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Tilting of the Puy de Dome by a forced fold

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The Puy de Dome, like the leaning tower of Pisa, has one side steeper than the other. Paleomagnetic data from 14 sites show a consistent horizontal-axis rotation of 15° from the expected 11 ka paleomagnetic pole position for the site location. Morphological data further support these data: the south west side of the dome is steep, rugged and scarred with landslides, and has a breccia apron only at the base made of mass flow deposits: this side has steepened and lost material. In contrast, the northeast side of the dome is smooth and less steep, and is mantled by breccia on the upper flanks: this side has become more stable. In addition, the north flank of the Puy de Dôme has a deep gully that extends down in line with a fault scarp of the summit graben of an uplifted area that trends across the Petit Puy de Dôme. This uplift has been interpreted as a forced fold that developed over a trachyte intrusion. Stratigraphic data further show that the fold formed after the Puy de Dôme was formed. We conclude that the volcano was deformed, faulted, then shed the south west flank's carapace as it was tilted by the bulge. Monogenetic volcanoes, like the Puy de Dôme display in miniature processes, such tilting, that could feasibly provoke large scale landsliding at much larger volcanic edifices. The collapses at Bezimyanny (Kamchatka) and Mt St Helens (Oregon), involved the forced folding deformation of the edifice by internal intrusions. However, we argue that, it is possible that sills are preferentially intruded at the margins of volcanic centres, and hence whole volcano tilting could be more common occurrence than previously recognised.