# Continents in oceans : Iceland revisited

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The main objective of this PhD proposal is to test or challenge new ideas on Iceland crustal nature and origin.

Explaining Iceland as a purely oceanic accretion ridge located top of a hot-spot is now a matter of debate. A significant amount of sub-basaltic continental crust is thought to exist both in Iceland (Torsvik et al., 2015; Foulger et al., 2003; 2006) and along the Greenland-Iceland-Faroes Ridge (GIFR; Yuan et al., 2020). Iceland and the GIFR could be explained as a product of highly-magmatic continental break-up, with Iceland as a C-Block (Geoffroy et al., 2015; Foulger et al., 2019; Geoffroy et al., 2020).

To constrain those ideas there is a need to understand the genesis (tectonic and/or gravity driven?) of the N*km-thick wedges of riftward-dipping basalts outcropping in the eroded Iceland and their geometric/structural relation to the underlying ultra-thick middle/lower crust. Another key-point is naturally to better stress the physical and rheological properties of this enigmatic sub-basaltic deep crust.

The project includes two main goals (or tasks):

A. The applicant will (1) gather and co-interpret the available relevant geophysical data to constrain the physical and rheological properties of the Icelandic middle/lower crust, and, (2) map in 3D the upper-crust/lower crust mechanical boundary. This is made possible in Iceland through the access to a number of databases. This synthesis includes 3D mapping of earthquakes depth, surface heat flow, compilation/analysis of post-seismic and post-dyking relaxation data, analysis of EMT data, compilation of seismic refraction and P and S tomography data;

B. The applicant will be an active part of an extensive field survey in Iceland (6 months in 3 years) aiming at building from highly-constrained structural sections a new 3D structural and tectonic model of the Icelandic SDR-bearing upper-crust

Eventually, those rheological and observational data will be used to constrain a numerical model of the Icelandic lithosphere deformation and evolution. The applicant will be a key partner in this modelling by providing both scientifically sound and robust inputs and by constraining the outputs from her/his knowledge of the observed Icelandic crust structure.

The candidate for this PhD must clearly be scientifically polyvalent, with proven background in geophysics, physical geodynamics and field geology. We would appreciate some experience in numerical modelling and a bilingualism French/English.

This project supervised by Prof. L. Geoffroy (UBO, France) and Prof G. Foulger (Durham, UK) is international, has great scientific implications and will involve a

number of collaborators, both in UK (U. of Durham), Iceland (Iceland Geo-Survey), Deutschland.


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