LAP 02 205: AN EVOLVED MEMBER OF THE APOLLO 12 OLIVINE BASALT SUITE? K. Rankenburg[1], A. Brandon[1], M. Norman[2] and K. Righter[1]. [1]NASA/JSC, Mailcode KR, Houston, TX 77058. E-mail: kai.rankenburg1@jsc.nasa.gov. [2] Research School of Earth Sciences, Australian National University, Canberra ACT 0200.

Introduction: LAP02205 is a low-Ti mare-basalt meteorite which was discovered in the LaPaz Ice Field in Antarctica [1]. The petrology and geochemistry of LAP02205 indicates that this meteorite is unique among lunar samples in its evolved magmatic nature (e.g. low Mg# of 0.33, high concentrations of incompatible elements). Previous work [2-8] suggests that LAP02205 is a younger variant of volcanism that produced the Apollo 12 pigeonite, ilmenite, or olivine basalts [2,5-7]. This hypothesis is addressed here on the basis of combined major and trace element modeling and isotope systematics.

Results: The major element, trace element and Rb-Sr isotopic compositions were measured for hand-picked pyroxene, ilmenite, plagioclase and shock melt glass by EMP and LA-ICP-MS. The glass composition compares very well with published bulk rock compositions of LAP02205 [2-4,8] and is therefore used to model parental melt compositions. Measured trace element concentrations of glass, clinopyroxene and plagioclase are consistent with equilibrium partitioning between these phases [D's taken from ref. 9]. The Rb-Sr data on leached mineral fractions of LAP02205 define a nine point isochron of 2956±14 Ma with an initial $^{87}Sr/^{86}Sr$ of 0.699840±11, MSWD=0.43). The whole rock leachate plots only slightly outside the 2σ-error interval, consistent with only minimal terrestrial contamination in the Antarctic environment. This crystallization age is consistent with previous results [7].

Discussion: The major and trace element composition of LAP02205 is consistent with a derivation from primitive Apollo 12 olivine basalts by fractional crystallization. Thermodynamic modeling demonstrates that the fractionating phases are mainly olivine with minor amounts of pigeonite. Ratios of incompatible trace elements therefore should be similar in LAP02205 and its parental magma. Assuming a parental melt similar to average Apollo 12 basalts, crustal contamination of LAP02205 can be excluded based on Sr/Sm and Eu/Sm ratios, which are high in lunar feldspathic crust [10]. However, slightly altered Ti/Sm, Ti/Y and Sc/Y ratios allow for assimilation of 6-7% of KREEPy material [av. from ref. 11]. Available data for Apollo 12 basalts suggest a lower source $^{87}Rb/^{86}Sr$ ratio compared to the LAP02205 source region [7]. However, this discrepancy might be resolved by assimilation of high Rb/Sr KREEP at 2.96 Ga. Recycling of KREEP into the moon's interior might be important for younger lunar magmatism in that it provides a suitable heat source for the generation of these magmas.

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