Application of *in situ* cosmogenic nuclide analysis to landform evolution in (palaeo)-periglacial south-west Britain

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Located beyond the southern limit of glaciation in Britain, the upland granitic terrain of Dartmoor, south-west England, has been exposed to long intervals of intense periglacial activity during the Pleistocene. This region has been significant in debates about appropriate models of long-term landscape change, most notably two-phase versus single-phase models of landform evolution, and the development of tors (Linton, 1955; Palmer & Nielsen, 1962). However, given the previous lack of quantitative techniques capable of constraining denudation and specific process rates, and thereby testing developmental models, for these features there remains much uncertainty in the interpretation of the classic landforms of the region. Here we present the results of research utilising in-situ cosmogenic nuclides to evaluate geomorphological processes and report on three key aspects of landform development: (1) the formation of tors and models of outcrop emergence in non-glaciated regions; (2) the development of regolith and boulderfields under periglacial conditions; and (3) catchment-averaged denudation rates derived from alluvial sediments. This variety of landforms and scale of investigation facilitates an integrated approach to the understanding of catchment-scale erosional dynamics. In addition, the complex nature of landform development that is evident in the area provides challenges to the application of in-situ cosmogenic nuclides and highlights both the potential and limitations of the technique.

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Origin of tungsten mineralization in the quartzdioritic unit of the Boroujerd Granitoid Complex (Western Iran) using geochemical evidences

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Boroujerd Granitoid Complex of the Sanandaj-Sirjan Zone consists of three main units: granodiorite, quartzdiorite and monzogranite. In Nezamabad area (SE of this complex), quartzdioritic unit has been cut by various quartz-tourmaline veins having NW-SE trending. Tungsten mineralization (scheelite) accompanying by arsenopyrite, pyrite, pyrrhotite, chalcopyrite, sphalerite, malachite, azurite and quartz and tourmaline as gangue are generally associated with the veins.

The geochemical signature of this unit is compared with the well known W-bearing and W-barren granites (Lemann *et al*., 1994; Srivastava and Sinha, 1997; Singh and Singh, 2001) in order to investigate their relationship with tungsten mineralization in the area.

The host quartzdioritic unit of the quartz-tourmaline veins is mostly depleted in silica (52-63%), total alkalis (4.6%), Rb (94 ppm), Nb (10 ppm), W (6 ppm) and Sn (3 ppm) with low DI and enriched in CaO (6.11%), MgO (4.16%), FeO (4.19%), MnO (0.14%), Sr (285 ppm) and Ba (359 ppm). Compared with the W-barren granites, the K/Rb (211) and Ba/Rb (4) ratios of this granitoid are also higher than its Rb/Sr ratio (0.34). All these geochemical evidences as well as I-type charachterstics of the quartzdiorite unit (Ahmadi-Khalaji *et al*., 2007) indicate that the unit behaves as a barren granite.

On the other hand, geochemical investigation on the metamorphosed sedimentary rocks (hornfels and spottedschist) existing in contact with the quartzdioritic unit demonstrates that the w-bearing fluid originated from the dehydration of the metamorphosed sedimentary rocks and it mixing with granitic fluids.

The quartzdioritic unit is a W-barren granite of a low differentiated magma and has no significant role in tungsten mineralization. In contrary, metamorphic rocks fluids can be considered as the main source for tungsten mineralization rather than granitic fluids.

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