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What's the gravel not telling you? Insights from the Iglesia basin, Argentine Andes

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Deciphering rates of erosion over geologic time is fundamental for understanding the interplay between climate, tectonic, and surface processes. Riverbed sediments are thought to provide a spatial integrated sample of erosion processes in the upstream catchment and are often used to generate catchment averaged erosion rates. Sampling the lithology and grain size of riverbed gravels on three alluvial fans in the Iglesia basin, Argentine Andes, we demonstrate a clear lithological control on clast size: the more resistant lithologies are concentrated in the coarsest fraction of river bed gravels. The more resistant lithologies are also under-represented in the riverbed gravels when compared to their exposure in their upstream catchments. We examine the steepness of fluvial channels in each catchment and evaluate the extent to which spatial variability in bedrock lithology and pulses of glaciation have modulated the lithology and size of sediment exported from the catchment. This work has significant implications for those applying cosmogenic radionuclide and thermochronology techniques on river bed gravels to estimate catchment averaged erosion rates.