BULK COMPOSITION AND ORIGIN OF A GABBRONORITE GRANULITE CLAST IN LUNAR METEORITE ALHA81005. A.H. Treiman[1], A.K. Maloy[1,2]., C.K. Shearer Jr.[3] [1]Lunar and Planetary Institute, Houston TX 77058. <treiman_lpi.usra.edu>. [2]Dept. Earth Sciences, Rice University, Houston TX. [3]Institute of Meteoritics, University of New Mexico, Albuquerque NM

An improved chemical composition for a granulite clast in lunar meteorite ALHA81005 [1,2] is basaltic with ~1% TiO_2 and a flat REE pattern at ~13xCI. Its composition is consistent with VLT basalt, but is not identical to Apollo or Luna VLT samples.

Introduction: Most lunar meteorites must be from sites outside those visited by Apollo and Luna landers, and so can provide crucial additional data on the rock types and compositions of the lunar crust. To enlarge knowledge of lunar highland rock types (and the Moon's early history), we are analyzing granulite clasts from lunar highland meteorites.

Methods: Major and minor elements in constituent minerals are by EMP at Johnson Space Center. Trace elements (REE, Ni, Th, etc) are by SIMS, using the Cameca ims 4f at the University of New Mexico. For minerals with grains too small for SIMS analyses (e.g., phosphate), trace element abundances are calculated from mineral/mineral partition coefficients. Mineral proportions are clas-classified from element X-ray maps, with mulitspectral remote sensing codes.

Clast 2: The clast consists of equant grains, 10-100µm across, of chemically homogeneous plagioclase (42.5%), opx (31%), cpx (23%), chromite (0.5%), ilmenite (1.5%), and rare Ca-phosphate. Opx-cpx thermometry gives ~1100°C, like other lunar granulites [3]. The bulk composition (right) is basaltic.

SiO_2	46.8
TiO_2	1.0
Al_2O_3	16.1
Cr_2O_3	0.27
FeO	12.3
MnO	0.20
MgO	8.56
CaO	13.9
Na_2O	0.21
K_2O	0.03
P_2O_5	0.004
Sum	99.4

Interpretation: Clast 2 is like VLT basalt in having a basaltic composition (Table) with TiO_2~1% (14xCI), and relatively low REE abundances (~13xCI) in a flat pattern [4,5]. Its Ca and Al are high relative to known VLT basalts, which could represent admixture of an anorthositic component. Luna 24 VLT basalt (24109) is similar (REE and Ti at ~10xCI) [4], but is much more ferroan (Mg*=36) than Clast 2. A15 green glass (15426) and A17 VLT (78526) are more similar in Mg*, but their REE abundances are only 2-5xCI [4]. A17 glass 70295,26 has comparable Mg* and flat REE at ~10xCI, but has a strong Eu deficit [6]. Thus, Clast 2 is similar to known VLT, but not identical to any. ALHA81005 contains a few fragments of VLT basalt [7], but it is not known if they are chemically similar to Clast 2. ALHA81005 is from a highland site near a VLT-bearing mare [7]; based on this VLT composition and those of its magnesian granulites [8], its source cannot be near the Apollo or Luna sites (see [8]).

References: [1] Goodrich C.A. et al. 1984. *JGR* 89, C87-C94. [2] Maloy A.K. & Treiman A.H. 2004. Abstr. #1159. *35th Lun. Planet. Sci. Conf.* [3] Cushing J.A. et al. 1999. *MaPS* 34, 185-195. [4] BVSP, 1981. *Basaltic Volcanism on the Terrestrial Planets*. Pergamon. [5] Taylor S.R. 1982. *Planetary Science: A Lunar Perspective*. LPI. [6] Shearer C.K. et al. 1991. *EPSL* **102**, 134-147. [7] Treiman A.H. & Drake M.J. 1983. *GRL* 10, 783-786. [8] Maloy A.K. et al. 2005. *MaPS* 40, this volume.