Goldschmidt 2024 Abstract
https://doi.org/10.46427/gold2024.23991

Global dissolved inorganic carbon cycling dominated by climate

JUN ZHONG[1], ALBERT GALY[2], SI-LIANG LI[1], SHENG XU[1] AND CONG-QIANG LIU[1]

[1]Institute of Surface-Earth System Science, School of Earth System Science, Tianjin University
[2]CRPG-CNRS-Université de Lorraine

Presenting Author: jun.zhong@tju.edu.cn

The transport of dissolved inorganic carbon (DIC) from rivers to the oceans represents an imprtant component in global carbon cycling. Herein, we analyzed the the stable ($\delta^{13}C_{DIC}$) and radioactive ($\Delta^{14}C_{DIC}$) isotopic composition of DIC in the rivers of the Tibetan Plateau, and also compiled global published data to understand global DIC cycling under different climate zones. We find that the $\Delta^{14}C_{DIC}$ has a significant negative relationship with elevation, showing lower $\Delta^{14}C_{DIC}$ in high-elevation areas and higher values in low-elevation areas. We attributed the changes of $\Delta^{14}C_{DIC}$ to changing climate variabilites, and found mean annual air temperature (MAAT) is the main control of $\Delta^{14}C_{DIC}$. Through modeling the controlling effects on DIC dynamics, we then built a isotopic mixing model to estimate the sources of DIC. We found that MAAT is the main control on DIC sources, i.e., when MAAT>10^{o}C, modern organic carbon respiration is the main souce, while MAAT<5^{o}C, atmospheric CO_2 is a signicant compent in DIC sources. Our studies highlight the effect of MAAT on DIC dynamics, having great implications on understanding global carbon cycling.