

Evidence for two 4.63 Gyr asteroidal parent bodies of the Shergotty-Nakhla-Chassigny meteorites

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The origin of the Shergotty-Nakhla-Chassigny meteorites is still controversial because definite proof regarding from which planets or asteroids they originated is still missing. Most authors believe they originated on Mars because they have similar Ar isotope signatures as those found in the Martian atmosphere. Here, we show that they originated on two distinct parent bodies, using a method based on the intersection of isochrons. It is found that the expected parent bodies fall on a 4.63 Gyr isochron, which intersects the 4.55 Gyr geochron, and the 5.13 Gyr lunar isochron, exactly on the Pb compositions of the solar photosphere, and the unequilibrated primitive meteorites on a standard $^{207}\text{Pb}/^{204}\text{Pb}$ vs. $^{206}\text{Pb}/^{204}\text{Pb}$ plot [1]. Thus, the Shergotty-Nakhla-Chassigny meteorites originated from two 4.63 Gyr asteroidal parent bodies, but not from Mars as is currently widely accepted. In fact, Mars is another example whose age could be determined with this method as Pb data for its primitive mantle could be available in the near future.

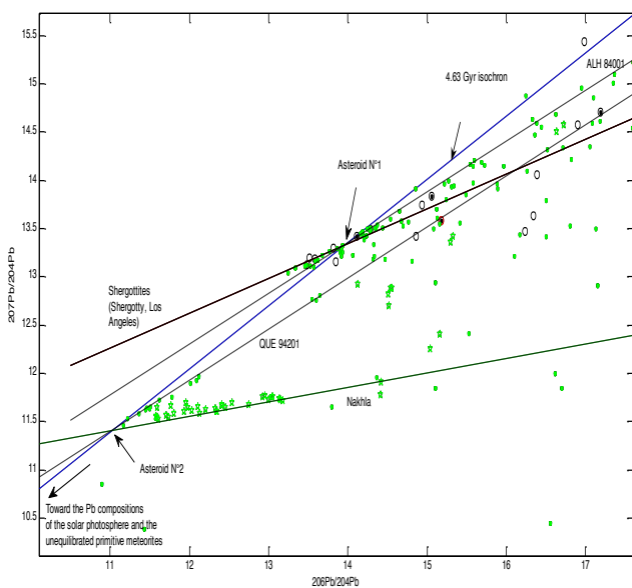


Figure 1: $^{206}\text{Pb}/^{204}\text{Pb}$ vs. $^{207}\text{Pb}/^{204}\text{Pb}$ plot.

[1] Rochd (2013) *Miner. Magaz.* **77**, 5, 2073-2073.