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# Use of airborne gamma-ray dataset for deciphering the crustal evolution of the circum-Atlantic Precambrian provinces in Africa and South America

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The circum-Atlantic Precambrian provinces in Africa and South America have recorded the progressive growth of the continental crust from Archaean to Neoproterozoic times. Various concepts have been developed to account for this growth such as diapirism, oceanic plateau, subduction complexes and collisional orogenic belts. Due to their crustal to lithospheric scale, the phenomena constraining individual models are generally difficult to assess on a local to regional surface level. Airborne geophysical surveys cover large regions in South America and Africa including radiometry and gamma-ray spectrometry. Gamma-ray spectra are collected along flight lines at regular spacing with a 1 Hz sampling rate over the energy range 0-3 Mev. The energy spectrum is split into 256 intervals of which 4 energy windows were extracted: the total count (0.4-3.0 Mev), potassium (1.35-1.57 Mev), uranium (1.63-1.89 Mev) and thorium (2.42-2.82 Mev). Window channels are processed to obtain the ground concentrations of K (Maps provide information that can be used to monitor the progressive evolution of the continental crust from primitive TTG and greenstone belts, typically depleted in radioelements, to the development of subduction systems, resulting in the significant input of U, K and Th into the crust. Subsequent erosion and deposition of these terranes into large detrital basins reflect the radioelement characteristics of the source areas. The Gabon craton (3.2 - 2 Ga) and the Paleoproterozoic province of the Guyana shield (2.2 - 2 Ga) illustrate such trends. Although covered by rain forests, gamma-ray response reveals contrasted geological units and structures that are used to evaluate this evolution. A similar evolution is recorded at the north-western margin of the Kalahari craton. Here, the evolution of a juvenile Late Paleoproterozoic ($\sim$ 1.9 - 1.7 Ga) greenstone belt, depleted in radioelements, is followed by a Mesopro-

terozoic ($\sim$ 1.4 - 1.1 Ga) arc-related volcanic-plutonic system, resulting again in the crustal enrichment of U, K, and Th. This older crust is finally eroded and redeposited in the Neoproterozoic ($\sim$ 0.6 - 0.5 Ga) shallow marine Nama basin that developed in a foreland position south of the Damara orogenic belt.