

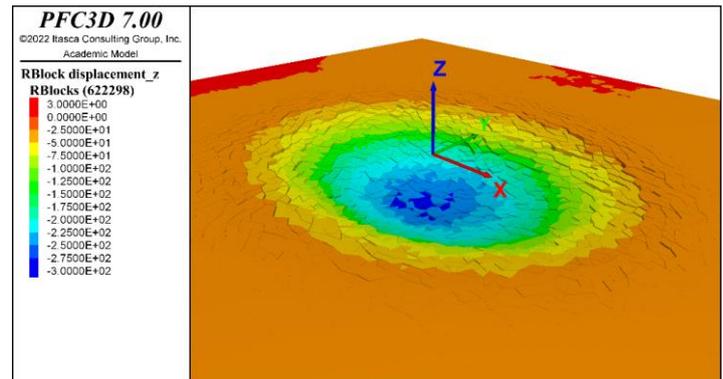
PhD position: Modelling the 3D fault architecture at resurgent caldera volcanoes

Lead supervisor: Claire Harnett, UCD School of Earth Sciences, University College Dublin
In collaboration with Eoghan Holohan, UCD & Martin Schöpfer, University of Vienna



Project description

Following their formation by collapse, caldera volcanoes commonly undergo substantial structural uplift - termed 'resurgence' – due to resumed magmatic and volcanic activity. Superposition of collapse and resurgence may produce a complex network of multiple ring faults, radial faults, and reactivated regional faults. A fuller understanding of the 3D architecture and evolution of these fault systems is crucial for: a) determining potential pathways of magma intrusion and possible locations of future eruptive activity; and b) developing structural geological concepts with relevance to ore mineralisation and geothermal energy.



This fully funded, four-year PhD project aims to constrain resurgence-related fracture system geometry and kinematics by using state-of-the-art quantitative analogue modelling and novel 3D distinct element method (DEM) numerical modelling. The analogue modelling will enable a rapid exploration of the interaction of key 3D geometric ratios of the resurging caldera floor and the role of magma viscosity. The DEM modelling will enable a more detailed understanding of the controls of mechanical properties on the system dynamics. Model results will be compared to field, geophysical and geodetic data to provide a step change in our understanding of fracture systems at resurgent caldera volcanoes.

Student profile

You should have a keen interest in volcanology, and a strong background in a quantitative science (earth sciences, physical geography, geophysics, geology, geotechnics, engineering, physics), with a degree in a related discipline. Experience in scientific computing and coding (e.g., MATLAB and/or Python) is highly desirable. An MSc is advantageous, but not required. You should be enthusiastic about international collaboration and overseas travel.

This project can be tailored to your interests and strengths. We anticipate that you will learn skills in experiment design, in 3D analogue and numerical modelling, and in the assimilation and interpretation of geophysical/geological data. There may be opportunities for fieldwork also. You will have access to transferable skills training, as well as the opportunity to take taught modules as part of the structured PhD program at UCD. This training will help you develop a strong and varied set of skills to prepare them for your future career.

How to apply

For informal queries, or to discuss your interest in the project, please contact Dr Claire Harnett (claire.harnett@ucd.ie) before applying. To apply, please send a CV (including details of two academic references) and a cover letter to Dr Claire Harnett before **31/08/2022**.

Funding notes

This 4-year award will provide tuition fees at EU rate, a tax-free stipend of €18,500 per year, and a research grant of €3,300 per year. This funding is thus open to EU students in the first instance, although highly qualified applicants from non-EU countries will be considered. The project start date is flexible but must be on or before 1st January 2023.