Serpentinite hosted hydrothermal systems of mid-ocean ridges: Kinetic and thermodynamic modeling of downwelling limb of a hydrothermal circulation cell

S.A. SILANYEV*, M.V. MIRONENKO AND A.A. NOVOSELOV

Vernadsky Institute, Moscow 119991, Russia (*correspondence: silantyev@geokhi.ru)

A model is development for the kinetic and thermodynamic simulation of the interaction of seawater derived fluid with oceanic peridotites (Sp-Harzburgites). Thermodinamic model is based on the GEOCHEQ complex which makes it possible to simulate equilibria in systems of aqueous solutions–minerals–gases. The calculating code was modified and adjusted for the thermodynamic–kinetic simulation of the passage of irreversible solution–rock reactions with time. The results of our simulations demonstrate that the degree of Peridotite serpentinization under the effect of low-temperature seawater when the rocks are exposed at the seafloor surface remains very low even after 10 000 years of interaction. Serpentinization becomes efficient only at temperatures of 130-150°C at crustal depths of 3.5–4.5 km. The results of our simulations of the phase transformations during the hydrothermal alteration of MOR peridotites led us to propose a geodynamic model for the development of hydrothermal systems related to peridotites in slow-spreading ridges. This model takes into account the principal phases of the compositional and tectonic evolution of the Hess crust. According to the model, low-density serpentinite material formed at crustal depths of about 3.5–4.5 km has an excess volume compared to the pristine unaltered peridotites, and this results in the uplift of this material to upper crustal levels.This processes is associated with faulting of the rigid and cold lithosphere. The detachment fault arrays produced thereby drain lower crustal magmatic chambers and trigger the emplacement of shallow-depth gabbro intrusions. As a result, conditions favorable for the “startup” of a hydrothermal circulation in serpentinites are created.

Sea level rise in the Mediterranean Sea: High resolution constraints from vermetid reefs

S. SILENZI[1]*, M. CALVO[2], R. CHEMELLO[3], S. DEVOTI[1], S. FALLON[4], M. MCCULLOCH[4], P. MONTAGNA[1], J. TEMPLADO[2] AND J. TROTTER[4]

[1]ISPRA, Rome, Italy (*correspondence: s.silenzi@icram.org)
[2]Museo Nacional Ciencias Naturales, Madrid (CSIC), Spain
[3]Dept. of Ecology, Palermo University, Palermo, Italy
[4]RSES, Australian National University, Canberra, Australia

The Mediterranean Sea (MS), is extremely sensitive to rising sea-levels (SL) as attested by drowned archeological remains from the Roman Period [2]. Due to the absence of coral reefs, evidence for recent and Holocene SL change has so far mainly been restricted to coastal cores [1] archeological remains [2] and submerged speleothem deposits.

Vermetid reefs are an extremely sensitive high resolution carbonate archive [3,4] and they are mainly formed in the lower intertidal zone by gregarious and sessile gastropods belonging to the genus *Dendropoma* (family Vermetidae). Since their interval of growth is restricted to the tidal zone, they can be used as precise SL proxies (about ±0.1 m in low-range tidal areas).

Here, we report new SL data covering two time-windows: between 2,380 and 1,520 years cal BP and during the last 300 yrs. These data have been obtained from two quasi-stable areas of the Western MS: S. Vito Lo Capo (N Sicily, Italy) and Cabo de Gata (SE Spain), opening new perspectives to understand the response of the global changes on this semi-enclosed basin.

[1] Lambeck *et al.* (2004) *QSR* **23**, 1567-1598. [2] Lambeck *et al.* (2004) *EPSL* **224**, 563-575. [3] Antonioli *et al.* (1999) *Mar. Geol.* **161**, 155-170. [4] Silenzi *et al.* (2004) *GPC* **40**, 105-114.