A synthesis of Fe chemistry of serpentinites and serpentine minerals

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The iron chemistry of serpentinites and serpentine group minerals is often invoked as a record of the setting and conditions of serpentinization. Iron can be partitioned into a variety of secondary mineral phases and undergo variable extents of oxidation and/or reduction during serpentinization. This has implications for many geophysical, geochemical, and biological aspects of serpentinizing systems and more broadly for Earth systems. A variety of attributes of the specific serpentinizing system can affect Fe behaviour including the protolith composition and extent of serpentinization. Data on iron chemistry of serpentinites and serpentines is frequently collected, analyzed, and reported for single systems. However, interpretations of the controls on, and the implications of, Fe behaviour drawn from a single system are often widely extrapolated. Due to the long history of the study of serpentinization, there is a wealth of chemical composition data available in the literature. Taking advantage of this, I compiled a database including potential predictors of Fe behaviour and measures of Fe chemistry. This enables investigation of trends in Fe behaviour across a wide variety of systems and conditions. The database presented here includes both bulk rock and serpentine mineral geochemical data. Measures of total Fe and Fe oxidation state are compiled with the geologic characteristics of the systems from which they were sampled (e.g. geologic setting, protolith, extent of serpentinization, serpentine polymorph). Observations of trends in Fe chemistry in serpentinites and serpentines across a variety of systems and parameters will aid in verifying and strengthening interpretations made on the basis of Fe chemistry and applied across systems.

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