THE NWA 773 CLAN: A UNIQUE GROUP OF LUNAR METEORITES. S. N. Valencia, B. L. Jolliff, and R. L. Korotev. Department of Earth and Planetary Sciences, Washington University, St. Louis, Missouri, 63130 (svalencia@levee.wustl.edu).

Introduction: The NWA 773 clan is a group of 11 named meteorites, with a total mass of 2.6 kg (Fig. 1). The NWA 773 clan meteorites comprise 6 lithologies, present in variable proportions in each meteorite that trace magmatic evolution from early, magnesian lithologies, to late-stage, ferroan lithologies. This group of meteorites is unique in that it comprises a collection of petrogenetically related lithologies that represents an intrusive and extrusive magmatic system on the Moon. A similar lithologic assemblage is not represented in the Apollo or Luna sample collections. Given their chemical and petrographical similarities, these meteorites are thought to be launch paired, despite where they were found on Earth, where reported find locations are too far apart to represent a strewn field.

Lithologies: The 6 lithologies present in the NWA 773 clan range from magnesian to ferroan lithologies, tracing magmatic evolution. Four of these lithologies are intrusive gabbros. The olivine gabbro (OG) is the most magnesian lithology. The olivine bearing gabbro (OBG) and anorthositic gabbros (AG) are intermediate lithologies. The ferroan gabbro (FG) is an iron-rich, late-stage, lithology. One extrusive lithology, the olivine phyric basalt (OPB), also occurs. A fragmental or regolith breccia matrix occurs in most of the NWA 773 clan meteorites. Most of the breccia is composed of fragments of the other lithologies.

Ages: A variety of methods have been used to obtain age-dates on lithologies in the NWA 773 clan. Pb-Pb Ages obtained through *in situ* analysis of zircon and baddeleyite grains in the OG, FG, and breccia are ~3.1 Ga [5, 9, 10].

Relationships and Formation: On the basis of mineral compositions, modal mineralogy, and trace element characteristics, Jolliff et al. (2003) suggested that some of the lithologies in the NWA 773 clan were related via a common liquid line of decent, possibly a similar source region to that of Apollo 14 green glass b1 [3]. The relationship among lithologies in the NWA 773 clan is supported by overlapping pyroxene major- and minor-element compositions among the lithologies [10]. Pyroxene compositions become progressively ferroan from OG → OBG → AG → FG. Textural evidence also supports a relationship between the AG and FG. Some regions of the two lithologies are nearly identically in texture and modal mineralogy, suggesting that the FG may have formed as small pockets of residual melt in the FG.

The chemical similarities among the lithologies suggest that the NWA 773 clan lithologies could represent a magmatic system on the Moon. We suggest a model where the intrusive lithologies crystallized along a common liquid line of decent in a shallow magma chamber from OG → OBG → AG → FG, where the FG crystallized from residual melt pockets within the AG. In our model, the basalt component (OPB) that erupted to the surface sometime after the formation of the OG.

References: [1] Meteoritical Society, J. N. Grossman, Database Editor, (2016) *The Met. Bull. Database* http://www.lpi.usra.edu/meteor/metbull.php. [2] Fagan, T.J. et al. (2003) *Meteoritics & Planet. Sci.*, 38, 529-554. [3] Jolliff B.L. et al. (2003) *Geochim. et Cosmochim. Acta*, 67, 4857-4879. [4] Bunch T.E. et al. (2006) *LPS XXXVII*, Abstract #1375 [5] Zhang et al. (2011) *Meteoritics & Planet. Sci*. 46, 1929-1947. [6] Zeigler et al. (2006) *LPS XXXVII,* Abstract #1804. [7] Kuehner S.M. et al. (2012) *LPS XXXXIII*, Abstract #1519. [8] North-Valencia et al. (2014) *LPS XXXXV,* Abstract #2858. [9] Shaulis et al. (2012) *LPS XXXXIII*, Abstract #2236. [10] Shaulis et al. (2013) *LPS XXXXIIIV*, Abstract #1781.

Members of the NWA 773 clan

Meteorite name	Year found or purchased	Total mass (g)	Number of pieces	OG	Bx	OPB	FG	AG	OBG	Key references
NWA 773	2000	633	3	X	X		X	X		[1] [2] [3]
NWA 2700	2004	32	1	X	X					[1] [4]
NWA 2727	2005	191	4	X	X	X	X	X		[1] [4]
NWA 2977	2005	233	1	X			X			[1] [4] [5]
NWA 3160	2005	34	3		X	X				[1] [6]
NWA 3170	2007	60	1	X	X		X	X	X	[1]
NWA 3333	2005	33	1	X	X	X				[1]
NWA 6950	2011	771	1	X						[1]
NWA 7007	2011	91	1		X		X			[1] [7]
NWA 8127	2012	529	1	X						[1]
Anoual	2006	6	12			X				[1]
Total	-	2613	-	-	-	-	-	-	-	-

Figure 1. Summary of the NWA 773 clan members and lithologies. Each lithology present in a meteorite is marked with an "X". OG = olivine gabbro, Bx = breccia, OPB = olivine phyric basalt, FG = ferroan gabbro, AG = anorthositic gabbro, OBG = olivine bearing gabbro. Stone mass and number of stones are also included.