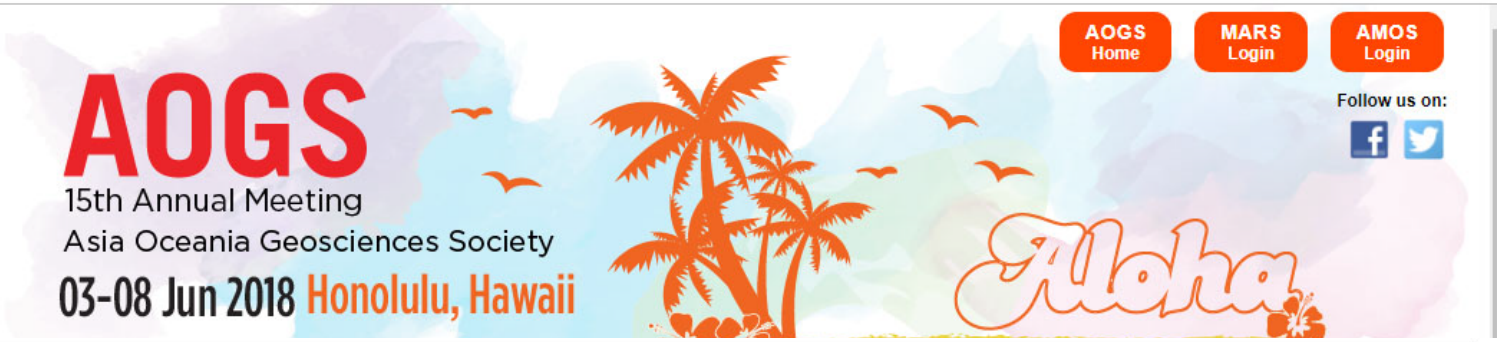

SE04 - Dynamic System of Earth: Interactions from Surface to Core
Tuesday, June 05, 2018 | 321B | 08:30-10:30

2. **SE04-D2-AM1-321B-009** (SE04-A025)

Lower Mantle-Sourced Hotspot Trail within the Australian-Antarctic Rift System

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The KR1 Seamount trail is located in the eastern end of the Australian-Antarctic rift system (the South-East Indian Ridge) and develops parallel to the ocean spreading direction. This seamount trail is a submarine volcanic mountain chain with a maximum altitude of more than 1,300 m and a length of ~60 km and consists mainly of alkaline basalt (ocean island basalt, OIB) and tholeiite (E- or T-MORB). Thus, the KR1 Seamount trail is considered as a volcanic mountain chain continuously erupting on the tholeiitic ocean floor. Alkaline basalts and tholeiites are grouped distinct in terms of Sr-Nd-Pb isotopic ratios. The $^{206}Pb/^{204}Pb$ ratio of alkaline basalts ranges from 19.5 to 19.9 exhibiting HIMU affinity and has values similar to that of the Balleny hotspot around Antarctica.The whole-rock K-Ar age of alkaline basalt (DG04-2) is measured as 4.6 ± 0.7 Ma. Various plutonic and volcanic gravels are dredged with basalts in the DG05 area, a deep crater of the seamount trail. The zircons of the four plutonic rocks exhibit different igneous ages such as the 336.2 ± 1.8 Ma (gabbroic diorite), 298.4 ± 1.2 Ma (granite), 228.8 ± 0.5 Ma (granodiorite) and 100.4 ± 0.5 Ma (granite). Whole-rock K-Ar ages of rhyolite and trachyte are measured as 291.6 ± 5.5 Ma and 150.9 ± 3.3 Ma, respectively. These various and old ages indicate that rocks other than basalts in the DG05 area are not related to the ocean floor and the seamount trail formations but are likely to be exotic gravels (e.g., ice-rafted materials) shifted from other place (e.g., Antarctica). Taken together, the KR1 Seamount trail corresponds to the underwater hotspot chain, and formation of this volcanic mountain chain could be explained by the process of the deep mantle (lower mantle) upwelling penetrating the upper mantle convection system.