Chemical Compositions of the Proto-Sun and the Bulk Earth: New Estimates and Implications

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We present new estimates of the bulk chemical compositions of the proto-Sun and the Earth. The latest elemental abundances in CI chondrites and the up-to-date solar photospheric data are combined to get the protosolar abundance. Due to the lack of measurable photospheric line of mercury (Hg), the solar Hg abundance is traditionally referred to its abundance in primitive meteorites, whereas, meteoritic abundance is presumably depleted for highly volatile elements, including Hg. Based on our simultaneous fitting to the terrestrial and meteoritic volatile depletion patterns, we redetermined the solar Hg abundance that is over 10 times its previous estimate from CI chondrites. On the other hand, a heterogeneous set of literature values for Earth's primitive mantle and core are combined into a concordance set of elemental abundances of the bulk Earth. The compositional similarities and differences of the bulk Earth and proto-Sun by comparison imply the potential chemical evolution relationship from a Sun-like star to a habitable planet.