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Long-term Uplift-denudation of the Japan Arc revealed by low-temperature thermochronology

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Recent progress of low-temperature thermochronology, e.g., developments of (U-Th-Sm)/He method and fission-track inversion modeling, enables to analyze uplift-denudation-cooling histories of the island-arc mountains with good confidence. This is particularly fruitful for studying the topographic evolution of the Japan Arc, because many of the Japanese mountains are started to uplift in recent time (e.g., late Pliocene to Quaternary) after an extended period of tectonic quiescence, and hence the resultant amount of total denudation is relatively small. This was first demonstrated by elucidating the uplift-denudation-cooling process of the Kiso and Akaishi Mountains, in which average topographic changes of the tilted mountain block were quantitatively reconstructed by low-temperature thermochronology (Ref.1-2). Such analyses also allow to estimate the background paleo-depth of neo-tectonic faulting episodes.
In this presentation, we give a brief overview of the low-temperature thermochronology and tectonic background of the Japan Arc, and then highlight some of the ongoing thermochronologic researches, such as:
(1) Compilation of previously reported thermochronologic data from the Japan Arc (Ref.3),
(2) (U-Th-Sm)/He and fission-track analyses of the NE Japan Arc (Ref.4-5), which is a well-known example of the modern island arcs in plate subduction zones and forms a main subaerial part of the overriding plate of the 2011.3.11 Mega-earthquake epicenter,
(3) (U-Th-Sm)/He, fission-track and U-Pb analyses of the Hida Mountain, which is a part of central mountain ranges that are formed by recent convergence between the NE and SW Japan Arcs and may have suffered widespread deformations with rapid exhumation, as deduced from the exposure of youngest granites on the Earth (Ref.6-7).

References

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