



A numerical model study to evaluate the effect of sedimentation on the thermal structure of extensional basin

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Sedimentation on extensional basins allows fast cooling of the shallow crust because the overlying sediments efficiently transfer heats from the shallow crust to the surface and hinders heat transfer from the underlying deep crust and mantle to the surface, which lowers the surface heat flux (e.g., covering effect). Therefore, it is important to evaluate the impact of transient sedimentation on the thermal structure of the extensional basin. We designed a numerical model which considers transient sedimentation based on the kinematic basin extension formulated by Jarvis and McKenzie (1980). In the model study, we vary duration of extension, stretch factor (β) and sediment thickness of the basin with 100 Myr of cooling since the basin extension ceases. First, we evaluate the effect of duration of extension on the thermal structure of the basin by using the stretch factor (β) and sediment thickness of 2 and 2 km, respectively. Our model calculations show that longer duration of extension results in larger decreases in the geotherm and surface heat flux of the basin. Second, we evaluate the effect of stretch factor (β) on the thermal structure of the basin by using the duration of extension and sediment thickness of 20 Myr and 2 km, respectively. The results indicate that larger stretch factor (β) results in larger decreases in the geotherm and surface heat flux of the basin. Evaluation of the effect of the sediment thickness is ongoing by keeping the duration of extension and stretch factor (β) of 20 Myr and 2, respectively. We will apply our findings to analyze the thermal structure of the Ulleung and Yamato Basins in the East (Japan) Sea.