Warm memories of the Shikoku Basin recorded within the Nankai inner accretionary wedge

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Paleothermal structure and tectonic evolution of an accretionary wedge is basic information for understanding subduction zone seismogenesis. To evaluate entire paleotemperature profile and evolutionary processes of the Nankai inner accretionary wedge, we performed vitrinite reflectance analysis and detrital zircon U-Pb age dating by using cuttings retrieved from the Integrated Ocean Drilling Program (IODP) Site C0002 located within the Kumano Basin and penetrates the inner accretionary wedge down to 3058.5 m below the seafloor (mbsf).
Both Ro values and the youngest detrital zircon U-Pb ages show a reversal between 2400-2600 mbsf, suggesting the existence of a thrust fault with sufficient displacement to offset both paleothermal structure and sediment age. Taking the reversal at 2400–2600 mbsf into consideration, apparent paleogeothermal gradients of 1700–2400 and 2600–3000 mbsf are calculated to be ~60 (~50–70)°C/km, assuming 1 million years of heating duration time. Geothermal gradient of ~60°C/km is significantly higher than the estimated modern geothermal gradient (~30–40°C/km; e.g. *Sugihara et al.*, 2014). For more precise estimation of paleogeothermal gradient, we collected effects of bedding inclination (subhorizontal to ~60°) and porosity reduction, and as a result, real paleogeothermal gradient of both hanging- and footwall of the presumed thrust fault at 2400–2600 mbsf is ~100°C/km. Such a large paleogeothermal gradient was probably obtained prior to subduction, reflecting large heat flux produced by young oceanic lithosphere and/or hydrothermal circulation within the Philippine Sea Plate. Our results suggest that large geothermal gradient of input sediments might have a potential to affect the up-dip limit of seismogenic zone.

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