Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.36820

Midlatitude dominance of deep crustal exhumation

ROSS MITCHELL[1], CHRIS SPENCER[2] AND YEBO LIU[3]

[1]Chinese Academy of Sciences (CAS)
[2]Queen's University
[3]Curtin University

Paleolatitudes of metamorphic rocks and their exhumation rates over the past 700 million years show a pronounced midlatitude maximum. This pattern cannot be readily explained by plate tectonics alone. Instead, it coincides with several latitude-dependent phenomena relating to Earth's rotation. Seasonal temperature contrast, greatest at midlatitudes due to axial tilt, enhances freeze-thaw cycling, frost wedging, and localized but efficient glacial erosion. Rotational flattening produces an oblate planetary figure whose curvature gradient peaks at midlatitudes, thus inducing membrane stress in continents transiting midlatitudes. Further, the interaction of rotation and tilt establishes jet streams that funnel atmospheric CO_2 into midlatitudes, where more acidic rainfall enhances chemical weathering. These processes span the lithosphere, hydrosphere, and atmosphere and cumulatively contribute to focus deep crustal exhumation in midlatitudes at Earth's surface.