

THE JADEITITES OF NANSIBON, MYANMAR: RECORDS OF THE GEOCHEMISTRY OF SUBDUCTION ZONE FLUIDS. S.S. Sorensen¹ and G.E. Harlow^{2, 1} Department of Mineral Sciences, National Museum of Natural History, Smithsonian Institution, Washington DC 20560-0119 sorena@volcano.si.edu, ²Department of Earth and Planetary Sciences, American Museum of Natural History (AMNH), Central Park West at 79th Street, New York, New York, 10024 gharlow@amnh.org

Introduction: Jadeitites--rocks that mostly consist of near-end-member jadeite--are reported from less than 10 localities worldwide. All jadeitite localities are locally or regionally associated with subduction zone metamorphic terranes, and most are also near large, active transcurrent faults. Sparse field data suggest that jadeitites are isolated bodies within serpentinite-matrix melanges. Despite speculation that jadeitite bodies have replaced a different protolith (e.g. [1]), cathodoluminescence (CL) petrography reveals cycles of deposition from fluids followed by deformation and recrystallization. All stages are accompanied by changes of minor and/or trace element contents. Jadeitites are thus variably deformed and recrystallized veins that record time-dependent variations of compositions of subduction zone fluids.

Previous Work: We studied the geochemistry of a suite of jadeitite samples assembled from museum collections [2,3]. Grains in these rocks display red and/or blue cores with green rims. The amounts of many minor and trace elements also vary from core to rim. This in part corresponds to an increase in the diopside component of the jadeite grains with time, an effect that we observed in all 7 of the 8 well-described jadeitite localities we studied. The diopside substitution (Ca and Mg, (Fe²⁺) for Na and Al), probably created more favorable sites for REE and M²⁺ as grains grew. However, the shapes of REE patterns of single grains also appear to have changed with time, and not all the elemental systematics are crystal-chemical effects. Our work made it desirable to visit jadeitite localities and collect samples with known relationships to each other.

Samples: In early 2000, we participated in an AMNH expedition that reached a conglomerate jade mine at Nansibon, Myanmar with a group of American and Burmese scientists. Nansibon had not been described in the Western scientific literature. Although the mine was not recovering *in situ* jadeitite from veins or blocks, we had the opportunity to collect and compare jadeitites from a restricted source area. We assembled a collection of non-gem-quality jadeitites for petrographic and geochemical studies. CL images guided the acquisition of 81 new ion-microprobe, trace-element analyses from 6 Nansibon samples, which were selected based on textures and provenance.

Results: Our previous observation that jadeitites evolved from red and/or blue to green-luminescent

zones is not correct for the utility-grade jadeitites from Nansibon. Samples NBJ-04 and CJ-01 contain green-luminescent crystals that are zoned to red and/or blue colors, and KB10J-4C progresses from blue to non-luminescent to green to red with time. Nearly all of our earlier results were obtained from commercial-grade jades, which evidently tend to be favored over the utility-grade for museum specimens. In general, commercial jade may have a less complicated fluid-rock history than the utility jade.

The LREE-enriched patterns exhibited by all but sample CJ-01 broadly conform with the shapes suggested by some experimental studies of fluid-omphacite REE partitioning [4,5,6]. One grain in sample JM05-04 shows coordinated oscillatory zoning of Li, Sr, Be, Y, Ti, Ce, Cr, and Er: the Be data are anti-correlated with those for the other elements. A green-to blue-luminescent grain in sample CJ-01 shows coordinated behavior of Ti, Cr, and Rb, and the overall sequence in sample KB10J-4C shows coordinated behavior of Cr and Be.

Conclusions: The REE abundances and fractionations of jadeite grains change with time, but the shapes of many patterns indicate that fluid/mineral D-values for omphacite (obtained at much greater P and T conditions) may be applicable to jadeite. Results from other subduction zone metamorphic terranes have suggested that REE and HFSE can be mobilized on the meters-scale [7], because fluid-rock effects on their distributions are heterogeneous on that scale. The jadeitites of Nansibon show evidence for time-dependent variations of element abundances and ratios within samples. This offers a possibility of tracking fluid compositions through time in evolving fluid/rock systems of subduction zones.

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