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# Chemical characterisation of Carboniferous age Irish volcanics: Correlating volcanic centres with bentonite ash layers

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Carbonate hosted Irish-type Zn-Pb mineralisation within Ireland shares a spatial and temporal correlation with Carboniferous aged volcanics [1]. In the Limerick Basin, Zn-Pb ore bodies occur in Waulsortian limestone breccias adjacent to several diatremes. Bentonite ash layers are used as important stratigraphic markers to both date Zn-Pb mineralisation horizons and to correlate across stratigraphy [2]. However, the source(s) of the ash layers is unknown and the ages of some horizons are poorly constrained. To better understand these ash layers and enable their utility as stratigraphic markers for Zn-Pb mineralisation, we focus on characterising previously undescribed or scarcely described Irish Carboniferous volcanics with the aim of: 1) examining broader chemical and age trends of volcanics across Ireland during this time period, and 2) identifying a potential volcanic source for the ash layers.

We report micro-bulk rock major and trace element data collected via LA-ICP-MS for Carboniferous volcanic centres across Ireland. Samples include basanite-alkali basalt diatremes from Co. Limerick, North Co. Cork, and Co. Offaly, and a lava flow and trachyandesite lamprophyric diatreme from Southwest Co. Cork. In total, 11 separate volcanic units across Ireland. Due to extensive alteration of the volcanic deposits, we are limited to the use of immobile elements (HFSEs, CHARAC elements) to characterise and compare volcanic source compositions. All analysed volcanic sources have an intraplate trace element signature and there is significant overlap in geochemistry among the different deposits, complicating efforts to determine the source of the bentonite layers using bulk geochemistry. To better differentiate between Carboniferous volcanics, we investigate the use of U-Pb ages and trace element compositions of robust magmatic mineral phases (apatite, rutile, or zircon) for characterising volcanic deposits. Ages and trace element compositions of analysed mineral phases were further compared to apatite and zircon found within the bentonite ash layers in order to better understand the ages, compositional variability, and source(s) of the ash layers and to improve the utility of these layers for the stratigraphic correlation and dating of mineralisation within the Waulsortian limestone.

[1] McCusker & Reed (2013), *Mineral Deposita* 48, 687-695.

[2] Koch (2021), *Trinity College Dublin [Ph.D]*