PETROGENESIS OF APOLLO 15 OLIVINE- AND QUARTZ-NORMATIVE MARE BASALTS. D. W. Schnare[1], L. A. Taylor.[1], J. M. D. Day[1], M. D. Norman[2] Planetary Geosciences Institute, University of Tennessee, Knoxville, TN, 37996 E-mail: dschnare@utk.edu [2]Australian National University, Canberra ACT 0200, Australia.

Introduction: Mare basalts are important lunar samples because of the mineralogical and chemical information they yield about their mantle source regions. On the basis of petrography and chemistry, most of the Apollo 15 mare basalts have been assigned to one of two groups: olivine-normative and quartz-normative basalt [1,2]. We present results of a detailed major- and trace-element study of mineral phases in four Apollo 15 mare basalts (15016, 15475, 15499, 15555). Polished thin sections of these samples were studied to examine their mineral chemistry and modal distributions. Polished thick sections of two olivine-normative basalts (15016-221, 15555-955) and two quartz-normative basalts (15475-174, 15499-154) were prepared for electron microprobe and laser ablation ICP-MS (LA-ICP-MS) analyses.

Methods: Mineral major-element compositions were measured using an automated CAMECA SX-50 electron microprobe (EMP)**.** Mineral trace-element compositions were measured by LA-ICP-MS at the Australian National University, Canberra.

Discussion: Apollo 15 olivine- and quartz-normative mare basalts have identical crystallization ages (~3.3±0.1 Ga [3,4,5]), and similar whole-rock rare-earth-element patterns. Olivine-normative basalts possess olivine with $Fo_{25\text{-}60}$, and pyroxenes compositions ranging $Wo_{10\text{-}42}En_{10\text{-}59}Fs_{22\text{-}55}$. The quartz-normative basalts have olivine compositions of $Fo_{44\text{-}69}$, and pyroxene in the range of $Wo_{5\text{-}40}En_{13\text{-}67}Fs_{25\text{-}43}$, consistent with previously published data [6,7]. Despite having many features in common, the two groups are unlikely to be related to each other by simple fractionation from a common parental magma or by differential partial melting of a common mantle source [2,8]. This study addresses the relationship of Apollo 15 olivine-normative and quartz-normative basalts using an in-situ mineralogic approach to understand the causes of chemical dispersion in the olivine- and quartz-normative basalts. Using our LA-ICP-MS data in conjunction with published experimental partition co-efficient mineral phase data we calculate incompatible element parental melt compositions for quartz- and olivine-normative Apollo 15 basalts to more fully understand the complex relationships between these suites of rock.

References: [1] Dowty E. *et al*. 1973. *Proc. Lunar Sci. Conf.* **4th**, 423-444. [2] Rhodes, J. M., Hubbard, N. J. 1973. *Proc. Lunar Sci. Conf.* **4th**, 1127-1148. [3] Nyquist, L. E., Shih, C. Y. 1992. *Geochimica et Cosmochimica Acta*, **56**, 2213-2234 [4] Snyder G.A. *et al.* 1997. *Lunar Planet. Sci. Conf.* ***XXVIII***, 1347-1348. [5] Snyder G.A. *et al.* 1998. *Lunar Planet. Sci. Conf.* ***XXIX***, abstract #1141. [6] Ryder G. (1985), *Catalog of Apollo 15 Rocks*, pp. 1296. [7] Shervais J.W. *et. al.* 1990. Proc. Lunar Planet. Sci. Conf. **20th**, 109-126. [8] Chappell, B. W., and Green, D. H. 1973. *Earth and Planetary Science Letters*, **18**, 237-246.