

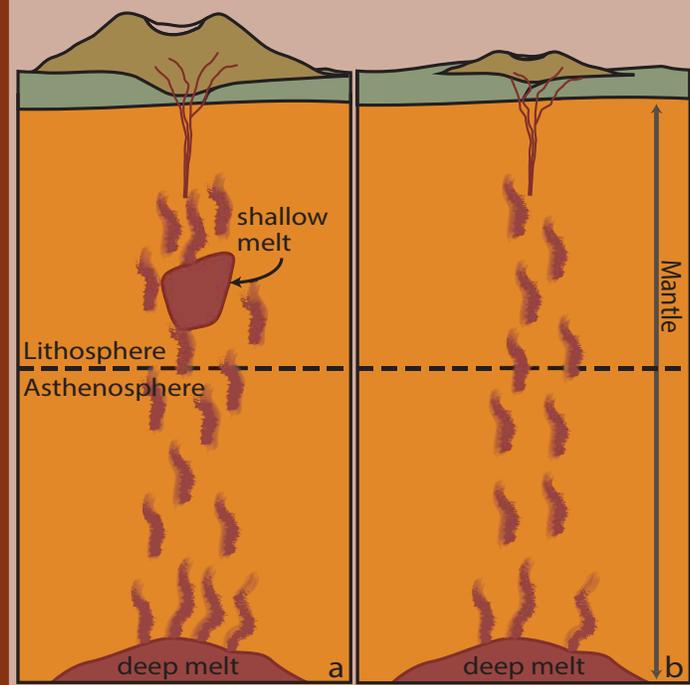
## How low does it go?

**Summary**

This research explains how the source of magma deep within the Earth's mantle contributes to the resulting size of an Auckland Volcanic Field volcano. The DETERmining VOLcanic Risk in Auckland (DEVORA) project will use relationships between magma sources and volcano size to help determine the scale of eruptions used in risk models, which, in turn, will be used for risk mitigation.

**Key Points**

- There are >50 volcanoes within the Auckland Volcanic Field.
- Samples from ~35 of these centres have been analyzed to determine their chemistry.
- These analyses indicate that there is a wide variation in lava chemistry across the field, which may be caused by variability in the magma source.
- The majority of Auckland lavas originate from two different mantle sources.
- Interestingly, these seem to relate to the size of the resultant volcano.
- Melting of magma under Auckland begins in the deep mantle (asthenosphere) in all cases.
- Occasionally this deep melt travels unmodified to the surface and produces smaller volcanoes like Purchas Hill.
- However, sometimes this melt triggers additional melting in the shallow mantle, producing larger volcanoes such as Rangitoto.



a) Melting in the lower mantle (asthenosphere) sometimes triggers melting in the upper mantle (lithosphere). This results in larger volcanoes, such as Rangitoto.

b) When there is a smaller amount of deep melt, the lithosphere does not contribute to the erupted magmas. The resultant volcano tends to be smaller, such as Purchas Hill or a maar.

This DEVORA field note summarises the journal article: *Asthenospheric Control of Melting Processes in a Monogenetic Basaltic System: a Case Study of the Auckland Volcanic Field, New Zealand*. By McGee, L. E., Smith, I. E. M., Millet, M., Handley, H. K., & Lindsay, J. M. (2013). *Journal of Petrology*, v. 54 (10): 2125 - 2153. doi: 10.1093/petrology/egt043.