Supporting Information for

**Lithospheric structure of the Southwest South China Sea: implications for rifting and extension**

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**Introduction**

The supporting Information provides details of analytical solution for Eq. (3) and additional figures to supplement the main article.

Text S1.

For the sedimentary layer, A and k is constant, the equation (3) in main article can be solved by transform to a boot-strapping equation as follow:

(4)

The vertical column is divided into arbitrarily thin layers. Temperature, Ti+1, and heat flow, Qi+1, at bottom of each layer are determined from the temperature, Ti, and heat flow, Qi, at the top of each layer.

For the upper crust, the thermal conductivity is k0/(1+mT) coupled with temperature, HG is A0exp(-z/D) coupled with depth. Therefore, equation (3) has the analytical solution:

 (5)

where Q0 is basement heat flow; T0 is basement temperature.

For the lower crust, the thermal conductivity is k0/(1+mT) coupled with temperature, HG is constant. Therefore, equation (3) has the analytical solution:

(6)

where Q0 is the heat flow at the bottom of upper crust; T0 is the temperature at the bottom of upper crust.

For the mantle, when temperature is larger than 230oC, the thermal conductivity is k0/(1+mT)+m1+m2T ; HG is constant. Therefore, equation (3) has the analytical solution:

(7)

where Q0 is Moho heat flow; T0 is Moho temperature.

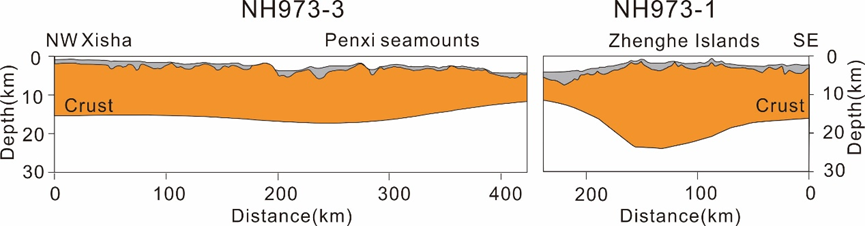


Figure S1. The crustal structure along Profiles NH973-3 (Lü et al., 2011) and NH973-1 (Qiu et al., 2011) in the southwestern South China Sea. See Figure 1 for locations.

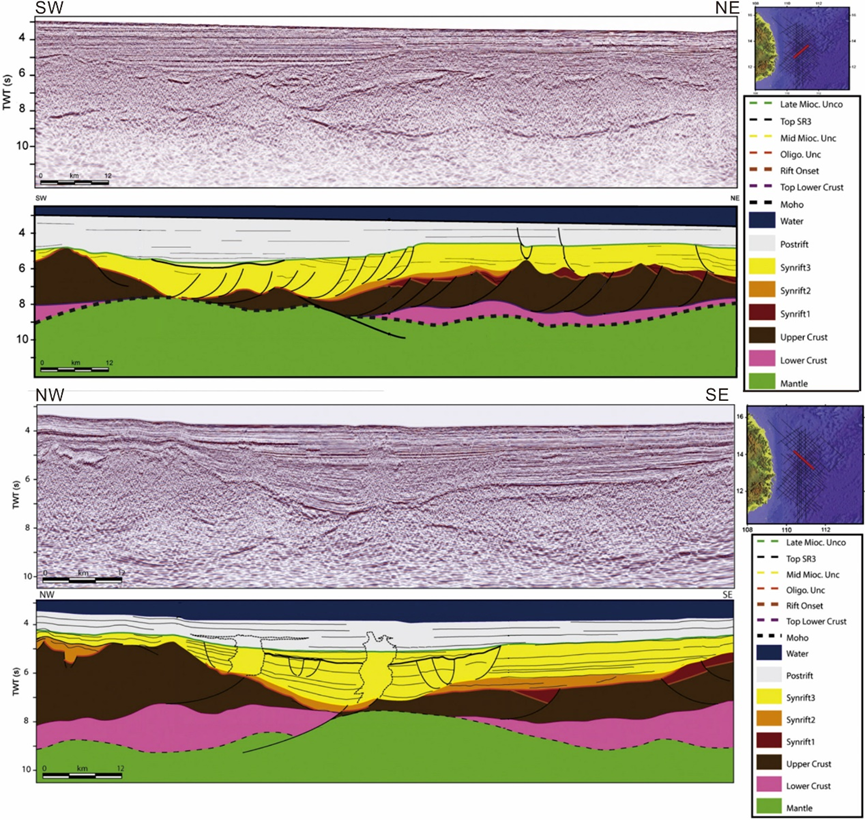


Figure S2. Seismic line with line drawing which show the 3 syn-rift episodes (Savva et al., 2013).

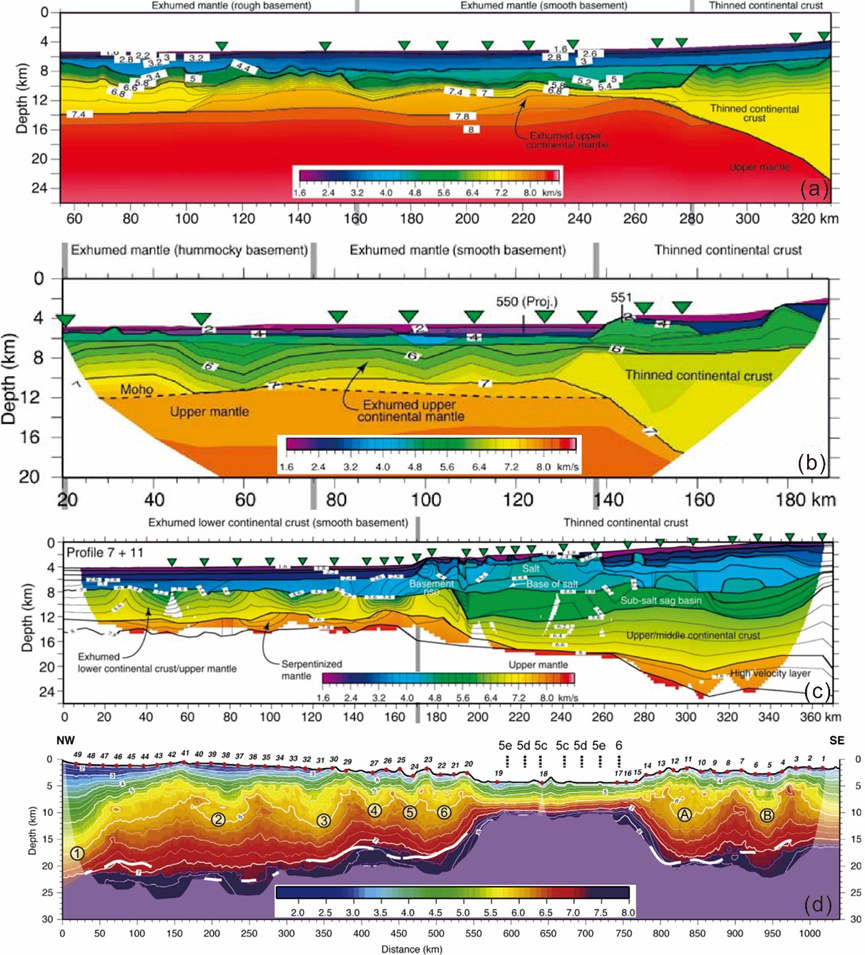


Figure S3. Comparison of the velocity model along (a) IAM9 seismic transect across the Iberia Abyssal Plain margin (Dean et al., 2000), (b) a segment of WAM seismic transect across the Goban Spur margin (Bullock and Minshull, 2005), (c) profiles 7+11 across the Angola-Congo margin (Contrucci et al., 2004), and (d) profile 2011 across the Southwest Sub-Basin of SCS (Pichot et al., 2014).

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