

## CONTEMPORARY DOMING OF THE ADIRONDACK MOUNTAINS: FURTHER EVIDENCE FROM RELEVELING

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(Received July 1, 1980)

### ABSTRACT

The Adirondack Mountains constitute an anomalously large, domical uplift on the Appalachian foreland. The dome has a NNE–SSW axis about 190 km long, and an east–west dimension of about 140 km. It has a structural relief of at least 1600 m, and a local topographic relief of up to 1200 m. First-order leveling in 1955, and again in 1973 along a north–south line at the eastern margin of the Adirondack shows an uplift rate of 2.2 mm/yr at the latitude of the center of the dome and a subsidence rate of 2.8 mm/yr at the northern end of the line near the Canadian border. The net amount of arching along this releveled line is  $9 \text{ cm} \pm 2 \text{ cm}$  (Isachsen, 1975). To test the idea that this arching represented an “edge effect” of contemporary doming of the Adirondacks as a whole, the National Geodetic Survey was encouraged to relevel a 1931 north–south line between Utica and Fort Covington (near the Canadian border) which crosses the center of the dome. The releveled line showed that the mountain mass is undergoing contemporary domical uplift at a rate which reaches 3.7 mm/yr near the center of the dome (compare with 1 mm/yr for the Swiss Alps). Three other releveled lines in the area support this conclusion.

The domical configuration of the area undergoing uplift, combined with subsidence along the northeastern perimeter of the dome, argues for a geothermal rather than glacioisostatic origin. A contemporary hot spot near the crust–mantle boundary is proposed as the mechanism of doming, based on analogy with uplifts of similar dimensions elsewhere in the world, some of which have associated Tertiary volcanics. The lack of thermal springs in the area, or high heat flow in drill holes up to 370 m deep, indicates that the front of the inferred thermal pulse must be at some depth greater than 1 km.

The present Adirondack dome did not come into existence until sometime after Late Devonian time, based on isopach maps by Rickard (1969, 1973). Strata younger than this, which might provide further time-strati-

graphic refinement of this lower limit, do not occur in the region. However, the consequent radial drainage pattern in the Adirondacks indicates that the dome is a relatively young tectonic feature.

Aligned with the long axis of the rising dome are prominent NNE faults and lineaments. The region is one of recurring low-level seismic activity. Fault plane solutions indicate a WSW—ENE axis of compression (Aggarwal and Sykes, 1977) which indicates an anomalous relationship between doming and seismicity.

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