Geophysical Research Abstracts,
Vol. 10, EGU2008-A-01148, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-01148
EGU General Assembly 2008

Hot orogenies in various tectonic settings

Alan Bruce Thompson (1) and Karel Schulmann (2)

(1) Earthsciences, ETH Zurich, CH-8092, Suisse (alan.thompson@erdw.ethz.ch),

(2) Géosciences, EOST, Strasbourg, France

The term “hot orogen” is often applied to terrains of high heat flow which reflect some recent volcanic event. A hot orogen may occur in the same surface as an extinct hot orogeny. Hot orogenies can occur in several tectonic settings. These are characterised by a metamorphic/magmatic record of $T > 750^{o}C$ at depths of equivalent to mid continental crust (ca. 20 km; high-T low-P). Hot orogens can be distinguished among those involving the upper or lower tectonic plate, and whether they involve mantle heat or crustal radiogenic heat.

Hot orogens postulated to involve transfer of the upper rocks of an underthrusted tectonic plate to the upper plate, can only become hot enough through an internal heat source (e.g., high radioactivity) during lateral extrusion (Type I). Otherwise such terrains would only exhibit modest temperature increase from heat conducted from proximate mantle at thickened depths ($>$ 35 km Moho). In convergent zones between plates, Type II hot orogenies could result within the thickened upper- or remaining lower-plate after delamination of eclogitic material into the mantle, with asthenospheric replacement.

Hot orogenies within the upper plate are related to crustal thinning (Type III), or mantle deflection beneath accreted terrains (Type IV) at ocean-continent convergent zones. Extensional (Type III) hot orogeny involves rise of underlying asthenosphere (Pyrenees) concomitant with rifting. Accretion orogenies can become hot (Type IV) if asthenospheric mantle can advect to beneath the accreted terrain, perhaps as a result of slab roll back (retreat of subduction zone; Andes, Central Asia Orogenic Belt). Each of these types of hot orogenies is distinguished by metamorphic assemblages, PTt

path and related magmatism. The exhumation of such hot orogenies, is usually due to a later quite separate orogenic episode which frequently disrupts the former hot orogenic sequence.