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Complexity in 15- and 30-sectors polygonal serpentine: Longitudinal sections, intrasector stacking faults and XRPD satellites

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Abstract

Pale-green massive serpentine veins cutting the Yugoslavian serpentinites consist of 15- and 30-sectors polygonal serpentine in random orientation but becoming stress-oriented close to the vein walls. [100] cross-sections show ordered one-layer and two-layer projected polytype sequences, as well as disordered multilayer sequences. From sector to sector, these sections have systematically alternating polytypes that obey the O-L-R and O-R-L alternation rules in 15- and 30-sectors polygonal serpentine, respectively. Furthermore, [010] longitudinal sections systematically show a unique two-layer sequence. By combining the two projections, we reconstruct the basic 3D polytype assemblage that from sector to sector consists of alternating M5-M15-M15 or M5-M16-M16 polytypes.

The individual fibers may be described as cyclical pseudo-twins, based upon continuous 1:1 layers, with possible octahedral rotation from one sector to the other. Continuous curved sector boundaries join adjacent sectors, with no tetrahedral sheet inversion; the curved boundaries behave as similar folds and have variable interplanar spacings. Simulated electron diffraction patterns reproduce all the observed diffraction geometries, even for faulted stacking sequences, and explain numbers of diffraction cusps and chords. Additional XRPD reflections are indexed based on polytypes present in 15- and 30-sectors polygonal serpentines.

Keywords: Polygonal serpentine, polytypism, twinning, stacking faults, electron diffraction, HRTEM