YAMATO UNEQUILIBRATED EUCRITES Y-74450, Y-793548, Y-82210, Y-74159, AND Y-75011: PYROXENE TRACE ELEMENT SYSTEMATICS. Aurora Pun and James J. Papike, Institute of Meteoritics, Dept. Earth & Planetary Sciences, University of New Mexico, Albuquerque, NM 87131-1126, USA.

We have evaluated the trace element concentrations in pyroxenes of several Yamato unequilibrated eucrites. All of the Yamato eucrites are polymict eucrites from the collections of the National Institute of Polar Research (NIPR). A total of 5 thin sections were examined for trace elements, Y-74450, 74-6; Y-82210, 61-4; Y-793548, 51-2; Y-74159, 62-1; and Y-75011,96. Y-793548, 51-2 is very weathered and clasts show obvious Fe-oxide staining. It consists of numerous fine-grained basaltic textured clasts and a few coarse grained eucritic clasts set in a brecciated matrix of pyroxene and plagioclase fragments. Y-82210, 61-4 contains large basaltic clasts with subophitic texture. Y-75011,96 consists solely of a large coarse grained eucrite clast with ophitic texture. Y-74159,62-1 is dominated by a large eucrite clast with varoilitic texture. Y-74450,74-6 contains several coarse grained eucrite fragments as well as some clasts with radiating plagioclase and pyroxene grains. It has been suggested that Y-75011 is paired with Y-74159 and possibly to Y-74450 as well. All three of these meteorites contain pyroxene and calcic plagioclase common to various eucrites, and that some pyroxenes exhibit extensive zoning similar that found in the Pasamonte eucrite [1]. We analyzed selected pyroxenes from moderately coarse grained unequilibrated eucrite clasts in all of the thin sections.

Major, minor and trace element analyses were measured for zoned pyroxenes in the eucritic clasts of these Yamato meteorites. The major and minor element zoning traverses were measured using the JEOL 733 electron probe with an Oxford-Link imaging/analysis system. Complimentary trace elements were then measured for the core and rim of each of the grains by SIMS. The trace elements analyzed consisted of eight REE, Sr, Y, and Zr. These analyses were performed on a Cameca 4f ion probe at the UNM/SNL Ion Microprobe Facility, a joint operation of the Institute of Meteoritics, UNM and Sandia National Laboratories.

The results of the CI Chondrite normalized (average CI, [2]) trace element analyses for the Yamato samples are shown in Figure 1. These patterns are found to follow crystal chemical rationales. The cores of the pyroxenes (low-Ca) are more depleted in REE compared to the rims of the grains. For instance, the patterns for Y-82210 show a range of REE abundances from core to rim reflecting the range in trace element zoning. The LREE have steeper slopes than the HREE, because the LREE have larger ionic radii than the HREE and therefore do not fit into the M2 sites of the crystal structures of the low-Ca pyroxene cores as well as the Ca-enriched rims. Also note that Sr follows Ca reflecting their geochemical similarities and that Y and Zr behave like the HREE. Major and minor element patterns are typical for igneous zoning in all of these samples. Pyroxene cores are Mg-enriched, whereas the rims are enriched in Fe and Ca. Also, Ti and Mn are found to increase, while Cr and Al generally decrease in core to rim traverses. The cores of the pyroxenes are more depleted in the REE than the rims.

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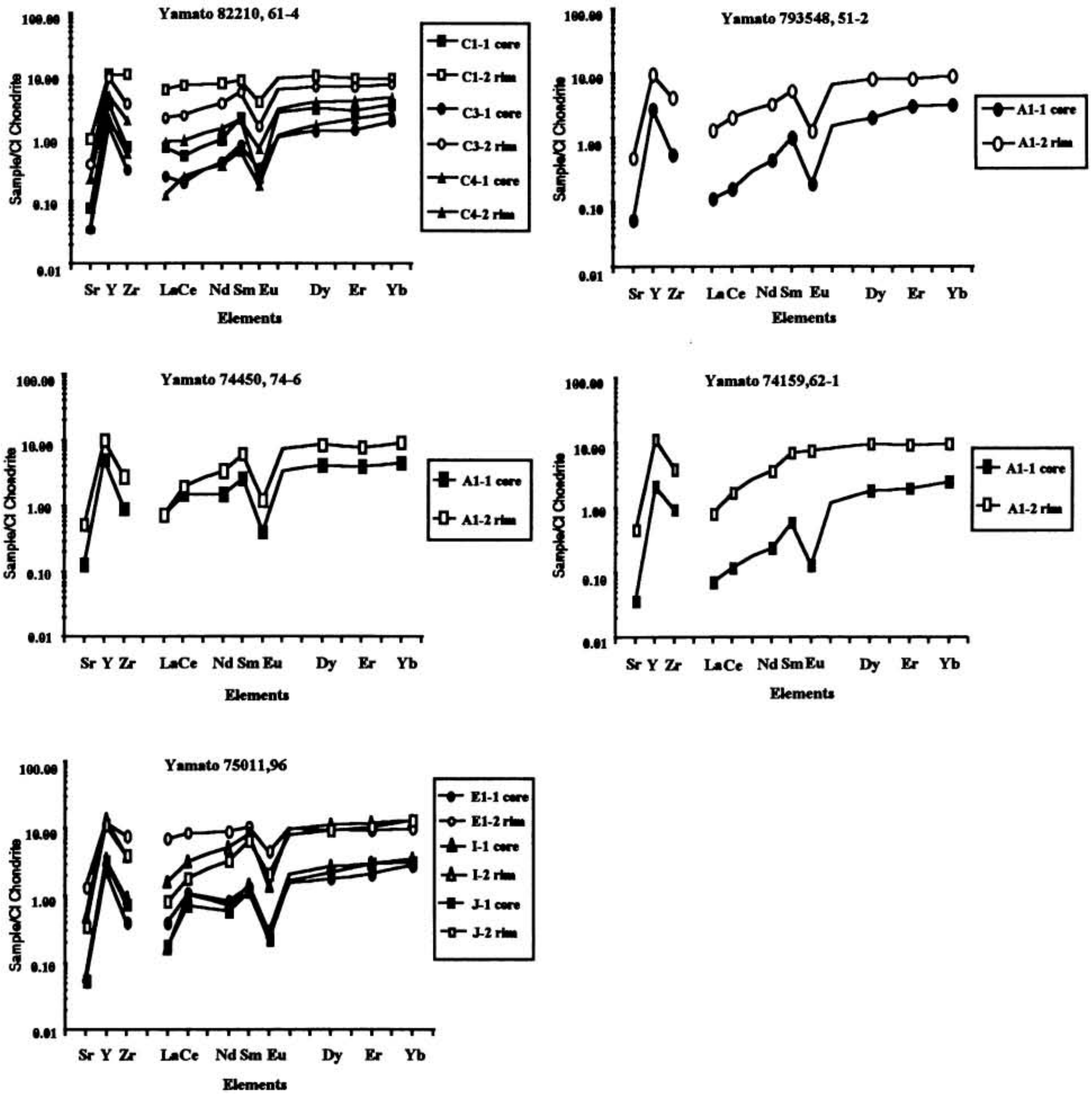
Figure 1. Legends indicate clast and grain numbers analyzed.



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