SSS31-P35 会場:コンベンションホール 時間:5 月 21 日 18:15-19:30

西南日本におけるフィリピン海プレートの沈み込みに伴う温度・流れ・地殻熱流量の３次元数値モデリング
3-D numerical modeling of temperature, fluid flow and heat flow associated with subduction of the PHS plate in SW Japan

季 頴鋒[1*], 吉岡 祥一[2], 松本 拓己[3]
Yingfeng Ji[1*], Shoichi Yoshioka[2], Takumi Matsumoto[3]

[1] 神戸大学理学研究科, [2] 神戸大学都市安全研究センター, [3] 防災科学技術研究所
[1]Department of Earth and Planetary Science, Graduate School of Science, Kobe University, [2]Research Center for Urban Safety and Security, Kobe University, [3]National Research Institute for Earth Science and Disaster Prevention (NIED)

Constructing a three-dimensional numerical model, we investigated temperature, fluid flow and heat flow distributions associated with subduction of the Philippine Sea plate subducting beneath the Amuran plate, southwest Japan. We modeled realistic three-dimensional shape of the Philippine Sea slab by an inversion analysis using ABIC, using the geometry datum obtained by high resolution of P-wave tomography and seismic reflection study. Subducion velocity was set to be 4 cm/yr during a period from 7 to 3 Ma in the direction parallel to the strike of the Kinan Seamount Chain, and 6.32 cm/yr for the last 3 Myr obliquely in the current convergent direction. The results showed the patterns of temperature distribution, fluid flow and surface heat flow distributions in southwest Japan after 7 Myr of subduction. We found that the cooling effect brought by the Philippine slab is remarkable in the portion on descent slope of the slab with a larger composite subduction angle. The distribution of interplate temperature on the slab upper surface appears similar to the geometry of slab upper surface, indicating a corresponding relation between them.. Flow velocity of the mantle substance near the upper surface of the Philippine Sea slab is lower than that of the slab, and oblique subduction resulted in convection in oblique direction beneath the Osaka Bay where a dip angle of the slab is much larger than that beneath Shikoku. Subduction velocities on ascent and descent slope gradients are different, for they have a different composite subduction angle. Surface heat flow distribution is also affected by the slab shape. The cooling effect became large with increasing subduction time and slab length. To fit the observed surface heat flow distribution better in the model domain, we changed thickness of the continental plate and pore pressure ratio related to frictional heating on the plate interface, and evaluated the simulated results using the least square method. As a result, we suggest that thickness of the continental plate larger than 30 Myr. Pore pressure ratio larger than 0.95 is better for fitting the observation data. High heat flow anomalies in Shikoku and the Kii Peninsula and the low anomaly along the Seto inland sea exist according to the comparison to the results of simulation.
Keywords: numerical simulation, temperature, fluid flow, heat flow, Philippine Sea plate, Southwest Japan