Permian ophiolites from the Wandashan Orogen, NE China: constraint to Paleo-Pacific subduction

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The Wandashan Orogen, located at the eastern margin of the Jiamusi Block, is a Paleo-Pacific accretionary orogen. Two Permian ophiolites are identified which are important for understanding the early history of Paleo-Pacific subduction.

The Dongfanghong Ophiolite consists from bottom to top layered intrusions (135°/30°) including serpentinized peridotite, pyroxenite, anorthosite, layered gabbro and intrusions of hornblende gabbro, diorite and plagiogranite. The Ol-Cpx-Pl crystalization sequence and arc-type trace element pattern suggest a SSZ-type origin. The hornblende gabbro and plagiogranite are enriched in LREE whereas rocks of the layered intrusions are depleted in LREE, likely caused by clinopyroxene fractionation and accumulation, respectively. The □Nd(t) values of pyroxenite, anorthosite and hornblende gabbro gradually decrease from +2.8, +1.6 to -0.6, suggesting progressive contamination and inapplicableness of Sm-Nd isochron dating. The scatteredly inherited Pan-African zircons also support an input of continental materials. The age of the Dongfanghong Ophiolite is 275 ± 2 Ma based on zircon U-Pb dating on hornblende gabbro.

The Yuejinshan Ophiolite consists both igneous rocks including serpentinized peridotite, anorthosite, layered gabbro (50°/35°), meta-basalt and meta-sedimentary rocks including marble and garnet-phengite schists. The Ol-Pl-Cpx crystalization sequence and E-MORB to OIB trace element pattern suggest a MORB-type origin. The □Nd(t) values of the meta-basalt and layered gabbro are from +5.4 to +7.1, plotting in the OIB area. CAMECA zircon U-Pb dating result shows that ages of the anorthosite and serpentinite are 265 ± 7 Ma and 257 ± 7 Ma, respectively. The meta-sedimentary rocks have no zircon, suggesting an origin of intra-oceanic deposition rather than continental margin.

The Dongfanghong and Yuejinshan ophiolites thus reveals the processes of Permian subduction, Permian intraplate magmatism and deposition within Paleo-Pacific, and oceanic materials collision and accretion in Early Mesozoic along the eastern margin of NE China continent.