The ^{138}La-^{138}Ce chondritic reference parameters

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The ^{138}La- ^{138}Ce isotope system (half-life 1.02 x 10^{11} years) was introduced in the 1980´s and the combination of the ^{138}La- ^{138}Ce and ^{147}Sm- ^{143}Nd isotopic system is a unique tool to study the behavior of the LREE, especially because of the relative compatibilities (La<Ce and Sm>Nd) and the redox sensitivity of Ce, which can occur in 3+ and 4+ state, depending on the redox conditions. In this study, 18 different meteorites (10 carbonaceous, 5 ordinary and 3 enstatite chondrites of petrological types 1-6 and one mesosiderite) were used to better define the Chondritic Uniform Reservoir (CHUR) reference value, allowing direct comparision of terrestrial data to that expected in a chondritic Earth. Therefore, Sm-Nd and La-Ce isotope compositions and concentrations in all meteorites were determined from one aliquot. Elemental concentrations were determined by isotope dilution using a mixed ^{138}La-^{142}Ce tracer and isotope compositions were obtained by MC-ICP-MS [1]. The Sm-Nd results are in a good agremment with the literature [2].
Notably, there is a resolvable isotopic difference between different AMES metal batches. For comparison, all data (literature and this study) were recalculated to the Mainz-AMES value of 1.33738±1 (2rsd) proposed by [3]. The mean values of ^{138}Ce/^{136}Ce obtained here are not fully consistent with all previous studies [4, 5]. After carefully revisiting all results, we now recommend a new ^{138}Ce/^{136}Ce weighted mean for chondrites (n=17) of 1.33685±3 (2 se).
Importantly, our ^{138}La/^{136}Ce values determined by ID-MC-ICP-MS are ca. 10% higher than proposed in a recent study [5] which did not employ isotope dilution for La-Ce. A literature comparision of La/Ce values for rock reference materials confirms a greater accuracy of the isotope dilution approach.

[1] Schnabel et al. (2017) *JAAS*, 32, 2360 [2] Bouvier et al. (2008) *EPSL,* 273, 48-57 [3] Willbold (2007) *JAAS*, 22, 1364-1372 [4] Bellot et al. (2015) *Geochim. Cosmochimi. Acta, 168*, 261-279 [5] Willig&Stracke (2019) *EPSL,* 509, 55-65