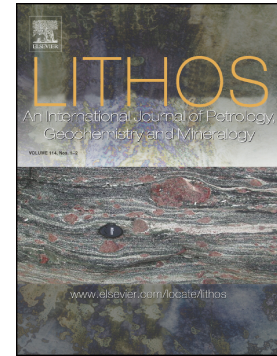


Accepted Manuscript

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PII: S0024-4937(17)30420-6
DOI: doi:[10.1016/j.lithos.2017.11.035](https://doi.org/10.1016/j.lithos.2017.11.035)
Reference: LITHOS 4496

To appear in:

Received date: 23 May 2017
Accepted date: 26 November 2017

Please cite this article as: Stefano Solarino, Marco G. Malusà, Elena Eva, Stéphane Guillot, Anne Paul, Stéphane Schwartz, Liang Zhao, Coralie Aubert, Thierry Dumont, Silvia Pondrelli, Simone Salimbeni, Qingchen Wang, Xiaobing Xu, Tianyu Zheng, Rixiang Zhu, Mantle wedge exhumation beneath the Dora-Maira (U)HP dome unravelled by local earthquake tomography (Western Alps). The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. *Lithos*(2017), doi:[10.1016/j.lithos.2017.11.035](https://doi.org/10.1016/j.lithos.2017.11.035)

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Mantle wedge exhumation beneath the Dora-Maira (U)HP dome unravelled by local earthquake tomography (Western Alps)

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Abstract

In continental subduction zones, the behaviour of the mantle wedge during exhumation of (ultra)high-pressure [(U)HP] rocks provides a key to distinguish among competing exhumation mechanisms. However, in spite of the relevant implications for understanding orogenic evolution, a high-resolution image of the mantle wedge beneath the Western Alps is still lacking. In order to fill this gap, we perform a detailed analysis of the velocity structure of the Alpine belt beneath the Dora-Maira (U)HP dome, based on local earthquake tomography independently validated by receiver function analysis. Our results point to a composite structure of the mantle wedge above the subducted European lithosphere. We found that the Dora-Maira (U)HP dome lays directly above partly serpentized peridotites ($V_p \sim 7.5$ km/s; $V_p/V_s = 1.70-1.72$), documented from ~ 10 km depth down to the top of the eclogitized lower crust of the European plate. These serpentized peridotites, possibly formed by fluid release from the subducting European slab to the Alpine mantle wedge, are juxtaposed against dry mantle peridotites of the Adriatic upper plate along an active fault rooted in the lithospheric mantle. We propose that serpentized mantle-wedge peridotites were exhumed at shallow crustal levels during late Eocene transtensional tectonics, also

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