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Recycling in Subduction Zones: Evidence from Blueschists and Eclogites from NW China.

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The geochemical evolution of oceanic crust (including both mafic and sedimentary components) has important implications for our understanding of the origin of mantle heterogeneity and the geochemistry of volcanic-arc basalts (VAB). However knowledge of the actual geochemical evolution of the subducting oceanic crust is largely based on indirect evidence, such as the composition of VAB and our understanding of the geochemical properties of key trace elements. Certain kinds of blueschist belt are thought to consist of exhumed portions of subducted oceanic crust. It is therefore possible to derive direct evidence of the geochemical evolution of subducted oceanic crust by studying blueschist belt metamorphic rocks (i.e. greenschists, blueschists and eclogites).

The bulk rock chemical analysis of rocks from the western Tian Shan blueschist belt, NW China, has enabled the geochemical affects of subduction zone metamorphism to be determined. These rocks are thought to have undergone "ultra-high pressure metamorphism," at pressures $>$2.5Gpa, and to have passed through the dehydration reactions associated with subduction zone processes. Comparison of the chemistry of these metamorphosed rocks with predictions of the protolith compositions, has not revealed any systematic chemical changes associated with subduction zone metamorphism. This finding is consistent with similar investigations into the geochemical affects of subduction zone metamorphism that have recently been published. Ostensibly, such findings have important implications in terms of the origin of mantle heterogeneity and VAB compositions. However, the assumption that rocks such as those of the western Tian Shan blueschist belt are analogous to deeply subducted oceanic crust may not be valid. Consequently, any interpretations of the geochemical evolution of

such rocks should not be extended to cover the evolution of subducting oceanic crust in general.