Australian volcanic mystery explained

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Dr. Rhodri Davies in the Raijin Supercomputer at The Australian National University. Credit: Stuart Hay, ANU

Scientists have solved a long-standing mystery surrounding Australia's only active volcanic area, in the country's southeast.

The research explains a volcanic region that has seen more than 400 volcanic events in the last four million years. The 500 kilometre long region stretches from Melbourne to the South Australian town of Mount Gambier, which surrounds a dormant volcano that last erupted only

5,000 years ago.

"Volcanoes in this region of Australia are generated by a very different process to most of Earth's volcanoes, which occur on the edges of tectonic plates, such as the Pacific Rim of Fire", says lead researcher Dr Rhodri Davies, from the Research School of Earth Sciences.

"We have determined that the volcanism arises from a unique interaction between local variations in the continent's thickness, which we were able to map for the first time, and its movement, at seven centimetres a year northwards towards New Guinea and Indonesia.

The volcanic area is comparatively shallow, less than 200 kilometres deep, in an area where a 2.5 billion year-old part of the continent meets a thinner, younger section, formed in the past 500 million years or so.

These variations in thickness drive currents within the underlying mantle, which draw heat from deeper up to the surface.

The researchers used state-of-the-art techniques to model these currents on the NCI Supercomputer, Raijin, using more than one million CPU hours.

"This boundary runs the length of eastern Australia, but our computer model demonstrates, for the first time, how Australia's northward drift results in an isolated hotspot in this region," Dr Davies said.

Dr Davies will now apply his research technique to other volcanic mysteries around the globe.

"There are around 50 other similarly isolated volcanic regions around the world, several of which we may now be able to explain," he said.

It is difficult to predict where or when future eruptions might occur, Dr Davies said.

"There hasn't been an eruption in 5,000 years, so there is no need to panic. However, the region is still active and we can't rule out any eruptions in the future."

Provided by Australian National University