



Institut für Geophysik

Geophysikalisches Kolloquium
Wintersemester 2022/23

Montag, 12. Dezember 2022

Prof. Rhodri Davies

Research School of Earth Sciences

Australian National University - College of Science

**Continental Magmatism:
The Surface Manifestation of Dynamic
Interactions Between Cratonic Lithosphere, Mantle Plumes and
Edge-Driven Convection**

Several of Earth's intra-plate volcanic provinces lie on or adjacent to continental lithosphere. Although many are believed to mark the surface expression of mantle plumes, our limited understanding of how buoyant plumes interact with heterogeneous continental lithosphere prevents further progress in identifying mechanisms at the root of continental volcanism.

In this talk, using a suite of 3-D geodynamical models, we demonstrate that the magmatic expression of plumes in continental settings is complex and strongly sensitive to the location of plume impingement, differing substantially from that expected beneath more homogeneous oceanic lithosphere. Within Earth's continents, thick cratonic roots locally limit decompression melting. However, they deflect plume conduits during their ascent, with plume material channelled along gradients in lithospheric thickness, activating magmatism away from the plume conduit, sometimes simultaneously at locations more than a thousand kilometres apart. This magmatism regularly concentrates at lithospheric steps, where it may be difficult to distinguish from that arising through edge-driven convection.

At times, the flow field associated with the plume enhances melting at these steps long before plume material enters the melting zone, implying that differentiating geochemical signatures will be absent. Beneath regions of thinner lithosphere, plume-related flow can force material downwards at lithospheric steps, shutting off pre-existing edge-related magmatism. Additionally, variations in lithospheric structure can induce internal destabilisation of ponding plume material, driving intricate magmatic patterns at the surface. Our analysis highlights the challenges associated with linking continental magmatism to underlying mantle dynamics, motivating an inter-disciplinary approach in future studies.

It's to answer this question.

Das Kolloquium findet um **11:30 Uhr** t. als Zoom- Videokonferenz statt. Der Link dazu wird auf der Homepage und per eMail rechtzeitig mitgeteilt.

Alle an dem Thema Interessierten sind hierzu herzlich eingeladen.

Die Dozenten des
Instituts für Geophysik