

The Deep Structure of Precambrian Shields : insights from multidisciplinary studies

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Major geoscience initiatives such as Lithoprobe in Canada and Europrobe have provided a wealth of new information concerning the formation and stabilisation of the continental crust in the Precambrian. These projects have been spearheaded by the acquisition of seismic reflection and broad-band refraction data, but have also been complemented by extensive geochronological data bases and regional mapping. In addition to providing a better understanding of the structure of the continental lithosphere, these studies provide important constraints for problems related to the origin of the crust, such as an origin from plume-products, or island arc-related accretionary complexes, the role of subduction in collision processes, the rates of crust accretion and extent of crust preservation. Fossil subduction zones have been imaged as far back as the Neoarchaeon. Hidden Archaean crust and associated mantle lithosphere are preserved at depth below younger mobile belts, providing important mineral exploration targets. Widespread underplating and intraplating of Archaean crust provide evidence for thermal reworking and resetting the ages of the deep Archaean crust.

Earth Scientists are coming to terms with mapping of the crust and lithosphere at depth. Understanding the relative ages of thermal events and seismic structure in the deep crust, and the resolution to which we can integrate data remain a significant challenge. International collaboration on studies of key geological targets in the deep crust and upper mantle should be the way of the future.