

Table DR1: Compositions and references from Figure 1. Possible parental magma compositions highlighted in bold¹:

	sample	SiO ₂	FeO	Th
Lherzolithic	ALH 77005 ²	42.4	20.1	0.057
	LEW8 8516 ²	46.0	19.0	0.037
	Yamato 793605 ²	45.4	19.7	0.06
	GRV 99027 ³	43.3	19.2	0.031
	NWA 1950 ⁴	44.0	21.7	0.083
	RBT 04262 ⁵	47.6	20.6	0.247
Basaltic	EETA 79001B ²	49.4	17.4	0.145
	Shergotty ²	51.3	19.4	0.38
	QUE 94201 ²	47.9	18.5	0.05
	Zagami ^{2,6}	50.5	18.1	0.37
	Los Angeles ⁷	49.1	21.2	0.7
	Dhofar 378 ⁸	49.9	19.9	0.3
Olivine-phyric	NWA 1068 ⁹	46	20.48	0.409
	Dhofar 019 ⁹	49.2	18.4	0.04
	DaG 476 ⁹	45.76	16.06	0.011
	DaG 489 ⁹	47.72	16.52	0.02
	SaU 005 ⁹	47.2	18.34	0.012
	Y-980459¹⁰	49.9	17.3	0.0213
	EETA79001A ^{2,9}	49.9	18.4	0.08
	LAR 06319¹¹	46.7	20.4	0.26
	NWA5990	42.3	22.1	
	NWA 5789¹²	48.57	17.56	
	NWA 2990¹³	51.08	16.42	0.27
Bounce ¹⁴		51.6	14.4	

Candidate parental magma compositions taken from relevant literature. Filiberto and Dasgupta (2011) identified three possible parental magma compositions directly from whole rocks, for Yamato 980459, NWA 5789, and NWA 2990. LAR 06319 composition was defined by Filiberto and Dasgupta as having accumulated olivine relative to parental magma composition. Balta et al. (2013) combined the whole rock composition and an olivine addition and mixing calculation to produce an estimated parental melt composition¹⁵. That composition was very similar to the composition of a melt inclusion from the same sample reported by Basu Sarbadhikari et al. (2011) and therefore is judged to be a 4th practical parental melt composition¹⁶.

Table 1 and Figure 2 include two other proposed liquid compositions. NWA 1068 is not a liquid composition, but Filiberto et al. (2010) present a reconstructed parental composition for that magma as well¹⁷, and that composition was used in the calculations of olivine-orthopyroxene equilibria. Finally, McSween et al. (2006) and Monders et al. (2007) argued that a Gusev basalt composition could represent a reasonable primary melt of a fertile martian mantle and the experimentally synthesized composition from Monders et al. (2007) was used in additional calculations¹⁸⁻¹⁹. We also note here that our calculations found a slightly higher pressure for olivine-orthopyroxene cosaturation than was found experimentally by Monders et al. (2007), possibly suggesting that the silica activity is also being slightly underestimated by pMELTS.

Figure 1 contains measured whole rock compositions, so only measured rocks (rather than reconstructed compositions) are displayed in Figure 1. Figure 1(a) has 4 proposed parental magma points while 1(b) only has 3 as there is no Th composition measurement for any of the Gusev rocks.

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