^{187}Re- ^{187}Os nuclear geochronometry: Chondritic ^{187}Os/^{188}Os heterogeneity in light of the Planck-WP data set

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Nuclear geochronometry is a new dating method, tightly constrained by other scientific fields like cosmology and nuclear theory [1]. Based upon an identified terrestrial ^{187}Re/^{188}Os = 5.873, interpreted as nuclear production ratio, it combines principles of geochronology with nuclear astrophysics to determine time intervals (t_1, t_2) between element formation, fractionation and the present [2]. The ^{187}Re/^{188}Os ratio points to a rapid neutron-capture (r-process) event at 13.781 ± 0.063 Ga, close to the *Planck+WP+highL* age of the Universe [3]. ^{187}Os/^{188}Os ratios of 30 H chondrite components taken from the literature [4] [5] vary significantly between 0.10281 ± 4 and 0.13763 ± 2, scattering around a 4.663 ± 0.250 Ga isochronous regression line. It is still unclear whether the scatter is due to different ages and/or source reservoirs of the components. Therefore, t_2 time intervals (nucleogeochronometric ages) are calculated to elucidate this question. For this, the BARBERTON nuclear geochronometer [1] is applied to all 30 components. Three major age groups can now be distinguished, matching the pattern of the isochron diagram: One between 13.78 Ga and 13.6 Ga, consistent with a possible dark matter halo ionization in the early Universe, another from 13.5 Ga to 13.1 Ga and around 12.9 Ga. The result is in line with the reionization epoch of the standard cosmological (base ΛCDM) model [3] for redshift $z \sim 6$ up to 60 [6]. From this it may be concluded that (i) the components are early-formed solids; (ii) there is neither a singular t_1 nor a singular t_2 time interval for all components; (iii) the 4.663 Ga "isochron" is a mixing line; and (iv) nuclear geochronometry can help to constrain metal enrichment in the early Universe, seeing beyond the formation of the solar system and revealing the cosmological source reservoirs for the metals with mass number A > 180.

[1] Roller (2015), *Geophys. Res. Abstr.* **17**, #2399. [2] Brown (1947), *Phys. Rev.* **72**, 348. [3] Planck Collaboration XVI (2014), *A&A* **571**, A16. [4] Horan *et al* (2009), *GCA* **73**, 6984-6997. [5] Smoliar *et al* (2006), *LPSC* **37**, 1468. [6] Barkana (2006), *Science* **313**, 931-934.