

Helium isotopic signature of the plate boundary suture in an active arc-continent collision

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We report new noble gas signatures of groundwaters, hot springs, and bedrock samples from two major fault system that form the plate boundary suture between the Eurasian and the Philippines Sea Plates. In the south, the east-dipping Eurasian Plate is associated with a relatively simple plate boundary fault as suggested by a well-defined cluster of earthquakes related to the active, east-dipping Chihshang Fault zone, which is the main conduit for mantle helium. In the north, as the subduction direction flips from the east-dipping Eurasian Plate to the north-dipping Philippine Sea Plate, the plate boundary fault is represented by a more complex system of east and west dipping structures. Clear signals of mantle contamination, as evidenced in helium isotopes, are also reduced in this area. We propose that as the subduction direction flips from south to north along strike, the tortuosity of the fault-related conduits increases, reducing the flow and limiting the release of mantle-derived gases.

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