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The utilisation of *X-ray Micro-Computed Tomography (XCT)* for the quantification of carbon dioxide in passively carbonated steel slag.

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Mineral sequestration using solid alkaline by-products, such as steel slag, is a feasible technology to capture carbon dioxide. This silicate weathering reaction forms solid carbonates, mineralizing the atmospheric CO_2 into calcite, which can occur passively under ambient environmental conditions over monthly to decadal timescales. The passive mineralization of carbon dioxide in steel slag is a not well-known reaction, particularly when climate factors influence the mineral carbonation. Non-destructive quantification of CO_2 mineralization is necessary to set underpinning knowledge on capturing rates.

The utilisation of *X-ray micro-Computed Tomography (XCT)* allows the 3D spatial visualisation and quantification of carbon dioxide precipitated as calcite in steel slag pores. We used *XCT* to analyse samples of legacy steel slag collected in Mexico and Scotland, to determine the effects of environmental factors on mineral carbonation. The *XCT* data were analysed with image processing to classify the slag volume into three phases (*slag, pores, and calcite*). The classification of the data into different phases allows the determination of the volume of each phase in the sample as well as its 3D spatial extent, thus enabling the quantification of mineralized CO_2 characterized as the calcite phase.

We will present a comparison between the volumes of carbon dioxide passively mineralized in the samples from the Mexican and Scottish collection sites, in the context of contrasting environmental factors. Preliminary results from one of the Scottish samples shows that calcite (mineralized CO_2) accounts for ~ 5 vol. % of the sample, and it is localised across the whole sample. A comparison of these results between the Mexican and Scottish samples will provide a better understanding of how climatic factors influence the volumes of atmospheric CO_2 mineralized by the samples.