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# **Authigenic Chrysotile Formation in the Matrix of Quaternary Debris Flows, Northern Southland, New Zealand**

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**Abstract:** Quaternary debris flows derived from ophiolite melange in northern Southland, New Zealand, are locally cemented and veined by cross-fiber and fine-grained chrysotile. Chrysotile was identified by optical, X-ray powder diffraction, electron microprobe, differential thermal (DTA), and infrared analysis methods. Microprobe and DTA also suggested the presence of as much as 6% of sub-microscopic, noncrystalline alumina, probably in the form of pseudoboehmite. Cavity fillings and irregular veins containing chrysotile are as thick as 40 cm and commonly contain lizardite clasts. Calcite commonly accompanies chrysotile as a vein mineral. Magnetite and pyrite are found near and adjacent to chrysotile veins. These accessory minerals imply that the chrysotile formed under alkaline, reducing conditions. Surface water seepages have pH = 9. Remnant debris-flow topography, Holocene radiocarbon dates, and the absence of hot spring activity confirms that chrysotile can form under near-surface, low-temperature conditions. Growth of chrysotile fibers on a lizardite substrate suggests that the chrysotile formed by solution of detrital lizardite and subsequent precipitation in cavities within the debris flow.

**Key Words:** Authigenesis • Chrysotile • Debris flow • Pseudoboehmite • Serpentine

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