THE PICRITIC SHERGOTTITE NORTH WEST AFRICA 1068 (NWA 1068 or "Louise Michel") J. A. Barrat[1], A. Jambon[2], M. Bohn[3], Ph. Gillet[4], V. Sautter[5], C. Göpel[6], M. Lesourd[2], and F. Keller[8], [1]Université d'Angers, 2 bd Lavoisier, F-49045 Angers Cedex, (barrat@univ-angers.fr), [2]Université P. & M. Curie, 4 pl. Jussieu, F-75252 Paris Cedex 5, [3]Ifremer-Centre de Brest, BP70, F-29280 Plouzané Cedex, [4]ENS Lyon, 46 allée d'Italie, F-69364 Lyon Cedex 7, [5]MNHN, 61 rue Buffon, F-75005 Paris, [6]IPGP, 4 pl. Jussieu, 75252 Paris Cedex 5, [2]SCIAM, 1 rue Haute de Reculée, F-49045 Angers Cedex, [8]UJF, Maison des Géosciences, F-38400 St Martin d'Hères.

Introduction: North West Africa 1068 (TKM about 577 g), a new picritic shergottite was found last April in Moroccan Sahara by meteorite hunters ("La Mémoire de la Terre"). Its synonymous name of "Louise Michel" (which we have used during the Met'Soc meeting last september) is preferred to avoid confusion with the many meteorites of all types reported under the NWA nomenclature (including now 4 Martian meteorites). In this abstract, its main petrological and geochemical features will be described.

Petrography: "Louise Michel" is a greenish-brown rock totally devoid of fusion crust. It displays a porphyritic texture consisting of a fine-grained groundmass and olivine grains. Excluding the impact melt pockets and the secondary carbonate veins, modal analyses indicate 52 vol% pyroxenes (compositions scatter from $En_{57}Wo_5$ to $En_{40}Wo_{13}$ for pigeonite, and $En_{55}Wo_{21}$ to $En_{35}Wo_{28}$ for augite), 22 % maskelynite (An_{53} to An_{35}), 21 % olivine (Fa_{28} to Fa_{58}), 2 % phosphates (merrillite and Cl-apatite), 2 % opaques (chromite, Ti-chromite, ulvöspinel, Ilmenite and sulfides), and 1 % K-rich mesostasis (more likely a shock-produced glass of alkali feldspar and silica). Olivines with various habits occur as clusters often associated with chromite, or single crystals ranging in size from 50 µm to 2 millimeters. The largest crystals contain magmatic inclusions, consisting of two immiscible silica-rich glasses, Ca-rich pyroxenes and Fe-sulfides.

The occurrence of large corroded olivine megacrysts and the observation that polycrystalline assemblages are sometimes broken apart and intruded by groundmass material, strongly suggest that the olivine megacrysts are xenocrysts. This interpretation is in agreement with the zoning of the megacrysts, which is chiefly the result of atomic diffusion due to contact with the melt when olivine were incorporated. They display a prominent homogeneous core (about Fa_{28-32}) with a zoned Fe-rich rim (typically to Fa_{40-50}), confined to the outer 100 (or less) µm. The Fe-rich rims are lacking when two olivines are in contact as exemplified by the Fe distribution map (Fig. 1). The Mg-rich cores indicate that large olivine crystals were chemically homogeneous before incorporation. They strikingly resemble olivine crystals found in the peridotitic shergottites which are large, homogeneous, with close compositions, and contain similar magmatic inclusions [1]. Our data allow us to suggest that "Louise Michel" megacrysts originate from disrupted cumulates, probably with strong affinities with peridotitic shergottites.

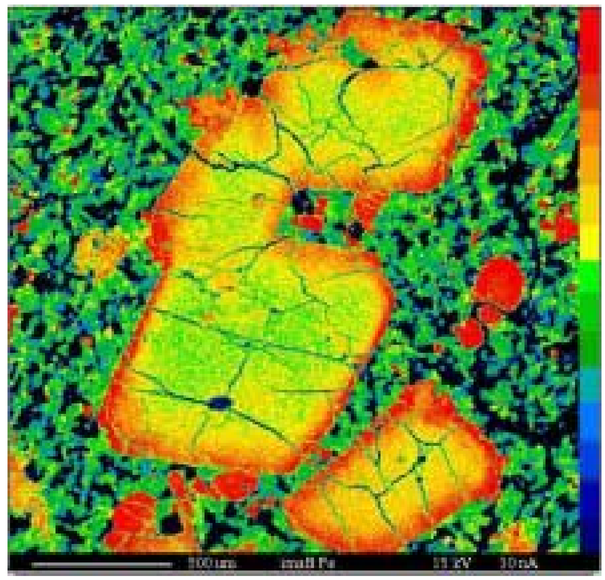

Figure 1. Fe distribution map. The largest crystals are olivines. The cluster in the center is composed by 3 crystals. Note that the Fe-rich rims (red) are lacking when two olivine crystals are in contact.

Chemistry: The bulk composition of "Louise Michel" has been determined for 45 elements. It is an Al-poor ferroan basaltic rock, rich in MgO. Its major element abundances are similar to those reported for EETA79001A [2]. Key element ratios such as Fe/Mn (=45), Al/Ti (=6.6), and Ga/Al (=4.4 10^{-4}) are typical of Martian meteorites. The trace elements demonstrate unambiguously that "Louise Michel" is unpaired with any of the other hot desert finds: it is the first picritic shergottite with a REE pattern similar to those of Shergotty, Zagami, Los Angeles, and Djel Ibone (NWA 856) (Fig. 2).

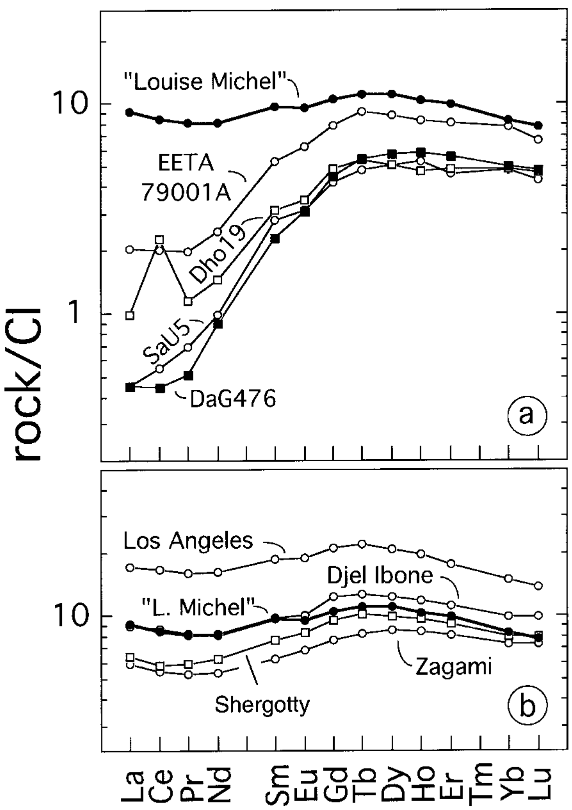

Figure 2. REE patterns of "Louise Michel" compared with other picritic shergottites (a) and "enriched" basaltic shergottites. The literature data are from [3] to [5].

Discussion and conclusions: A genetic relationship between these "enriched" shergottites is probable. "Louise Michel" has not crystallized from a melt more primitive than the "enriched" basaltic shergottites (with possible olivine accumulation): this model requires the incompatible elements abundances in "Louise Michel" to be significantly lower than in "enriched" shergottites; "Louise Michel" displays the same level of incompatible elements than Shergotty (Fig. 2) which rules out directly this hypothesis. Accumulation (and/or) digestion of an olivine dominated cumulate by magma with a composition close to a basaltic shergottite seems a suitable alternative, in agreement with the major element abundances and petrographic observations.

References: [1] McSween jr. H. Y. and Treiman A. (1998) *Rev. Miner., 36*, chapter 6, 1–53. [2] Warren P.H. et al. (1999) *Geochim. Cosmochim. Acta., 63,* 2105-2122. [3] Dreibus G. et al. (2000) *Meteoritics Planet. Sci., 35,* A49 [4] Barrat J.A. et al. (2001) *Meteoritics Planet. Sci., 36*, 23-29. [5] Neal C.R. et al. (2001) *LPS XXXII*, #1671.