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Paleogene Alpine tectonics and Icelandic plume-related magmatism and deformation in Ireland: Evidence from the regional, high resolution Tellus geophysical survey

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The Cenozoic tectonic history of NW Europe is generally attributed to some combination of three principal controlling factors: North Atlantic opening, Alpine collision and formation of the Icelandic mantle plume. Here we present the results of an interpretation of high resolution aeromagnetic imagery from the Tellus survey of Northern Ireland. This dataset distinguishes four distinct dyke swarms, which together with the known extrusive history of the Antrim Lava Group and intrusive history of the central igneous complexes, supports the concept that Paleocene plume activity was pulsed. Differential displacement of the dyke swarms and central igneous complexes by both sinistral and dextral strike-slip faults indicates, for the first time, that N-S Alpine compression, of Paleocene through to Oligocene age, temporally overlapped with plume-related intrusions. Whilst this evidence shows, for the first time, that N-S Alpine compression was periodically overwhelmed by the dynamic stresses and uplift associated with pulsed mantle plume-related deformation, related strike-slip faulting may have controlled the locus of volcanic activity and central igneous complexes, and the location of sedimentary depocentres.