9th FTSES 2024 Penghu, Taiwan

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

Detrital zircon U-Pb-Hf constraints on PSP/EU plate kinematics

Frédéric Mouthereau[1], Florence Annette Labis[1], Stéphanie Brichau[1], Oscar Laurent[1], Cédric Bulois[2], Manuel Pubellier[2], Matthias Delescluse[2], Carla Dimalanta[3], Betchaida Payot[3], Jillian Aira Gabo-Ratio[3]

[1] GET, Université Toulouse III, Toulouse, France
[2] Laboratoire de Géologie, ENS, Paris, France
[3] National Institute of Geological Sciences, University of the Philippines, Diliman, Quezon City 1101, Philippines

Arc-continent collision is a key process for understanding the recycling of continental crust on Earth. Along the plate boundary between the Philippine Sea Plate (PSP) and Eurasia (EU), Taiwan and the Philippines constitute a unique region to study this process. Major unknowns are the exact origin and plate kinematics of the arc slivers and continental terranes involved in plate convergence. Rifting of the SE China margin has reactivated Mesozoic accretionary prisms, forearc basins and plutons related to the former "Andean-type" subduction of the Pacific and Paleo-Tethys suture zones. The SCS is bordered in the East by the Philippine Mobile Belt, which is the northern termination of a very large Eocene to Present volcanic arc built on the edge of the PSP. Although its detailed kinematics is debatable, most models show that the PSP rotated clockwise during the Paleocene and reached the Palawan Block (southern margin of the SCS) by the Miocene, thus dragging pieces over several 1000 kms of the EU plate and possibly slivers of the Proto-South China Sea (P-SCS) in Luzon and Taiwan. Currently, the basement of the Luzon Arc is suggested to connect with the mid-Cretaceous oceanic basement of the Huatung Basin (HB) in southeastern Taiwan and it is debated whether the HB originated on the edge of the EU continent in the proto-SCS or belongs to the Proto-PSP. A proto-PSP origin of the HB and Luzon implies this domain travelled for 2000 km northwards with the PSP since 50 Ma, subducted to the north below the Ryukyu trench as the N-directed PSP motion and collided with EU only recently. Alternatively, this Cretaceous oceanic basement was part of the P-SCS near Taiwan that has been captured by the PSP and requires 500 km of PSP motion. Here we exploit new U-Pb-Hf analyses on detrital zircon collected in Mesozoic series of Taiwan and the Philippine Mobile Belt. Results are confronted to other age/tectonic data and existing plate kinematic reconstruction.

Keywords: Plate kinematics; collision; subduction; geochronology; geochemistry