Our preliminary data indicate that exhumation rates within the Hida range were higher under a cooler and wetter climate and that glacial erosion processes may have been significant at sub-Quaternary timescales.

References

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