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# Lithium isotopes as a new indicator for change in hydrology

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**The Tibetan Plateau and its surrounding mountains store Earth's third-largest ice reservoir. Nevertheless, how warming global climate could affect weathering behavior in this Mid-latitude largest alpine glacier environment remains enigmatic. Here, we report the first annual time-series of river Lithium isotopes in this area via exploring a typical, rapidly eroding Muztagh glacier (peak of 7546 m) basin. Our results show remarkable (up to ~ 15 ‰) seasonal changes of river $\delta^7$Li, from 17.9 ‰ in the dry season to 2.5 ‰ in the wet season. The very low $\delta^7$Li in this tectonically active basin during wet season contradict the long-standing uplift/weathering hypothesis, that intensified erosion associated with tectonic uplift increased incongruent continental weathering and thus higher riverine $\delta^7$Li to the ocean. Instead, we find that the large changes in alpine glacial $\delta^7$Li strongly reflects the changes in lake water levels ($r^2$ = 0.61), with high values during low lake level, and vice versa. We propose that shifts in the fluid residence time linked to changes in hydrology controls the seasonal river $\delta^7$Li.**

**In addition, our data show that although increasing runoff dilute the total cation content in glacier area, it still results in elevated chemical weathering fluxes. We suggest global warming would further enhance weathering rate in high-altitude mountain regions, and therefore in turn affect the carbon cycle and climate feedback.**