

Coeval exhumation or subduction channel extrusion of the high pressure Yuli belt? Insights from the Shoufeng fault in eastern Taiwan

*Jian-Cheng Lee^{1,5}, Gong-Ruei Ho^{1,5}, Timothy B Byrne², Yuan Hsi Lee^{3,5}, En-Chao Yeh^{4,5}

1. Academia Sinica, 2. University of Connecticut, 3. National Chung Cheng University, 4. National Taiwan Normal University, 5. The Yuli Exhumation Study team (YES Team)

Based on field investigations, microscopic observations, and available geophysical, geochemical and geochronological data, this study intends to better understand the structural characteristics of the Eurasian continental margin (e.g., the eastern Central Range in Taiwan) during subduction and exhumation while the Philippine Sea plate has been approaching in the vicinity of Taiwan since the Miocene time. The eastern Central Range is composed of two major geological units: 1) the Tailuko belt, the Mesozoic metamorphic subduction complex, retro-metamorphosed in green schist facies and exhumed since late Miocene, and 2) the Yuli belt, continental margin rocks that contain high-pressure minerals (omphacite, glaucophane, garnet) with Miocene-Pliocene ages suggesting rapid exhumation from mantle depths of 40-50 km.

We conducted detailed field surveys around the Shoufeng fault which represents the boundary between the Tailuko belt and the Yuli belt. We found a mylonite zone of several kilometers wide in the boundary of these two belts. Based on the meso- and microscopic scale observations we define the boundary as ultra-mylonite, mylonite, and proto-mylonite zones. Within the ultra-mylonite and mylonite zones, rocks from two belts are intercalated each other in varied widths. The main dominant schistosity/cleavage in the mylonite zones (Sm/S3) remains the same orientation of striking in NE/NNE and dipping to the west. Also, the main composition layers, which we tentatively called S2 for the sake of field investigations, were more intensively deformed (i.e., crenulated, folded, etc.) from outside toward the core of the mylonite zones. As a result, the Sm/S3 becomes less persistent outside of the mylonite zones in the Yuli belt.

The mylonite zones exhibit left-lateral Sm/S3-related shearing without significant down-dip component. We also observed a general S2/S3-related top-to-west sense of shear across the two belts. As a consequence, we tend to interpret that the Yuli belt and the Tailuko belt have been mylonitically sheared (Sm/S3) in a left-lateral movement at the depth and that they exhumed coevally up to the surface level. The schistosity of the main composition layers S2 probably occurred before the mylonization during the transition from subduction to exhumation. The shallow dipping and less dominant S3 outside the mylonite zone might imply an upward and unroofing process during the rapid exhumation of the eastern Central Range of Taiwan.

Keywords: Mylonite, Exhumation, Shoufeng fault, Yuli belt, Taiwan