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Structural control of the along-strike variations in heat flow and the location of the thermally-defined seismogenic zone in South-Eastern Japan margin

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In convergent margins, the seismogenic zone is defined as the limited depth range of interplate contact that can generate thrust earthquakes. It is commonly acknowledged that the updip and downdip limits of this seismogenic zone are related to temperatures ranges 60-150˚C and 350-450˚C respectively. Thermal modelling by estimating the location of temperature contours along the interplate contact, thus offers an opportunity to estimate the location of seismogenic zone at convergent margins.

The South-eastern Japan margin is known to be segmented in the Nankai, Tonankai and Tokai segments. Great subduction earthquakes repeatedly ruptured one or several segments with propagation limited by seismological barriers. A well-identified barrier in Nankai trough is located nearby the Kii Peninsula, where occasional slow earthquake may have a strong influence on the plate coupling. Along this margin, extensive geophysical data, and particularly pre-stack depth migration of multichannel seismic lines, provide us with great details concerning along-strike variations in margin structure. Among other features, variations in accretionnary prism thickness, interplate dip and trench sediment thickness may greatly influence the temperature distribution along the interplate contact. The heat flow based on numerous measurements and calculations from numerous Bottom Simulating Reflectors shows along-strike variations, and in particular an abrupt 40% decrease nearby the Kii Peninsula.

In this study we investigate the thermal variations along the margin by using a newly-improved version of the K. Wang's code for un-steady state 2D thermal model which specifically include the influence of the sedimentation rate and compaction. These

models aim at estimating temperatures distribution and thermally-defined seismogenic zones along the interplate contact in order to address: 1/ variations in the seismogenic zone location along the interplate contact, 2/ possible control of these variations by structural variations, 3/ the specific case of the thermal regime nearby the Kii Peninsula that coincide with a thermal cooling on the interplate contact at shallow depth.