Perspective of studies on the Oman ophiolite

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Since first visiting to the Oman ophiolite at 1995, ten years passed. Systematic studies by Japanese geologist team for the Oman ophiolite have been launched from 1997. Many new findings are carried out by the Japanese geologist team. We summarize recent progress and unsolved problems on studies of the Oman ophiolite.

1. Magmatic system along ridge axis: Large-scale segmentation structure in the northern Oman ophiolite was defined through regional and detailed field survey. We found a large-scale discontinuity corresponding to the second order of ocean ridge segmentation around Wadi Fizh area. While the segment center is found at Wadi Thuqbah area. Systematic variations of magmatic system in terms of degree of partial melting and mode of fractional crystallization are detected along the segment (Miyashita et al., 2003; Adachi and Miyashita, 2003; Umino et al., 2003).

2: Small-scale discontinuity: We found disturbed zones in the gabbro unit appearing as echelon like zones oblique to the main structure which may correspond to smaller scale of discontinuity (third to fourth order) in ridge segmentation (Tomatsu. 2004MS).

3. Supercooled crystallization in gabbronorite sill: We have found that numerous gabbronorite sills intrude into still unsolidified layered gabbros at Wadi Fizh area. The intruding magmas were much hotter than the unsolidified gabbros to result in rapid and supercooled crystallization of the injected magmas (Miyashita, Adachi and Okazawa, submitted).

4. Origin of layering: There are many ideas on the origin of fine-scale layering in the gabbroic unit of the Oman ophiolite. We have found that layered gabbros are generally composed of numerous cyclic units each spanning about 10 to 15 m thick (Akimoto et al., 2005 this meeting).

5. Ferrous-rich intrusion (black body): We found ferrous-rich body intruding into upper gabbros of the Oman ophiolite. This intrusion is very homogeneous and has very abnormal bulk compositions, which were not known on the earth so far. One possible origin for the black body is a large-scale liquid immiscibility (Neo et al., 2004).

6. Origin of plagiogranite: In the Oman ophiolite there are many plagiogranite bodies which appear usually between upper gabbro and sheeted dike complex. However, detailed studies on plagiogranite are few. We surveyed Suhaylah plagiogranite complex, largest plagiogranite body in the Oman ophiolite, and found several lines of evidence showing a large scale partial melting of upper gabbros and/or sheeted dike complex (Takeuchi et al., 2005 this meeting).

7. Boninitic dikes intruding into lower crust along Wadi Kyabiyat: Calc-alkalic ultramafic intrusions was found from Wadi Kyabiyat (Adachi and Miyashita, 2003; Adachi et al., 2004). Very primitive boninitic dikes were recently found from several locations in and around the Kyabiyat complex (Adachi et al., 2005 this meeting).

8. Late intrusive complex and boninitic dike swarm in the Wadi Rajmi area: Huge gabbronorite body intruding into the gabbro unit was found from the Wadi Rajimi area. This complex is associated with dunite-wehrlite-clinopyroxenite at the base and diorite-tonalite at the top. Furthermore, numerous boninitic dikes were found from deeper part of the crustal section (Yamazaki et al., 2005 this meeting).

Thus, many new findings were carried out by recent studies on the Oman ophiolite. We can explore for the formation processes of ocean crust and transformation processes from ridge environments to immature arc. However, there exist still unsolved problems, such as origin of the ferrous-rich body, origin of layering and so on.