9th FTSES 2024 Penghu, Taiwan

9th France-Taiwan Symposium in Earth Sciences
Session: General Session

Outgassing of mantle Helium in convergent setting: a comparison between Taiwan and the Apennines

Anne Battani[1], Frédéric Mouthereau[2], Jean de la Paix Izerumugaba[3]

[1] LFCR, Université de Pau et des Pays de l'Adour, E2S UPPA, CNRS, Pau, France
[2] Géosciences Environnement Toulouse (GET), CNRS, Université Toulouse III-Paul Sabatier, IRD, CNES, OMP, Toulouse, France
[3] IPREM, Université de Pau et des Pays de l'Adour, CNRS, Pau, France

How the continental crust is mechanically coupled to the sub-lithospheric continental mantle is a classic issue for understanding the dynamics of collisional orogens, for which, however, we have few clues. In Taiwan, geophysical data, such as S-wave anisotropy beneath the Central Range and the occurrence of deep crustal earthquakes in the Western Taiwan foreland thrust belt, support the idea that crustal deformation in Taiwan is not fully decoupled from the mantle and instead shows progressive decoupling in the lower crust. A few 3He/4He isotope ratios measured from groundwater and hot springs in southern Taiwan independently indicate the unambiguous occurrence of Helium-derived fluids at the surface. Here, we review and present new noble gas analyses from the Apennines to discuss the significance of the noble gas degassing patterns observed in Taiwan. In particular, we explore the role of delamination not only in providing a mechanism for mantle melting and fluids transport to crustal faults but also to explain the relationship between heat flux and Helium flux in Taiwan.

Keywords: Helium isotopes, heat flux, crustal faults, mantle fluids