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Combined $^{40}Ar/^{39}Ar$ and OSL dating of Pleistocene pyroclastic and fluvial deposits of the Cagayan Valley Basin, Northern Luzon, Philippines

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The backarc Cagayan Valley Basin (250 x 80 km) of Northern Luzon, Philippines has a 10 km thick sedimentary infill deposited since the late Oligocene. The upper 900 m consists of non-marine Plio-Pleistocene fluvial sediments with interbedded pyroclastic deposits. Fossil vertebrates and stone artefacts occur within the upper part of this succession. The terrestrial vertebrate fauna is thought to have migrated to Cagayan Valley Basin via one or more land bridges during the Middle Pleistocene, however, the precise age of the fossil and artefact sequences is poorly known. In this study, we present the first results of a dating program on key sections of the Cagayan Pleistocene succession that is being carried out using two complementary numerical-age dating methods - $^{40}Ar/^{39}Ar$ and optically stimulated luminescence, OSL. In addition to providing numerical age information on the Cagayan Valley Basin Pleistocene succession, our aim is to compare results from the two different dating methods using data obtained on stratigraphically equivalent samples.

We sampled below, within, and above the fossil and artefact section of the Pleistocene succession. Samples for laser fusion, single crystal $^{40}Ar/^{39}Ar$ dating were taken from both ignimbrites and airfall ash deposits. The analyses were carried out using a CO_2 laser attached to a low-volume (450 cc) cleanup system and a NU-Instruments Noblesse multi-collector noble gas mass spectrometer.

In OSL dating the age is determined by dividing the total dose absorbed during burial by the environmental dose rate. Samples for OSL dating were taken in sand sized fluvial sediments. These samples contained very little quartz so OSL measurements were undertaken using potassium-rich feldspar extracts. To determine the dose, conventional infrared (IR) stimulation of feldspar is usually performed at or close to room temperature. However, this signal suffers from a significant athermal loss with time (anomalous fading). It has been shown previously that IR stimulation at elevated temperature following IR stimulation at 50^oC gives rise to signal that is much less subject to this undesirable phenomenon. Here we use this post-IR IR signal to determine the burial dose in small aliquots (each $\sim$100 grains) and individual grains. By examining the resulting dose distributions we are able to deduce the most probable burial dose. Environmental dose rates were measured using gamma spectrometry both on site and in the laboratory.