Geophysical Research Abstracts, Vol. 7, 06550, 2005
SRef-ID: 1607-7962/gra/EGU05-A-06550

The Asturian Arc: from Eduard Suess description to its relation with lithospheric delamination

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Eduard Suess was a pioneer in the description and study of curved orogenic belts (oroclines), including some seminal work on the Asturian Arc of south-western Europe. Being one of the most highly curved orogens on Earth, the formation of the Asturian Arc has been studied by many researchers over the last century in an attempt to explain and expand on the early descriptions made by Suess. From this work several hypotheses have been postulated to explain the formation of the Asturian Arc, mostly in the context of collisional orogenesis. Recent paleomagnetic and geochronological studies suggest that this arc may constitute an example of how late- to post-orogenic oroclinal bending around a vertical axis, in conjunction with thinning of the lithospheric mantle, is potentially an important component of the waning stages of plate convergence in collisional orogenesis. From this point of view we describe the possible and hitherto unexplored cause-effect relationships between oroclinal bending of an originally linear orogenic belt and lithospheric thinning and delamination based on data from the Asturian arc in the Western European Variscan Belt (WEVB). We suggest that late- to post-orogenic bending of the lithosphere around a vertical axis may cause thickening and eventual detachment of the lithospheric root of orogenic belts such as the WEVB. The proposed hypothesis is consistent with the chronology of tectonic, metamorphic, magmatic and hydrothermal events recorded in the WEVB. Moreover, this hypothesis could account for the preservation of the lithospheric root in linear orogens, such as the Urals, which lack significant modification following the initial phase of "orthogonal" lithospheric thickening.