



Subduction without initiation signatures: Is magmatism important ?

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The Alpine orogeny is commonly held as a key example of a complete Wilson Cycle, from rifting and the opening of the Alpine Tethys to subduction and collision. We will go through a 300 Ma magmatic, metamorphic and sedimentary overview of the Alpine Orogeny to highlight that most models of the rifting and closure of the Alpine Tethys fail to integrate two fundamental features characteristic of the Alps, namely the lack of magmatism during convergence and the lack of a preserved mature ocean crust.

Recent research has shown that the Alpine Orogeny records complex, inherited pre-collisional structures. The Alpine Tethys has been shown to be formed by a complex array of buoyant, hyper-extended basins dominated by exhumed serpentinitized subcontinental mantle intruded by Jurassic MORB melts. Moreover, from subduction initiation to peak HP-metamorphism during Alpine convergence, the closure of the Alpine Tethys coincides with a lack of magmatism that is at odds with 'Pacific-type' subduction zone models. These often overlooked amagmatic characteristics indicate that a "traditional" subduction zone model is hard to apply to the formation of the Alpine Orogen.

The magmatic paradox of the "Missing Alpine Arc" during the Alpine Orogen can be resolved by proposing that the inherited, pre-collision geometry of small ultra-extended basins will act as a control on the collision mechanism, inhibiting traditional subduction initiation and arc inception, instead forming an Orogenic Wedge. The implications of this model on the significance of (ultra)-high pressure metamorphism and evidence of ancient subduction zones will be discussed.