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High-resolution transmission electron microscopy (HRTEM) investigation of antigorite polysomes (m = 15 to 18)

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ABSTRACT

Single-crystal structure determinations of the m = 17 and m = 16 antigorite polysomes confirmed the existence of two basic antigorite structures, i.e., "odd" antigorites, with $m = 2n + 1$ (m being the number of tetrahedra in a wavelength visible in the [010] projections), and "even" antigorites, with $m = 2n$. Both structures contain "8-reversals" and "6-reversals." The "8-reversals" consist of 8-member rings of tetrahedra, where four tetrahedra point in one direction and four in the opposite direction, whereas "6-reversals" involve four tetrahedra and two tetrahedra, respectively. "Odd" antigorites have m tetrahedra and $m - 1$ octahedra along a wavelength (which coincides with the a translation) and Pm space group. Conversely, **b**/2 shifts every second 8-reversal cause the structure to be C-centered in "even" antigorites ($C2/m$ space group). In the latter case, m tetrahedra and $m - 1$ octahedra occur within a wave, but two waves occur within an a periodicity.

Transmission electron microscopy (TEM) of antigorite polysomes with m ranging from 15 to 18 is successfully interpreted on the base of previous X-ray data. In particular, [001] selected area electron diffraction (SAED) patterns show primitive or C-centered cells, for $m = 2n$ or $2n + 1$, respectively. In addition, [001] high-resolution (HR) images show 8-reversals aligned or offset by **b**/2 (i.e., stacking based on a primitive or C-centered lattice).

Keywords: Antigorite, HRTEM, structure, polysomatism