



The complexity of South China Sea kinematics

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Magnetic modeling shows that the age of the youngest South China Sea (SCS) oceanic crust is controversial (e.g. 15.5 Ma, Briais et al., JGR 1993 and 20.5 Ma, Barckhausen et al., MPG 2014). Close to the rift axis of the East sub-basin, Ar-Ar age dating of oceanic crustal rocks collected during IODP Leg 349 gives ages of 15 and 15.2 +/- 0.2 Ma (Koppers, Fall AGU meeting, 2014), which seems to favor the 15.5 Ma age given by Briais et al. modeling. However, basaltic samples might belong to a sill and not to the typical oceanic crust. As post-spreading magmatic activity (~8-13 Ma) largely masks the spreading fabric, in particular near the previously identified E-W portion of the extinct ridge axis of the East sub-basin, the published locations of the axial magnetic anomaly and spreading rates are incorrect. The compilation of available swath bathymetric data shows that if post-spreading volcanics hide the seafloor spreading magnetic fabric mostly along and near the extinct spreading axis, the whole SCS is globally characterized by rift directions following three directions: N055° in the youngest portion of the SCS, N065° and N085° in the oldest portions of the SCS (Sibuet et al., Tectonophysics 2016) suggesting the extinct ridge axis is N055° trending instead of E-W.

We present an updated version of the whole SCS structural sketch based on previously published swath bathymetric trends and new detailed magnetic lineations trends compiled from an extremely dense set of magnetic data. The new structural sketch shows:

- The distribution of conjugate kinematic domains,
 - The early opening of the NW and East sub-basins, before a jump of the rift axis,
 - A second ridge jump in the East basin,
 - The different expressions of the post-spreading magmatism in the East and SW sub-basins. In the East sub-basin, crustal magmatic intrusions led to the formation of extrusive basalts associated with the presence of numerous volcanoes (Wang et al., Geological Journal 2016). In the SW sub-basin, crustal magmatic intrusions deformed and uplifted the already formed oceanic crust and oldest overlying sediments, resulting in the formation of a double post-spreading ridge belt previously identified as the shoulders of the extinct spreading rift axis.
- Later on, this preliminary work will be used to identify magnetic lineations not polluted by the post-spreading magmatism.

The unfolded Manila trench and proto-SCS slabs from seismic tomography indicate that the Eurasian margin has been maximum ~500 km east of the Manila trench since the proto-SCS era, and we incorporate these restored slabs to show a more complete SCS kinematic history.