NEWS FROM THE UNIVERSITY OF TASMANIA, AUSTRALIA

# Media Release

## Chiefs of Staff, News Directors

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# Evolution driven by regular collision of continents, say researchers

In a major scientific advance, a collaboration of international scientists led by geologists at the University of Tasmania has published a new and exciting perspective on the Theory of Evolution.

The scientists have proposed that the regular collision of tectonic plates over the last 700 million years has been the prime driver of evolutionary change on Earth.

The research was published this week in the journal *Gondwana Research*. The research team, funded by the Australian Research Council, includes scientists from Tasmania, South Australia, Western Australia, Russia and Canada.

The research program, led by Distinguished Professor Ross Large, used laser technology housed in the Earth Science laboratories at the University of Tasmania to analyse more than 4,000 pyrite grains from seafloor mudstone samples collected from around the globe.

The resultant analyses enabled the team to determine nutrient trace element time-series curves that demonstrate how the concentrations of trace elements in the oceans have varied over the past 700 million years.

“Nutrient trace elements such as copper, zinc, phosphorus, cobalt and selenium are vital for life and are critical building blocks for evolutionary change,” Professor Large said.

This is the first research project to succeed in producing detailed time-series curves for these bio-essential elements, from 700 million years ago to the present.

The most surprising outcome is that the trace element time-series curves revealed there were certain periods in Earth history when nutrient trace elements were highly enriched in the oceans, and other periods when these critical trace elements were very poor.

The researchers propose that the nutrient-rich periods promoted rapid plankton growth in the short term and sped up evolution and diversity of life in the longer term. The nutrient-poor periods on the other hand caused depletion of plankton and promoted a slow-down in evolution and ultimately led to major mass extinction events.

What has this to do with plate tectonics?

“Nutrients in the oceans ultimately come from weathering and erosion of rocks on the continents. Weathering breaks down the minerals in the rocks and releases the nutrient trace elements, which are the key to life and evolutionary change,” Professor Large explained.

“Thus when weathering and erosion rates increase for extended periods, more nutrients are supplied to the oceans.”

In the long term of geological history, erosion rates rise dramatically during mountain-building events, and these major events are caused by the collision of tectonic plates (see Figure 1 attached).

Geologists have known since the 1960s that collisions of tectonic plates leads to the formation of continent-scale mountain ranges. These continent-collision, and mountain-building events, are called orogenic events by geologists, and their timing through Earth history is well established.

This research represents is the first time nutrient trace element time-series curves have been developed that demonstrate the relationship between tectonic plate collisions, evolution of life and mass extinction events.

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