

# Recent Advances in Geochemistry for Carbon Dioxide Storage, and Utilization in the Subsurface

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The science underpinning the quantification of carbon removals and durability of subsurface storage is fundamental to the development of monitoring, reporting, and verification (MRV) in both the voluntary carbon market and the emerging procurement and compliance markets. MRV protocols are important to ensure responsible scaling of CDR projects that have demonstrable net-negative atmospheric impacts over 1000+ year timescales. Quantification of the durability of subsurface CO<sub>2</sub> storage involves a geochemical and geophysical characterization of the storage complex, injected material, and ongoing monitoring to determine the behaviour of CO<sub>2</sub> within the reservoir(s).

Here, we present the highlights of the first versions of the Isometric subsurface storage modules (CO<sub>2</sub> storage in Saline Aquifers and CO<sub>2</sub> storage via In-situ mineralization). We will explore the MRV frameworks for subsurface storage including pre-injection, during operation and post-injection monitoring, focussing on the geochemical requirements. In addition, we shall explore how the MRV needs differ depending on the storage environment. Finally, we will highlight how interdisciplinary collaboration informed decision-making and iterations towards the current version, including the interaction between industry and academia. Ultimately, we aim to receive feedback on the protocol and our approach in order to apply this method to new versions and additional protocols and modules across subsurface storage and other CDR pathways.