A LIQUIDUS PHASE DIAGRAM FOR A PRIMITIVE SHERGOTTITE. J.H. Jones, SN2, NASA-JSC, Houston, TX 77058; A.J.G. Jurewicz and L. Le, Lockheed ESC, C23, 2400 NASA Rd. 1, Houston, TX 77058.

Shergottites are members of the SNC meteorite suite, which are thought to be samples of Mars. Of the shergottites in our collections, the meteorite most likely to represent a primitive liquid from the martian mantle is EETA79001. EETA79001 has the Nd isotopic signature of a long-term depleted mantle [1], has a relatively high Mg# [2], and is slightly olivine normative [2].

Actually, these primitive characteristics do not apply to the EETA79001 whole-rock, which is an assemblage of lithologies, but to the groundmass of a particular lithology, EETA79001A. The composition of this groundmass (Eg) has been estimated by [2]. To see if there is any relationship between "primitive" shergottites such as Eg and "evolved" shergottites such as Shergotty and Zagami, we have performed one-bar experiments on an Eg composition.

A synthetic Eg glass was prepared by fusing a mixture of oxides and carbonates. Excess Fe_2O_3 (2.4 wt.%) was added to correct for FeO loss to Pt. Charges were placed on Pt loops and equilibrated at temperature (f_{O_2} of QFM) for 10-12 hours. Quenched charges were analyzed using the electron microprobe. At 1175°C we have FeO mass balance to within 0.6 wt.% (3% relative). Our experiments range from 1300 to 1100°C, at ~25°C intervals. We report preliminary results.

The Eg liquidus is approximately 1300°C, with Fo_{78} olivine as the liquidus phase. Sub-calcic pyroxene (~En_{78}, Wo_3) joins olivine between 1275°C and 1250°C. By 1100°C, plagioclase has appeared (~An_{63}). Changes in liquid composition (Figure 1) imply that, in the interval 1200-1150°C, either the pigeonite starts to become more calcic or that a second pyroxene appears. Projections onto OL-SI-PL and mass balance calculations suggest that the olivine-pigeonite boundary is a peritectic (Figure 2). The 1100°C liquid has probably been modified during quenching and should probably plot nearer the ol-pig-plag±cpx pseudo-invariant point (Figure 2).

We compare these results with the calculated phase relations predicted by [3]. The predicted liquidus is 1304°C, with the first olivine being Fo_{79}. Low-Ca pyroxene (En_{73}, Wo_4) is predicted to appear at 1245°C. Augite (En_{49}, Wo_{36}) is calculated to appear at 1174°C. Plagioclase (An_{73}) is predicted to appear at 1098°C. Broadly, our experimental results compare favorably with prediction, although there is a systematic difference in normative silica. This difference is probably because the calculation treats the Ol-Pig boundary as a cotectic. Our inferred phase diagram (Figure 2) and a comparison to the Shergotty and Zagami melting experiments of Stolper and McSween [4] are given below (Figure 1). It does not appear possible to derive bulk Shergotty or Zagami by either equilibrium or fractional crystallization of Eg. However, if Shergotty and Zagami are cumulates, it may be possible to derive the inferred interstitial liquid [4] from a composition such as Eg.

References: [1] Jones (1989) *Proc. Lunar Planet. Sci. Conf. 19th.*, pp. 465-474. [2] Longhi and Pan (1989) *Proc. Lunar Planet. Sci. Conf. 19th.*, pp. 451-464. [3] Longhi (1991) pers. comm. [4] Stolper and McSween (1979) *Geochim. Cosmochim. Acta* **43**, 1475-1498.

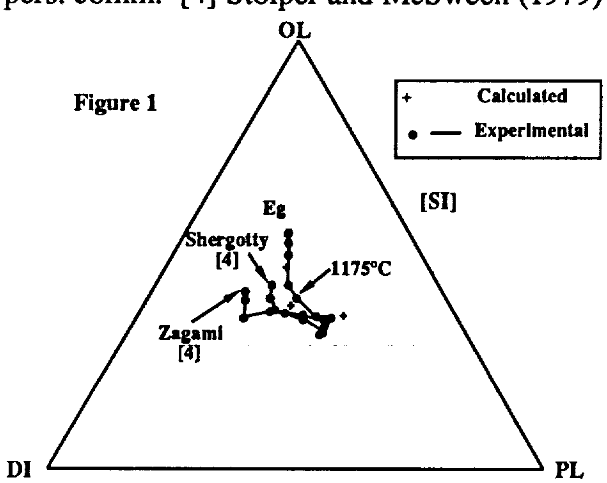

Figure 1

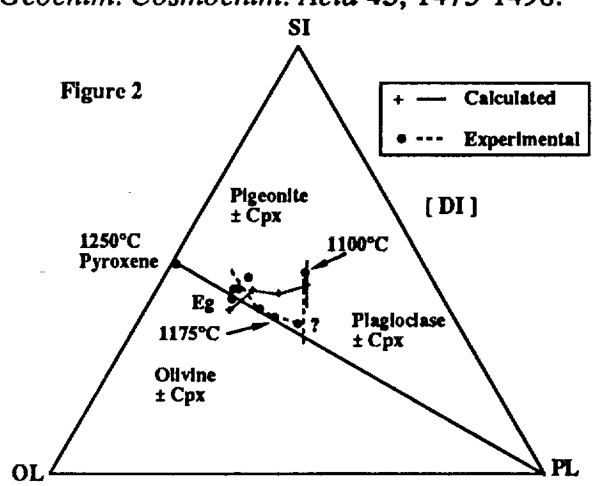

Figure 2