Please ensure that your abstract fits into one column on one page and complies with the *Instructions to Authors* available from the Abstract Submission web page.

Earth's lithosphere through time

PETER A. CAWOOD[1], CHRIS J. HAWKESWORTH[2], BRUNO DHUIME[2], & TONY KEMP[3]

[1] School of Earth, Atmoshere & Environment, Monash University; *email: peter.cawood @monash.edu
[2] Bristol Isotope Group, School of Earth Sciences, University of Bristol, UK
[3] School of Earth & Environment, University of Western Australia, Australia

The lithosphere is the long term archive of Earth's history. Its formation and evolution are driven by thermal energy from the planet's interior and modulated by solar radiation which regulates the temperature at its surface. The evolving thermal budget of the Earth has resulted in a multistage history of the lithosphere. This is recorded in progressive changes in its composition, its differentiation into, and changing proportions of, continental and oceanic variants, changing thicknesses, and patterns of interaction with underlying asthenospheric mantle and overlying hydrosphere, atmosphere and biosphere. On this basis, we envisage 5 main stages in the evolution of the Earth and its lithosphere: 1) Initial accretion and differentiation of the core/mantle system within the first few 10's of millions of years with a surface magma ocean, on an anoxic prebiotic Earth; 2) Generation of crust prior to 3.0 Ga, in a pre-plate tectonic regime associated with the evolution of early life and large fluctuations in atmospheric chemistry; 3) Early plate tectonics involving hot, presumably shallow subduction over the period from 3.0-1.7 Ga, associated with changes in the composition of new crust from mafic to intermediate and an increase in crustal thickness and recycling, along with massive changes in the biosphere, ocean and atmospheric chemistry, and global climate, including the initial rise in atmospheric oxygen and global glaciations; 4) Earth's Middle Age from 1.7-0.75 Ga, characterized by lithospheric, environmental, and evolutionary stability, and the evolution of early eukaryotes; 5) Initiation of modern cold subduction at ~0.75 Ga, associated with a second rise in atmospheric oxygen, extensive global glaciations, and the radiation of animal life. Supercontinents have operated during the last three stages and their assembly and dispersal require horizontal motion of the lithopshere through plate tectonics. Volume of continental lithosphere, reflecting the tectonochemical interplay of processes of generation and recycling, increased until Earth's Middle Age and they may have been decreasing for the last ~1 Ga.