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Geochemical variations among basaltic clasts and flows in Guyot province, South Atlantic Ocean, IODP 397T expedition: Insights into magmatic and post magmatic processes

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The Tristan-Gough-Walvis (TGW) ridge volcanic chain in the South Atlantic Ocean, rooted at the margin of African LLSVP, is believed to record one of the longest (> 70 Ma) plume-related spatial geochemical zonations on the Earth. Thick volcaniclastic sequences, containing basaltic clasts, were recovered from the Gough (U1584A) and Tristan tracks (U1585A) during IODP expedition 397T, yet the petrogenetic relationship between these clasts and the underlying basalt flows remains unresolved. Determining this has important implications regarding the development of these volcanic edifices and also the eruptive nature of their products. We present the preliminary petrography and mineral chemistry that, together with Pb isotopic data from the clasts from both cores and basalt flows from the U1585A, will be used to evaluate their potential genetic links. Mineral compositions differ markedly between flows and clasts. Pyroxenes are diopsidic in flows but range from augitic to pigeonitic in the clasts. plagioclase in the flows is labradorite to bytownite (Or_{0-03}-$Ab_{47-19}An_{50-81}$), whereas clasts contain both K-feldspar ($Or_{84-99}Ab_{05-01}An_{11-0}$) and plagioclase ($Or_{01-09}Ab_{19-91}An_{80-0}$). Some magnetites show alteration to hematite. The flows exhibit evidence of crystal fractionation, including lower olivine Fo values (Fo_{79-87}), while pyroclast matrices spread towards more evolved compositions. PetThermoTool modelling indicates that up to 52% closed-system fractional crystallisation can account for the oxide chemistry of the most evolved clasts. Pb isotopic data will be further used to constrain the effect of magmatic processes and source variability in producing the observed geochemical variations.