

The Chemical Compositions of Other Earths

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The Earth is devolatilized debris left over from the Sun's formation. Thus, the Sun and Earth share the same refractory elemental abundances. If we did not know which star was ours, we could identify it by comparing the refractory elemental abundances of the stars with the Earth. Conversely, we can infer the elemental compositions of extrasolar earths from spectroscopic measurements of the elemental compositions of other stars. An important part of this procedure is to determine the degrees of devolatilization and chemical fractionation that occurred in our Solar System 4.5 billion years ago. To do this we compare the elemental abundances in the Sun to the elemental abundances of the rocky planets in our Solar System. Under the reasonable assumption that these fractionation processes are universal features of rocky planet formation, we make estimates of the chemical composition of extrasolar terrestrial planets from measurements of the elemental abundances from the largest, most recent stellar surveys. Extrasolar terrestrial planets are devolatilized pieces of their host stars much as the Earth is a devolatilized piece of the Sun. We present preliminary results for a classification system for extraterrestrial rocky planets based on the chemical abundances of stars.