The ophiolitic chromitite and dunite with highly variable Cr#-spinel originated from an evolving magma

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The ophiolitic chromitites can be divided into high-Cr, intermediate-Cr and high-Al according to the composition of chromian spinel (i.e. Cr#-spinel). The high-Cr and high-Al chromitites are considered to form from boninitic and MORB melts, respectively. The intermediate-Cr chromitite may be related to a transitional melt between MORB and boninite. The Dazhuqu massif from the Xigaze ophiolite in Tibet contains high-Cr, intermediate-Cr and high-Al dunites and chromitites. The spinels of the high-Al chromitites and dunites have evidently high in Zn, Co and low in Ti, Sc comparing to spinel of MORB. The high-Cr dunites show higher Ti, Zn, Co and Mn in spinel than that of boninite. The intermediate-Cr chromitites and dunites have higher Al, Ga, Ti, Ni, Zn and Co in spinel relative to that of boninite. These features suggest that the parental magmas formed the dunites and chromitites with variable Cr#-spinel may be neither MORB nor boninitic melts. There is no correlation between V/Sc and Zn/Ti in chromian spinel from these dunites and chromitites suggesting that the parental magma not generated at different degrees of partial melting of depleted mantle source. However, the Cr# of chromian spinel of these dunites and chromitites are negatively correlated with Ni and Co, and are positively correlated with Sc and Mn, respectively. This implies a series of parental magma compositions generated via different degrees of fractional crystallization of a primitive magma. Therefore, the high-Cr, intermediate-Cr and high-Al dunites and chromitities of the Dazhuqu massif may have been originated from an evolving parental magma in suprasubduction zone setting.