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Variations in magnetic properties of Mexican serpentinites and related micro-textures

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Magnetite formation of serpentinized ultramafic rocks leads to variations in the magnetic properties of serpentinites; however, magnetite precipitation is still on debate.

In this work, we analyzed 60 cores of ultramafic rocks with a variety of serpentinization degrees. These rocks belong to the ultramafic-mafic San Juan de Otates complex in Guanajuato, Mexico. Geochemical studies have been previously conducted, enabling us to compare changes in the magnetic properties against the chemical variations generated by the serpentinization process. By studying the density and magnetic properties such as anisotropy of magnetic susceptibility, hysteresis curves as well as magnetic and temperature-dependent susceptibility and, we were able to identify the relationship between magnetic content and serpentinization degree, the predominant magnetic carrier, and to what extent the magnetite grain size depends on the serpentinization. Variations in these parameters allowed us to better constrain the temperature at which serpentinization occurred, the generation of other Fe-rich phases such as Fe-brucite and/or Fe-rich serpentine as well as distinctive rock textures formed at different serpentinization degrees.