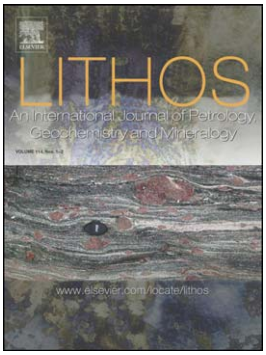

Collision vs. subduction-related magmatism: two contrasting ways of granite formation and implications for crustal growth

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1 Introduction

The continental crust has been extracted from the mantle throughout Earth history,. In contrast with the mafic oceanic crust, the continental crust is largely made up of low-density, buoyant quartzo-feldspathic material, in particular granitoid rocks, which enable its long-term stability and preservation at the surface of our planet (Rudnick and Gao, 2003; Hawkesworth et al., 2010; Dhuime et al., 2011). However, granitoid rocks cannot be directly derived from mantle melting (Rudnick, 1995): as such, felsic melts are not in equilibrium with an ultramafic mantle assemblage. Hence, two main mechanisms allow the formation of granitoid magmas: (i) differentiation, through crystallization or melting, of mantle-derived basaltic material; or (ii) partial melting of felsic, meta-igneous or meta-sedimentary rocks, either containing free water or hydrous minerals making them prone to melting. Whereas the first mechanism allows the formation of new continental crust, since it is ultimately a high-degree fractionation process of mantle material, the second mechanism reworks pre-existing continental rocks and therefore does not represent any addition to the crustal volume. Thus,