Evidence for an Earth-Moon impact event 800 Ma ago

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Lunar Impact Glasses

Lunar impact glasses offer the potential for providing compositional information about local and remote areas of the Moon [1-3] and may also place constraints on the impact history in the Earth-Moon system.

Previous workers have reported $^{40}Ar/^{39}Ar$ ages of ~800 Ma on lunar samples, such as rock fragments (Apollo 12; 4) and impact glasses (Apollo 14, 16; 5, 6). We present additional $^{40}Ar/^{39}Ar$ ages on Apollo 14 and 17 impact glasses. When all of these data are viewed collectively, there is a suggestion that there may have been an increase in the impact flux at ~800 Ma.

Results

Of the 62 glasses for which an age has been determined by these authors, 8 have diverse compositions with ages ~800 Ma, as shown in Figure 1. This age is similar to the best current estimate for the age of the Copernicus impact event (~800±15 Ma; [4, 7]).

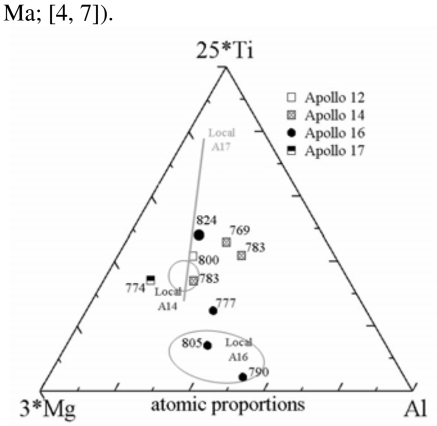

Figure 1; Refractory element compositions of lunar samples (including impact glasses) with ~800 Ma ages.

The higher frequency of impact glasses with this age is consistent with a transient increase in the impact flux at this time. Perhaps the Copernicus impact event was only one of numerous large events (and many small local events) that occurred.

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Early Mesozoic high pressure metamorphism in the Lhasa Block, Tibet: Implications for the growth of the Cimmerian subcontinent

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The traditional Lhasa Block is part of the Cimmerrian subcontinent which was accreted to the southern margin of the Laurentia continent at Mid-Mesozoic [1, 2]. The east-west trending Sumdo-Jiaxing eclogite belt, ~200 km east of Lhasa, provides information to constrain how the Cimmerian subcontinent was assembled. This eclogite belt consists of two types of eclogites: kilometers long and several hundreds meters wide massive blocks and sub-meter size subparallel layers or lentoids. Both are enclosed within late Paleozoic quartzite and carbonates. Bulk-rock major and trace element data indicate that these eclogites have preserved an N-MORB type geochemistry [3]. P-T estimations show that they experienced high pressure metamorphism at ~2.6 GPa and ~650°C. Sm-Nd whole rock isochron on 11 data yields an age of 239±16 Ma. Petrography and trace element data suggest that this age represents the timing of high pressure metamorphism. These data show that the Sumdo-Jiaxing oceanic block was subducted to a depth of ~75 km and underwent high pressure metamorphism at ~239 Ma. Such an early Mesozoic event of subduction of oceanic crust within the Lhasa Block suggests that (1) at least one oceanic basin existed concurrently with the Paleo-Tethys and (2) the Cimmerrian subcontinent was assembled by a number of smaller continental or oceanic blocks that were scattered within the Paleo-Tethyan Ocean.

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