

Magnetism of chromium-rich spinel in serpentinized ultramafic complexes

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Chromium-rich spinel commonly occurs in exposed ultramafic bodies. To investigate magnetic properties of Chromium-rich spinel, we collected twelve samples that might contain potentially magnetic Chromium-rich spinel. Magnetic characterization and compositional analysis revealed that eight samples were magnetic while four other samples were non-magnetic. A total of seventeen different spinel phases were recognized from twelve samples analyzed. There is a tendency that the magnetic remanence carrier reflects the degree of low-temperature metamorphism (serpentinization). Magnetite was solely responsible for the main natural remanent magnetization (NRM) in four samples that are severely serpentinized. In four other samples that were magnetic, stable remanence in Chromium-rich spinel was probably acquired as a result of the subduction-induced metamorphism of ultramafic complexes. On the basis of compositional analysis, it is apparent that a high Fe/Cr ratio and a low (Al+Mg)/(Cr+Fe) ratio are required for the presence of magnetic Chromium-rich spinel. Chromium-rich spinel has a Curie point of 200-350°C, which would allow their presence up to ~10 km in terrestrial lithosphere, given a normal geothermal gradient. Thus, Chromium-rich spinel is a potential NRM carrier and a source of magnetic anomalies in ultramafic complexes.samples.