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A New High-Precision SEM – LA-ICP-MS Sample Coordinate Integration Method

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For geological and non-geological samples, multi-instrumental analyses are often required to obtain a comprehensive dataset from a given sample. Until now, trying to re-localise the exact area or mineral grain to analyse after transferring the sample from one analytical instrument to another to the next analytical instrument is not just time consuming, but often unprecise. For non-transparent and/or samples with uneven surfaces, it is extremely difficult and often impossible to locate single grains used for laser-ablation inductively-coupled-plasma mass-spectrometry (LA-ICP-MS) systems. We present a new analyses points coordinating approach, connecting the scanning electron microscope (SEM) and LA-ICP-MS analytical systems using the transposition of coordinates of a randomised Euclidean space. This approach allows for fast and precise localisation of mineral grains. By marking samples with more than 4 laser points using a CO₂ laser engraver, the transfer of the coordinates from the mosaic montage created by ZEISS Mineralogic software into a GEUS developed MATLAB script is possible by matching the fiducial points. Specific features, e.g., zircons, can be selected by thresholding their assigned colour from the false-coloured Mineralogic mineral map and their positions transferred as a list of points from the MATLAB script. Ultimately any succeeding laboratory instrument can be guided to the exact same positions in that instrument's coordinate system.