



## **Denudation rates from mass balance on alluvial fans in the chinese Tian Shan**

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Denudation is a key process for mountain ranges evolution as it is an essential parameter to study the mass transfer over the Earth surface, the evolution of reliefs, or the complex relationships between climate, erosion and landscape changes. Several methods have been developed to quantify denudation such as the estimation of paleo-sediment fluxes from mass budget. In fact, markers of erosion within drainage areas are often scarce, temporary and difficult to reach. At the outlet of mountain belts, more continuous and perennial records of deposition can be found in sedimentary basins. Sediment budget is thus a powerful approach, generally used at the scale of sedimentary basins. However, this method can also be applied on smaller sedimentary systems, such as alluvial fans. Yet, it is seldom used on these systems, and consequently, its accuracy is barely questioned. We propose to implement such a method on several alluvial fan systems in the Chinese part of the Tian Shan Range, where estimations of denudation rates have already been proposed. Based on the reconstruction of two generations of alluvial fans, we estimate the volume of sediment exported out of the drainage system of the range for the Middle-Late Pleistocene (300 000 to ~11 000 y) and for the Holocene (~11 000 y to present). From these volumes, we derive denudation rates of ~135 m/My at maximum for these two periods, in good agreement with previous mass balance studies. Despite a strong change in the morphology of the piedmont at the onset of the Holocene, denudation rate seems quite stable within the hinterland mountains. This value is quite low for such a range. Based on a comparison of denudation rates observed in other areas over the world with comparable shortening or precipitation rates, we suggest that the low denudation rate observed in the chinese Tian Shan is related to the limited amount of precipitation.