Studying an Earth Sciences degree taught through the Natural Sciences Tripos has emphasised to me the huge diversity of research areas in Earth Sciences. Focussing on topics in petrology, mineralogy and geophysics since my third year, I have become increasingly interested in the links between them. For example, new seismic tomographical methods have allowed imaging of ultra-low velocity zones at the core-mantle boundary underneath established mantle plumes. This affects our view of mantle dynamics and raises petrological and mineralogical questions about the composition of plume sources, their heterogeneity and links to erupted products. Producing a coherent explanation of these problems requires integration of skills from a range of research areas, and I am excited by projects that bring together my interests in high-temperature isotope geochemistry, petrology and mantle dynamics.

My Masters research introduced me to the integration of iron isotopic data into other petrological (thermometry, oxygen fugacity, major and minor elements) information to study pyroxenite or mantle metasomatism in mantle plume-heads, which sparked my interest in the contribution of stable isotope geochemistry to mantle structure and dynamics. The results of my project include a larger thermal anomaly in the proto-Icelandic plume-head than standard plume-head models predict, an oxidised and elevated δ^{57}Fe source tapped by melting beneath Rum, and heterogeneity likely reflecting differences in lithospheric thickness and degree of melting on the opposite side of the plume in Baffin Island. The University of Bristol would give me the chance to use new isotopic systems (Cr and Ti) and a much larger dataset to examine the problem touched on by my Masters project.

'Understanding chromium and titanium isotope fractionation in the Earth's mantle' uses my experience in isotope geochemistry to explore under-studied stable isotopic systems, building on laboratory skills I have already been introduced to and challenging me with unfamiliar experimental techniques. The topic is at the forefront of stable isotope research and is an area of Earth Sciences that has been rapidly developing in the past ten to fifteen years. The rate of progress in analytical capabilities and expanding experimental data makes this an exciting time to study high-temperature geochemistry, with the well-established and high quality clean laboratory and analytical facilities at the University of Bristol marking the group out among UK universities.

I believe I am a suitable candidate for this project as my Natural Sciences background has given me experience in well-equipped Chemistry and Material Sciences laboratories, in addition to clean laboratories, analytical equipment and sample preparation in the Earth Science department. The short timeframe of one term to complete my Masters project (from sample collection in the field in Summer 2017 to isotopic data collection in November-December) alongside the petrographic and literature review aspects of the research demonstrates that I am self-motivated and manage my time effectively, while still completing intricate and initially unfamiliar laboratory procedures to high analytical accuracy. These skills would be vital in an experimentally focussed project such as this. As I wish to pursue a career in academia, the connections I can make through a large and active geochemistry group, and the Bristol Isotope Group as a whole, will be invaluable. I wish to undertake research at the boundary between isotope geochemistry and petrology as I believe these tools are most usefully combined together, and Bristol is one of the few universities where prestigious groups in both areas combine.