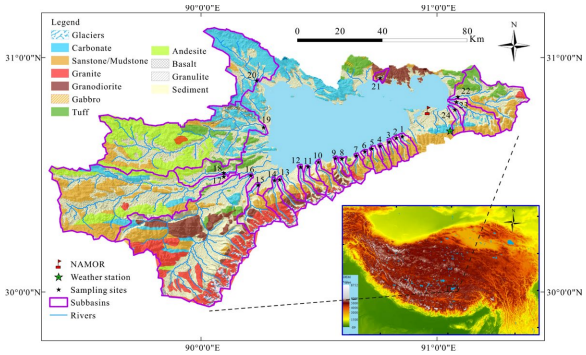
Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.10066

Carbon sink effect caused by chemical weathering is weak in mountainous catchments of the west Nyaingêntanglha Ranges, Central Tibetan Plateau: Evidence from Bayesian mixing model using $\delta^{13}C_{DIC}$

YU ZHENGLIANG

Institute of Tibetan Plateau Research, Chinese Academy of Sciences

Presenting Author: yuzhengliang@itpcas.ac.cn



The Tibetan Plateau (TP) is a focus of chemical weathering research worldwide for the last 30 years. However, carbon sink effect is still a controversial issue in the mountainous regions. In this study, dissolved inorganic carbon (DIC) concentration and $\delta^{13}C_{DIC}$ in 24 streams of the Nam Co basin, central TP were monitored monthly during the monsoon season of 2018. A Bayesian mixing model was applied to distinguish the sources of DIC. The results show that the sources of DIC in 7 streams, stemming from low-elevation hills and characterized by widespread carbonates, are dominated by carbonates/silicates weathering coupled with H_2CO_3 formed by atmospheric CO_2 dissolution with an average value of 38%. This unexpected phenomenon highlights chemical weathering may absorb a significant amount of atmospheric CO_2 in regions carbonates is widely distributed in the TP. The contribution from carbonates weathering coupled with H_2CO_3 formed by soil CO_2 and H_2SO_4 deprived of sulfide oxidation is comparable with average values of 29% and 25%, respectively. 8 studied streams are originated from the west Nyaingêntanglha Ranges and mainly occupied by sandstone and recharged by groundwater. The DIC provenance in these catchments is dominated by carbonates dissolution by H_2SO_4 with an average of 72%. The second most important source is silicates weathering drove by H_2CO_3 formed by soil CO_2 (24%). Near half DIC for 9 catchments in the west Nyaingêntanglha Ranges, mainly occupied by granite and recharged by glacial meltwater, derive from carbonates dissolution coupled with H_2SO_4 (53%), followed by silicate weathering coupled with H_2CO_3 formed by soil CO_2 (40%). Over half of DIC in streams of the west Nyaingêntanglha Ranges is derived from carbonates dissolved by H_2SO_4. Which means its carbon sink effect caused by chemical weathering may be offset by significant CO_2 release due to H_2SO_4 attacking carbonates in mountainous catchments. H_2SO_4 prevalent participation in chemical weathering in the west Nyaingêntanglha Ranges is attributed to the influences of lithology and glaciation. Abundant sulfide oxidation minerals are contained in sandstone of the study regions. While glacial abrasion exposed numerous sulfide minerals, pyrite for instance, for weathering even though its content is minor in granite.