PRESSURE CALIBRATION AND THE MARE BASALT SOURCE REGION Sedelia R. Durand and John Longhi, Lamont-Doherty Earth Observatory, Palisades, NY 10964 (longhi@ldeo.columbia.edu)

Previous studies [1] showed that there were discrepancies of up to 0.8 GPa in the determination of the spinel-peridotites to garnet-peridotite transition in the CMAS system between laboratories employing barium carbonate pressure media in 1/2" piston cylinder runs and labs employing talc-pyrex pressure media (Fig. 1). Comparison of results from piston-in and piston-out experiments revealed a changeover from frictional loss of pressure at low temperature to pressure intensification at high temperature (T > 1400°C). A new pressure correction algorithm, derived by multiple regression analysis, was developed to account for the different pressure regimes. When this pressure correction was applied to experiments run on talc/pyrex as well as salt/pyrex assemblies, the pressures were in agreement with those obtained from the barium carbonate experiments. In the present study, calculations of liquidus phases for Mare green glass compositions were done with the BATCH program. The calculated olivine/orthopyroxene liquidus multiple-saturation point for Ap 14 green glass was found to be at 3.5 GPa. In contrast to ~ 2.4 GPa determined experimentally at MIT by [2]. Fig, 3 illustrates the temperature and pressure dependence of the new calibration. As a test we synthesized a reduced crystal/glass composite with the composition of Apollo 14 green glass and performed melting experiments. We obtained a pressure of 2.75 GPa for the multiple saturation point using the old calibration and 3.45 GPa with the new pressure calibration. These results require additional work, but do suggest melting at greater depths in the moon than previously believed.

References: (1) Longhi, J. (2005) Am. Mineral., 90, 206-218. [2] Elkins, L.T., Fernandes, V.A., Delano, J.W., Grove, T.L. (2000) Geochim. Cosmochim. Acta, 64, 2339-2350.

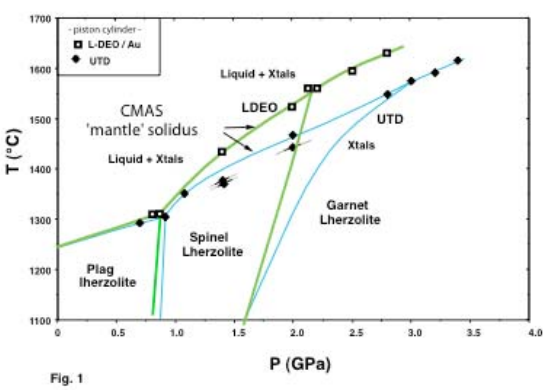

Fig. 1

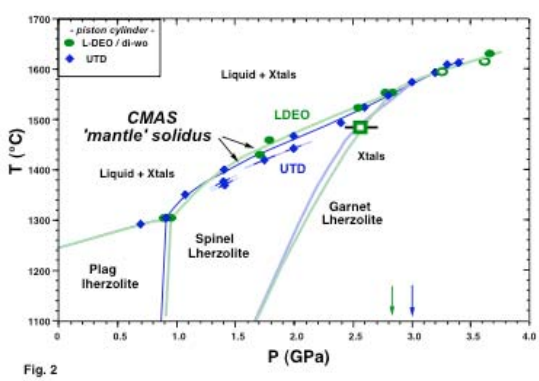

Fig. 2

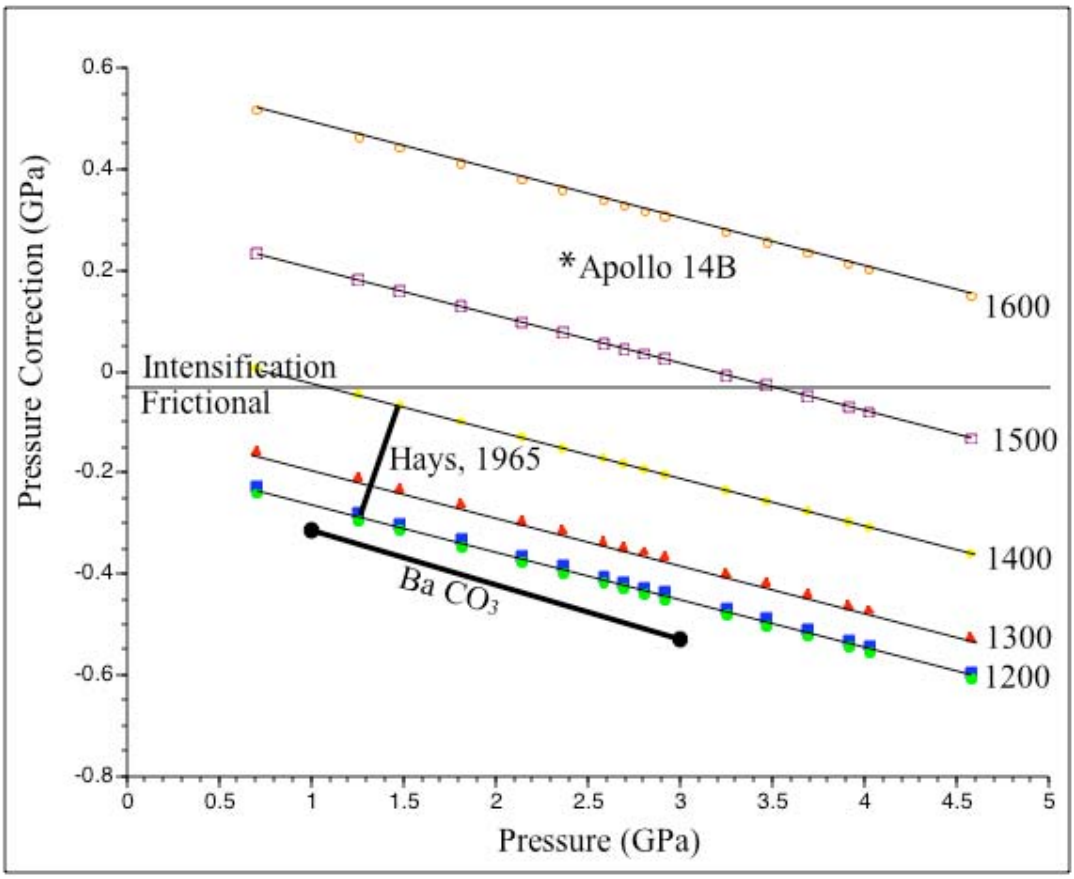
Pressure Correction (GPa)
Pressure (GPa)
*Apollo 14B
1600
1500
1400
1300
1200
Intensification
Frictional
Hays, 1965
Ba CO3
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5

Fig. 3