

Serpentinization of the Ronda Massif (Spain): structural control and fluid origin, a framework for metal mobility

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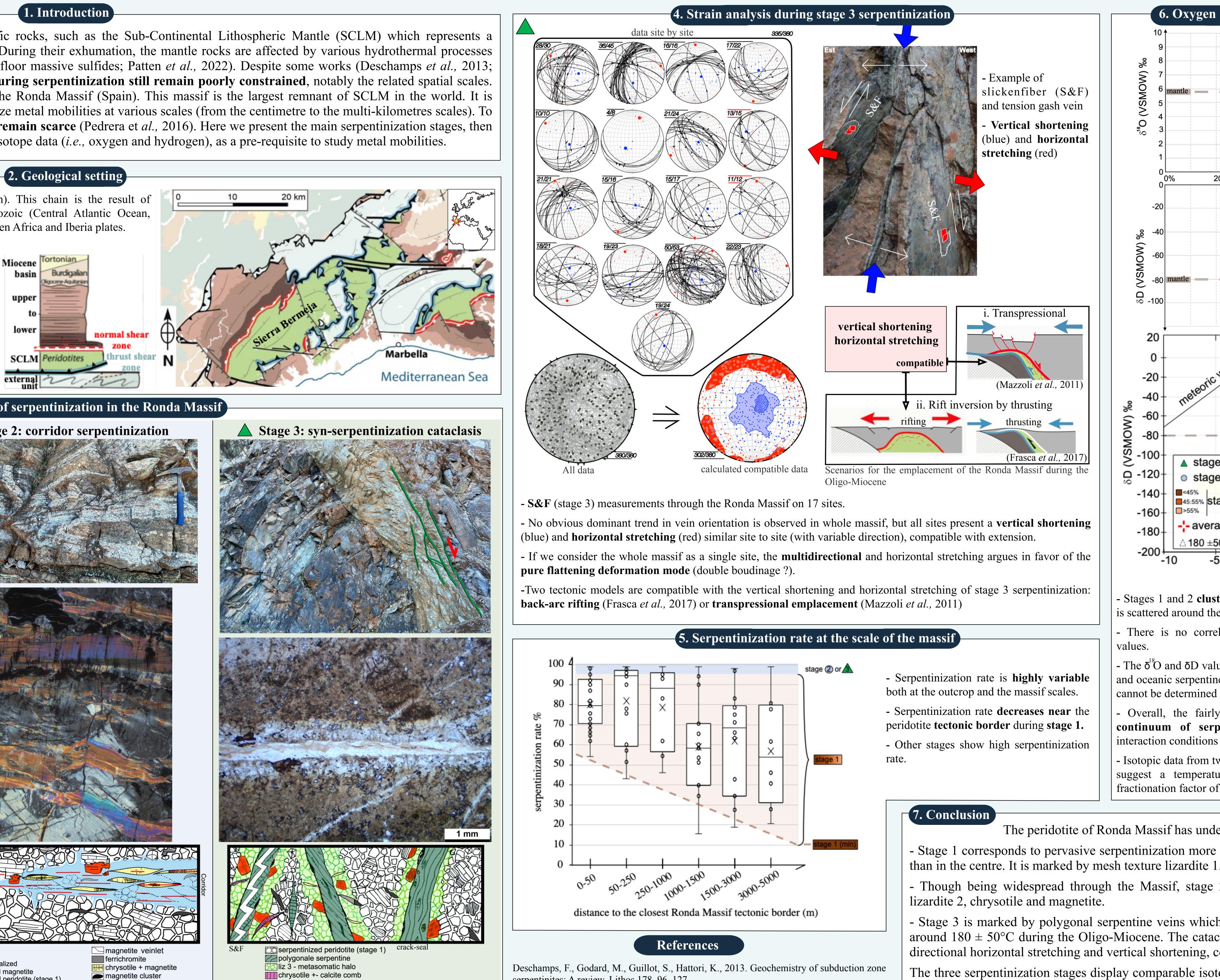
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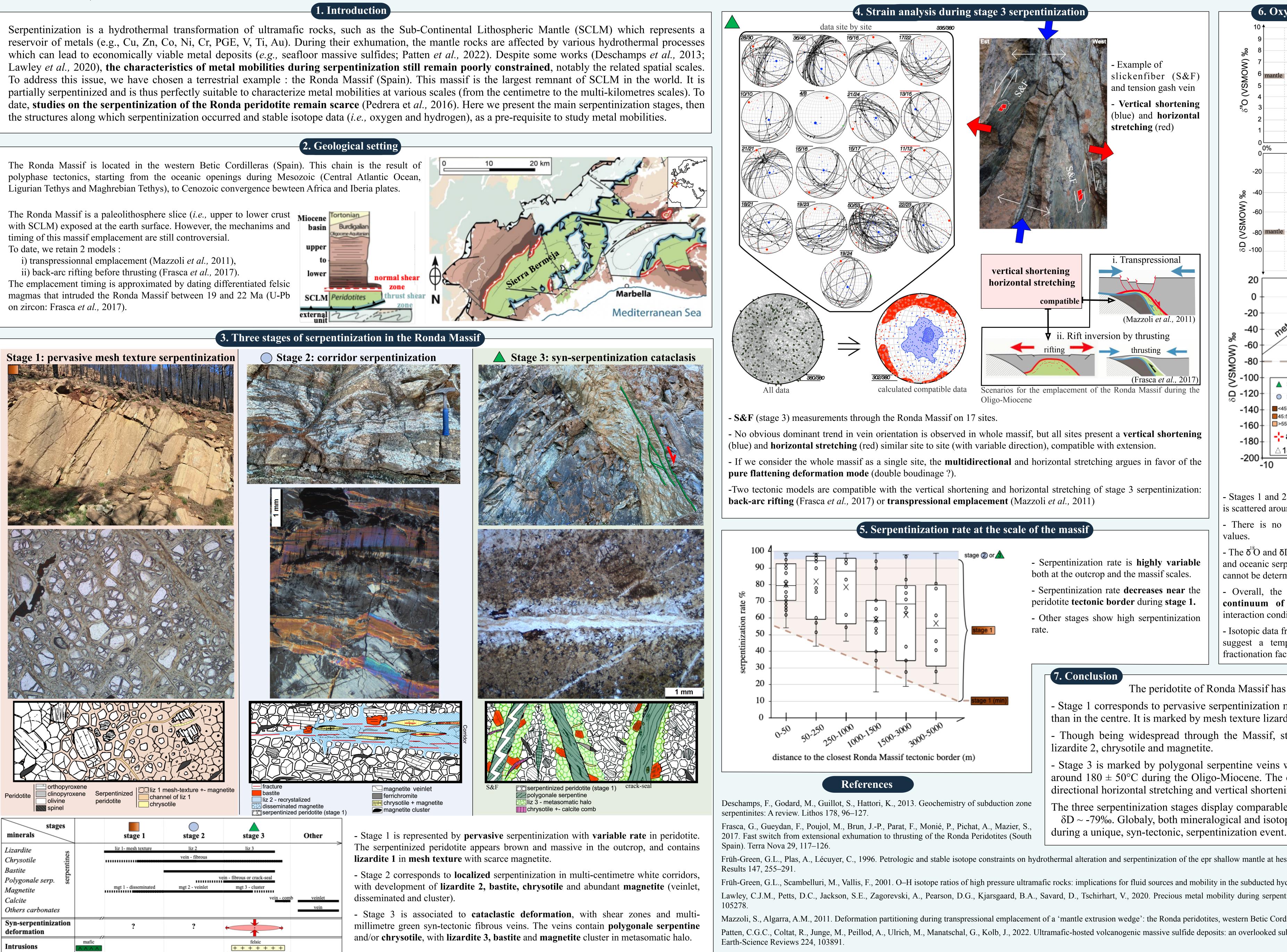
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1. Introduction

Lawley et al., 2020), the characteristics of metal mobilities during serpentinization still remain poorly constrained, notably the related spatial scales. the structures along which serpentinization occurred and stable isotope data (*i.e.*, oxygen and hydrogen), as a pre-requisite to study metal mobilities.





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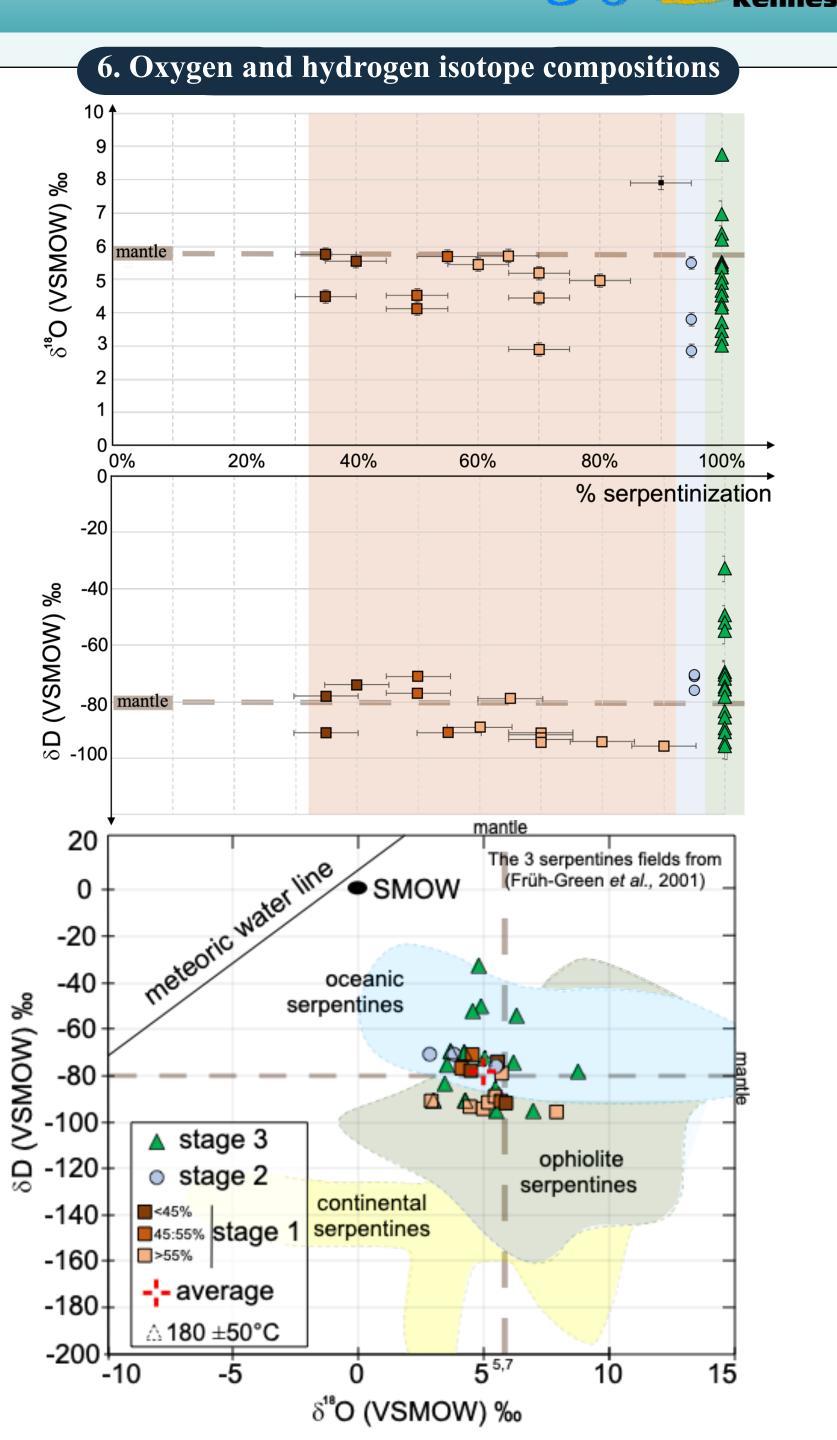
Früh-Green, G.L., Scambelluri, M., Vallis, F., 2001. O-H isotope ratios of high pressure ultramafic rocks: implications for fluid sources and mobility in the subducted hydrous mantle. Contrib Mineral Petrol 141, 145–159. Lawley, C.J.M., Petts, D.C., Jackson, S.E., Zagorevski, A., Pearson, D.G., Kjarsgaard, B.A., Savard, D., Tschirhart, V., 2020. Precious metal mobility during serpentinization and breakdown of base metal sulphide. Lithos 354–355,

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- There is no correlation between serpentinization rate and isotopic values. - The δ^{18} O and δ D value of Ronda serpentinites are split between ophiolite and oceanic serpentines fields. Yet, the origin of the serpentinization fluid cannot be determined with certainty only based on the avalaible data. Overall, the fairly comparable isotopic compositions plead for a continuum of serpentinization, and relatively similar fluid-rock interaction conditions (low fluid/rock ratio, variable temperatures). - Isotopic data from two pairs of **stage 3** serpentine-magnetite intergrowth suggest a temperature of equilibrium of $180 \pm 50^{\circ}C$, using the fractionation factor of Früh-Green et al., (1996)

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- Stages 1 and 2 **cluster** near the intersection mean isotopic data. Stage 3 is scattered around the values of stages 1 and 2.

The peridotite of Ronda Massif has undergone three stages of serpentinization.

- Stage 1 corresponds to pervasive serpentinization more efficient near the outer contour of the massif

- Though being widespread through the Massif, stage 2 consists of discrete cm-long corridors of

- Stage 3 is marked by polygonal serpentine veins which lie within cataclastic zones at temperatures around $180 \pm 50^{\circ}$ C during the Oligo-Miocene. The cataclastic deformation is characterized by multidirectional horizontal stretching and vertical shortening, compatible with two tectonic scenarios.

The three serpentinization stages display comparable isotopic signatures with average $\delta^{10} \circ +5\%$ and $\delta D \sim -79\%$. Globaly, both mineralogical and isotopic data suggest that stages 1 to 3 likely occured