Northwest Africa 11522: a new paired stone of Martian polymict regolith breccia Northwest Africa 7034

Benjamin E. Cohen1, 2, Caroline L. Smith3, Martin R. Lee1, Darren F. Mark2, 4, Natasha Almeida3, William S. Cassata4, Lydia Hallis1, Aine Smith1, and Luke Daly1

1 School of Geographical and Earth Sciences, University of Glasgow, UK
2 Scottish Universities Environmental Research Centre, UK
3 The Natural History Museum, London, UK
4 Department of Earth & Environmental Science, University of St Andrews, UK

1 Lawrence Livermore National Laboratory, USA

[Abstract #1900]

(1) NWA 7034 and NWA 11522
- NWA 7034 and its pairs are amongst the oldest and most diverse Martian meteorites [1-3]:
  - U-Pb, Sm-Nd, and Rb-Sr ages ranging from 4.4 to 1.3 Ga.
  - Ages indicate a long and protracted history.
- Complex polymict breccia comprising clasts of impact, igneous, and sedimentary lithologies, set in fine-grained matrix.
- In this study we describe NWA 11522, a recently discovered pair of NWA 7034. Specimen details are as follows:
  - NWA 11522 comprises single dark stone weighing 3.2 g (Fig. 1).
  - Purchased in November 2013.
  - Type specimen is held at the Natural History Museum, London (BM.2013,M8).
  - Outer surface is irregular.
  - Lacks fusion crust, but has dark desert varnish (Fig. 1).
- NWA 7034 and NWA 11522 share similar petrographic characteristics.
- Chlorapatite is a minor constituent (Fig. 3c, d).
- Main minerals are pyroxene, feldspar, Fe-Ti oxides, and Fe-oxides.
- Lithic clasts are predominantly mafic, although include impact melt clasts and spherules (Fig. 2, 3).
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- Zircon is present as a rare phase (Fig. 3e).

(2) Petrography of NWA 11522
- Characterization was undertaken via:
  - X-ray micro-CT (at NHM).
  - SEM & EBSD (at Glasgow).
  - X-ray micro-CT (at NHM).
- These techniques demonstrate that NWA 11522 is petrographically very similar to NWA 7034, i.e.:
  - Polymict breccia (Fig. 2, 3).
  - Lithic clasts are predominantly mafic, although include impact melt clasts and spherules (Fig. 2, 3).
- Main minerals are pyroxene, feldspar, Fe-Ti oxides, and Fe-oxides.
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(3) Mineral chemistry
- Fig. 4: (a) Feldspar and (b) pyroxene compositions in NWA 11522 show close similarities to NWA 7034. NWA 7034 data are from [1]. Like NWA 7034, NWA 11522 has a wider range in feldspar compositions than most Martian meteorites – in line with the fact that NWA 7034 and pairs are polymict breccias comprising clasts from a wide variety of Martian protoliths.

(4) Summary
- NWA 11522 is confirmed as a pair of NWA 7034.
- Mineral fragments (feldspar, pyroxene, Fe-Ti oxides) and clasts are abundant.
- Rarer phases such as apatite and zircon are also present.
- NWA 11522 expands the amount of material available to study the diverse NWA 7034 pairing group.

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