A PRELIMINARY STUDY ON GABBROIC CLAST OF YOUXI MESOSIDERITE.

L. Y. Wang[1]. W. B. Hsu[2]. [1] Faculty of Earth Resources, China University of Geosciences, Wuhan, China. E-mail: linyanwang@cug.edu.cn. [2]Purple Mountain Observatory, Chinese Academy of Sciences, Nanjing, China.

Introduction: Youxi is a newly found mesosiderite and classified as a type 2A mesosiderite [1]. Both gabbroic and orthopyroxenitic clasts are present in Youxi. Here we carry out a preliminary study on the gabbroic clast and undertak a comparative study with cumulate eucrites.

Result: Gabbroic clast has a coarse-grained gabbroic texture that pyroxene and plagioclase grains form 120° triple junctions. It is composed predominantly of pyroxene (inverted pigeonite and orthopyroxene) (~40 vol. %) and plagioclase (~60 vol. %). Minor minerals include phosphates, silica, chromite, troilite and metal. The inverted pigeonite typically contains thin and closely spaced augite exsolution lamellae. Occasionally, thick augite lamellae occur. Tiny silica and troilite inclusions always concentrate along the inverted pigeonite boundary. Orthopyroxene is clouded by abundant augite, silica and opaque. Augite occurs as bleb instead of lamella, and often contains very thin lamellae.

Discussion: The modal abundance of the gabbroic clast is similar to those of Serra de Magé and Moama [2]. Plagioclase compositions ($An_{94.1-95.6}$) fall within the range of cumulate eucrites (An_{96-90}), especially match Serra de Magé ($An_{94.3-94.6}$) and Moama ($An_{94.2-94.3}$) [2-3]. Pyroxene compositions (En_{56-63}) fall within the cumulate range (En_{65-46}) [2]. The mg# (57.0-65.2) is within the range of cumulate eucrites (mg# = 45–67) [4]. The compositions of inverted pigeonite (En_{56-58}) are similar to those in Moama and Serra de Magé[2, 5-6]. However, the finer exsolution lamellae within inverted pigeonites than those within the cumulate eucrites, likely reflect a different cooling history. Orthopyroxenes (En_{63}) are rather similar to those in Binda in mineralogy and major composition [4]. Two type pyroxenes with different texture and composition may indicate that they came from different portions of the parent body and then recrystalized by a reheating event. Based on the compositions of augite and pigeonite pairs plotted on the Sack and Ghiorso solvus (1994) [7], the closure temperature was ~900 ºC, higher than that of Serra de Magé (794 ±24°C) but comparable to the Moama (903±33 °C) [2]. In conclusion, the gabbroic clast is similar but not identical to Moama cumulate eucrites. The original magmatic pyroxene compositions in the gabbroic clast are likely affected by secondary metamorphism, and the original magma compositions of the gabbroic clast may be similar to the parent magmas of the cumulate eucrites.

References: [1] Hsu W. and Wang L. 2013. *Meteoritics & Planetary Science* 48:A171. [2] Mayne R. G. et al. 2009. *Geochimica et Cosmochimica Acta* 73:794–819. [3] Pun A. et al. 1997. *Geochimica et Cosmochimica Acta* 61:5089–5097. [4] Takeda H. 1997. *Meteoritics & Planetary Science* 32:841–853. [5] Pun A and Papike J. J. 1995. *Geochimica et Cosmochimica Acta* 59:2279–2289. [6] Hsu W. and Crozaz G. 1997. *Geochimica et Cosmochimica Acta* 61:1293–1302. [7] Sack R. O, and Ghiorso M. S. 1994. *Contributions to Mineralogy and Petrology* 116:277–286.