Element mobility from seafloor serpentinization to high-pressure dehydration of antigorite in subducted serpentinite: insights from Cerro del Almirez (southern Spain)

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The Cerro del Almirez massif is composed of antigorite serpentinite and chlorite harzburgite separated by a transitional zone that marks the front of prograde serpentinite-dehydration at high pressure in a paleo-subduction setting. Concentrations of Sc and V indicate that the peridotite precursor of serpentinite experienced up to 20% partial melting in the spinel stability field at $-2 < \Delta\log fO_2^{FMQ} < 0$. Peridotites underwent intense seafloor serpentinization in a fluid-dominated system. Olivine hydrolysis at ~ 200 °C and pyroxene serpentinization at > 350-400 °C remobilized Ca and REE (especially LREE and Eu) and caused the progressive enrichment of Cs, Rb, Ba, U and Pb and locally the crystallization of talc by silica fluid addition. Transformation to antigorite serpentinite upon subduction led to Sr depletion, and Ti, Tm, Yb and Lu were remobilized at the sample scale during fluid-assisted crystallization of titanian clinohumite. The high-pressure prograde breakdown of antigorite to chlorite harzburgite preserved the REE fractionations and the characteristic negative Eu anomaly of precursor serpentinites. Relative enrichment of Th-U-Nb-Ta-Pb-Sr in chlorite harzburgite cannot be balanced by closed-system dehydration of serpentinite indicating that dehydration occurred in an open system involving external fluids equilibrated with crustal sources. Open-system fluid flux in the subducted slab results in the recycling into the deep convective asthenospheric mantle of prograde harzburgite enriched in Th, U, HFSE and Pb relatively to oceanic depleted peridotite.

Isotopic composition of precipitation in Ferrara Province

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Ferrara province is located in the Po valley, a flat low-land surrounded by the Alps and the Appennines. The particularity of this area is represented by the proximity to the Comacchio Valleys and the Adriatic Sea. It is interesting to note that, in spite of the vicinity to the sea, the area is charaterized by continental climatic characteristics. Stable hydrogen and oxygen isotope ratios are dynamic tracers for the cyclying of atmospheric moisture as influenced by water vapour advection, condensation, and evaporation [1].

The stations selected for this study include various sectors of the Ferrara province and allow to characterize the isotopic fingerprint of the local meteoric water. The recorded $\delta^{18}O$ values ranging between -6.95 and -5.19, and δD values ranging between -46.21 and -31.82 are compared with Northern Meteoric water Line [2].

These data will be implemented with the investigation of further local events in the selected stations in order to create an hydro-archive, i.e. a data-set of stable isotope of meteoric water in Ferrara province. This is important considering that the stable isotopes provide a snapshot of the current climatic conditions to be compared with the literature data and with the future composition, as a proxy to evaluate on-going climatic changes.

[1] H.Fudeyasu, *et al*. (2008) *J*. *Geohys*. *Res*, **113**]. [2] Longinelli and Selmo (2003) *Jour*. *Hydrol*. **270**, 75-88]. [3]Zuppi and Sacchi, (2004) *Global Planet*. *Change* **40** 79–91].

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