Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.14616

Constraining the plate interface fluid composition during subduction infancy – an attempt by linking the metamorphic sole and peridotite from Andaman Ophiolite, India

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Plate subduction is the unique and principal material-recycling phenomenon that characterizes the dynamics of the planet Earth. During different stages of subduction, the downgoing slab adds the material flux (devolatilization of subducting metamorphic rocks) into the mantle by releasing fluid which even aided mantle melting beneath the subduction zone. Thus, robust tracking of such fluid ingression in terms of composition, content, etc is extremely crucial to understand the whole scale subduction mechanism. The basal part of an ophiolite stratigraphy may provide some critical insight into this since it essentially preserves both sides of the subduction plate interface - mantle peridotites (of the upper plate) and metamorphic sole (scrapped off a metamorphosed section of the downgoing plate). Here we focus on the amphibolite (metamorphic sole) and variably serpentinized mantle peridotites from the ophiolite suite of the Andaman-Nicobar Accretionary Ridge (or Andaman ophiolite), located in the forearc, east of the Sunda-Burma subduction zone, between Sumatra and Myanmar. Andaman ophiolite may have been formed during subduction initiation (at least by 105 Ma) in a former back-arc basin when the former (Woyla) arc collided with the Sundaland via "subduction polarity reversal" [1, 2]. In this study, we first attempted to obtain a thermobarometric estimation using phase equilibrium analysis of the mantle peridotite (in dry and fluid excess conditions) that closely corresponds to the peak *P-T* (0.9 GPa and 675 °C, [2]) from amphibolite. This result coupled with the clinching field evidence clearly indicates that the amphibolite-peridotite contact might represent the plate interface (of downgoing slab /sole and overlying mantle). Based on these inferences we tried to compute and compare the composition of the fluids that got released from the metamorphic sole and that might have been in equilibrium with the peridotite using experimentally determined partition coefficients. Our preliminary results show an impressive correlation between the estimated compositions and might further allow us to obtain a well-constrained estimation of plate interface fluid composition.

[1] Plunder et al. (2020) *Tectonics* **39,** 10.1029/2019tc005762. [2] Bandyopadhyay et al. (2021) *Lithos* **380-381**, 10.1016/j.lithos.2020.105853.