Geophysical Research Abstracts
Vol. 15, EGU2013-1959, 2013
EGU General Assembly 2013

Variscan Oroclines and their implications for Pangean Paleogeography

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The supercontinent Pangea is commonly interpreted to have formed in the Upper Carboniferous as a result of collision of Gondwana and Laurussia. The western European Variscan Orogen is interpreted as the product of the Gondwana - Laurussia continental collision. In Iberia, the Variscan Orogen describes two coupled Early Permian oroclines; a northern, convex to the west Cantabrian orocline, and a southern, convex to the east Central Iberian orocline. Palinspastic restoration of the oroclines using paleomagnetic, structural and stratigraphic constraints yield a 2300 km long, linear orogen that: consists of a west-facing lower Paleozoic passive margin sequence of Gondwanan affinity; is characterized by an east-verging thrust belt that passes east into Carboniferous foreland basin sequences and west into a metamorphic hinterland; is bound to the west by ophiolite and juvenile oceanic arc sequences obducted over the the distal west edge of the passive margin along east-verging thrust faults; has syn- to post-kinematic granitic intrusions that young from 330 in the west to 290 in the east; and is, in the east, characterized by sedimentary and volcanic sequences of Avalonian (Meguma) affinity which are separated from the passive margin sequence by a marginal basin ophiolite. This tectonic template can be used to interpret the Variscan orogen across all of western Europe, and shows that the orogen consists of a >7000 km long ribbon that extends from Cornwall, SW England, east along a north-verging northern limb, around the Bohemian orocline in the east into a south-verging southern limb that runs along the Mediterranean into the Iberian oroclines. The implication of this geometry is that: Variscan orogenesis consisted of the Carboniferous collision of a juvenile oceanic arc with a Gondwanan-affinity ribbon continent and the related collapse of a marginal basin that separated the passive margin from Avalonian lithosphere; followed by buckling of the orgenic ribbon, forming the Iberian and Bohemian oroclines. There is, therefore, no evidence of any Carboniferous continental collision, and hence no evidence for the Carboniferous construction of Pangea. Permian buckling of the Variscan orogen requires 5000 km of relative translation of the ends of the orogenic ribbon toward one another and may, therefore, be a record of the dextral translation of Gondwana relative to Laurussia during the Pangea B to A transition. However, attempts to model orocline formation as a result of the westward translation of Gondwana relative to Laurussia (the B to A transition) have proved difficult, if not impossible. The implication is that the Permo-Carboniferous Pangean paleogeography remains highly speculative.