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Radiocarbon tracing deep carbon emissions from the Tibetan Plateau

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The Tibetan Plateau plays an important role in the global carbon cycle. Despite its significance, the mechanisms, sources and fluxes of CO2 emissions from this region remain poorly understood. This study employs radiocarbon to trace the origins of CO2 released in the southern Tibetan Plateau. Combining 14C and other geochemical proxies (chemical compositions, 3He/4He, δ13C, etc.) from soil gases, hydrothermal gases, hydrothermal waters and travertines, we aim to quantify the contribution of deep carbon to contemporary CO2 emissions.

In this study, radiocarbon has been measured for dissolved inorganic carbon (DIC) in hydrothermal waters from representative rifts and strike-slip faults in the Tibetan Plateau and adjacent regions. The Δ14CDIC data vary from −220‰ to −1000‰, falling in the mixing trend between 14C-depleted end-members (i.e., deep carbon of mantle and metamorphic origins and carbonate minerals) and modern biological carbon components. Our findings reveal remarkable interaction between the deep and shallow carbon and a substantial release of deep carbon from deep faults in the Tibetan Plateau. By enhancing our understanding of deep CO2 release from the Tibetan Plateau, this study contributes to more accurate carbon cycle models and informs climate change mitigation efforts on both regional and global scales.

Student Submission

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