Genetic relation between boninite and mantle section in the northernmost part of the Fizh block, the Oman ophiolite

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We report structural, petrological and geochemical data for highly refractory harzburgites and dunites associated with high Cr# spinel-bearing orthopyroxenites and websterites distributed in the mantle section of Wadi Fayd ˜Wadi Al Qahfi areas in the northernmost Fizh block, the Oman ophiolite. We discuss genetic relationships between these lithologies and the boninitic dikes intruded in the gabbroic unit of Wadi Rajmi (Yamazaki and Miyashita, 2006).

The most important results from our study are the findings of two types of dunite - harzburgite associations. The first type is harzburgite having spinel Cr# less than 60 (Fo 90.5-91.5 and spinel Cr# 44-58) associated with dunite having higher Cr# spinel but similar Fo values (Fo 90.3-92.4 and spinel Cr# 66-77). The second type is harzburgite having spinel Cr# greater than 60 (Fo 90.6-91.1 and spinel Cr# 58-66) associated with dunite containing higher Cr# spinel and Fo values (Fo 92-93.5 and spinel Cr# 65-75). The former type is frequently found in Wadi Fayd and the second type is in Wadi Al Qahfi. As a result, the tie lines connecting harzburgite and associated dunite show two intersecting trends.

The boninite dike swam are reported from the gabbroic unit in Wadi Rajmi, southeast to our study area (Yamazaki and Miyashita, 2006) and their origin is still under question. We consider that the dunite in the first type discussed above may have been generated by remelting of harzburgite producing boninitic melt while the dunite in the second type served as a conduit for ascending boninitic melt within mantle section. The boninite - dunite reaction produced high Cr# spinel without largely modifying Mg#.

Finally, ultramafic dikes are distributed in whole studied area. Their lithology changes from orthopyroxenite in Wadi Al Qahfi (spinel Cr# 60-75) to websterite in Wadi Fayd (spinel Cr# ˜60). It may indicate that these ultramafic dikes formed as cumulates as ascending boninitic melt fractionated.