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Quantifying long-term sediment yield from mountainous watersheds using cosmogenic nuclides in fluvial sediment

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This study demonstrates a new technique determining rates of sediment yield from mountainous watersheds for a millennial timescale, using cosmogenic nuclides in fluvial sediment. This methodology employs Be-10 and Al-26 produced in situ in quartz grains via irradiation of secondary cosmic rays. Long-term spatially-averaged erosion rates of hillslopes in upstream catchments can be calculated from nuclide concentrations determined by accelerator mass spectrometry. Such approach enables us to predict reservoir sedimentation and/or to assess effects of the sand accretion in civil engineering structures to sediment budget in river systems. We introduce the basic principle of the methodology, and then report a case for several watersheds in Northern Japanese Alps, including parts of Takase dam catchments.

Keywords: sediment yield, cosmogenic nuclides, fluvial sediment, erosion rate, watersheds