

Polar wander and surface convergence on Europa: Evidence from a survey of strike-slip displacement

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Two global issues regarding Europa are addressed by a survey of strike-slip faults. First, a common type of terrain is identified that appears to represent convergent sites of surface removal, which may help compensate for substantial widespread dilation along tectonic bands elsewhere, thus helping resolve the problem of conserving global surface area. Second, evidence for polar wander may provide the first confirmation of that theoretically predicted phenomenon. These are among the results from an extensive survey of strike-slip faults over the two broad swaths that run from the far north to far south in the leading and trailing hemispheres respectively, where Galileo images at 200m/pixel resolution were obtained for regional mapping purposes. Reconstruction of specific examples of strike slip reveals sites of lateral convergence. These sites are not similar to compression features on other bodies, which may explain why they had previously been difficult to identify. The distribution of strike-slip in both hemispheres, when compared with predictions of the theory of tidal walking, indicates that the north pole of Europa has wandered, probably during the last few million years, from a location that is currently about 30° away in the leading hemisphere. Such polar wander probably also explains symmetry patterns in the distribution of chaotic terrain, pits, and uplift features.