

CURRENT PROJECTS

Wandering continents back to the dawn of time

Continents are vagrants, wandering the Earth. They go through cycles of colliding to form 'supercontinents', such as the well-known Pangea about 300 million years ago. Supercontinents are then split-up by the development of new ocean basins, and reform as a new supercontinent a few hundred million years later. Yet how far back into Earth's 4000 million years of surviving geological history can these continent formation cycles be recognised? Research led by UOW's Professor Allen Nutman pushes the first recognised extensive continent back to the very start of the geological record – with evidence of a single continent 'Itsaqia' (Latinised Greenlandic for 'old thing' named by the research team) that formed by 3600 million years ago. This finding, just published in the *American Journal of Science*, is a stunning example of the geological principle 'uniformitarianism' – natural processes that we see operating on Earth today resemble those operating in Earth's Deep Time.

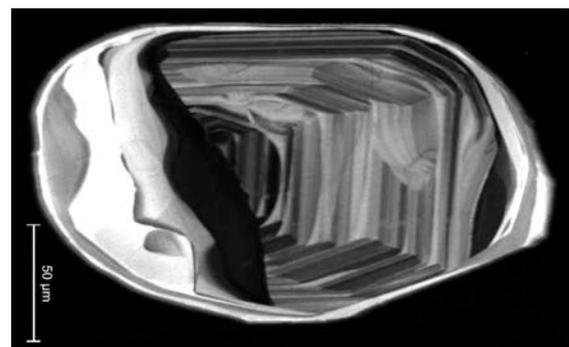
The evidence and concept of this earliest continent grew out of decades of research by Professor Nutman and colleagues at ANU and the United Kingdom. The history of all the oldest fragments of Earth's crust had to be appraised and compared – meaning large amounts of time spent on field work in localities scattered around the globe, including Greenland, Canada and China, coupled with substantial laboratory studies ascertaining the absolute ages of Earth's most ancient rocks by uranium-lead isotopic dating of zircons, extracted from these rocks. This has pieced together evidence that the continent Itsaqia had formed by 3600 million years ago, but soon after started to split apart.

The research team are now setting their sights on what implications Itsaqia has for

the most ancient climate. Major climate shifts can be related to the formation and destruction of ancient supercontinents: Earth's severest ice ages were triggered by global cooling when the atmosphere-warming gas CO_2 is reduced in concentration by chemical reaction with the large exposed land surfaces of supercontinents. Therefore a question to be addressed is: Did Itsaqia trigger Earth's first ice age?



West Greenland example of the complicated ancient rocks dispersed around the world, as modified fragments of >3600 million year Itsaqia. These form less than a millionth of Earth's present crust.



An example of the tiny complicated zircon crystals (50 μm = 0.05 mm) that yield the U-Pb ages necessary to piece together Itsaqia's history. Ages can be determined on spots only 25 μm in diameter.

Research team consists of Prof. Allen Nutman (GeoQuEST Research Centre, University of Wollongong), Dr Vickie Bennett (Australian National University) and Dr Clark Friend (U.K.).

Contributed by Allen Nutman, 31st July 2015