Spurious Lu-Hf ages of achondrites not caused by irradiation

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The long-lived ^{176}Lu-^{176}Hf decay system often yields dates up to 300 Myr older than Pb-Pb when applied to meteorites. Irradiation by gamma- [1] or cosmic rays [2] was suggested as the reason for this descrepancy because it can accelerate ^{176}Lu decay, rotating isochrons around their initial ^{176}Hf/^{177}Hf. However, internal Lu-Hf isochrons [3, 4] with the highest apparent ages yield the lowest initial ^{176}Hf/^{177}Hf values (Fig. 1), in contrast with the irradiation hypothesis which predicts a constant intial ^{176}Hf/^{177}Hf. Thus a different mechanism is required to explain the old Lu-Hf ages. We find that terrestrial weathering [5] can account for both the age discrepancy and the consistent patterns of scatter observed in internal isochrons of eucrites [4] and angrites [6].

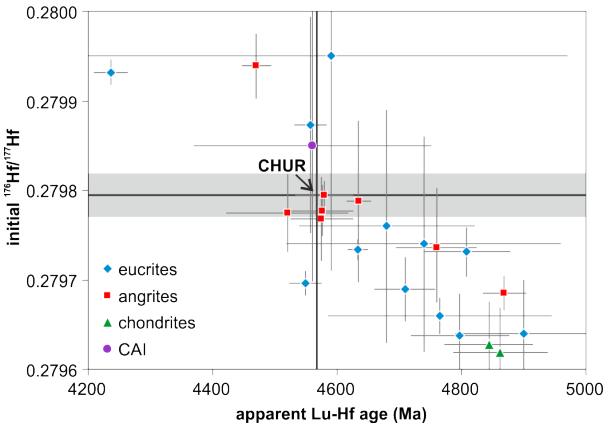

Fig. 1 Literature data from [3-4, 6-11] & CHUR-parameters of [12] calculated back to 4567 Ma.

[1] Albarède *et al* (2006) *GCA* **70**, 1261-1270 [2] Thrane *et al* (2010) *Astrophys J* **717**, 861-867 [3] Bizzarro *et al* (2012) *G*^{3} **13**, 10.1029/2011GC004003. [4] Bast *et al* (2012) *LPSC* **43**, 2542 [5] Crozaz *et al* (2003) *GCA* **67**, 4727-4741 [6] Bast *et al* (2013) *Min Mag* **77**, 665 [7] Amelin *et al* (2011) *LPI Contrib* **1639**, 9014 [8] Bizzarro *et al* (2003) *Nature* **421**, 931-933 [9] Blichert-Toft *et al* (2002) *EPSL* **202**, 167-181 [10] Bouvier & Boyet (2013) *Min Mag* **77**, 754 [11] Sanborn *et al* (2012) *LPSC* **43**, 2039 [12] Bouvier *et al* (2008) *EPSL* **273**, 48-57