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## Numerical simulation of evolution of dissolved inorganic carbon chemical and isotopic compositions ( $^{13}\text{C}$ and $^{14}\text{C}$ ) in carbonate-bearing areas

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Investigating the dissolved inorganic carbon (DIC) processes and associated chemical and isotopic ( $^{13}\text{C}$  and  $^{14}\text{C}$ ) evolutions is critical for deciphering its implications on climate change and groundwater quality. Growing number of  $^{13}\text{C}$  and  $^{14}\text{C}$  measurements of DIC in recent years, however, it is still unclear about the DIC evolution. In this study, we synthesize and deduce the isotopic fractionation and chemical equilibrium theory to understand DIC evolution under different scenarios. We summarize and model the DIC chemical and isotopic compositions in carbonate-rich areas, including:

- (1) Carbonate weathering under close and open system
- (2) Transition from open to close system
- (3) DIC-carbonate exchange in close system
- (4) Sulfuric acid-driven weathering
- (5) The impacts of climate on carbonate weathering
- (6) The effects of  $\text{CO}_2$  outgassing

With this work, we summarize the interactions between soil  $\text{CO}_2$ , DIC and carbonates, and understand how the DIC chemical and isotopic compositions evolve.

### Student Submission

No

**Primary authors:** Dr ZHONG, Jun (Tianjin University); Dr DING, Hu (Tianjin University); Prof. LI, Si-Liang (Tianjin University); Prof. XU, Sheng (Tianjin University); Prof. LIU, Cong-Qiang (Tianjin University)

**Presenter:** Dr ZHONG, Jun (Tianjin University)

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