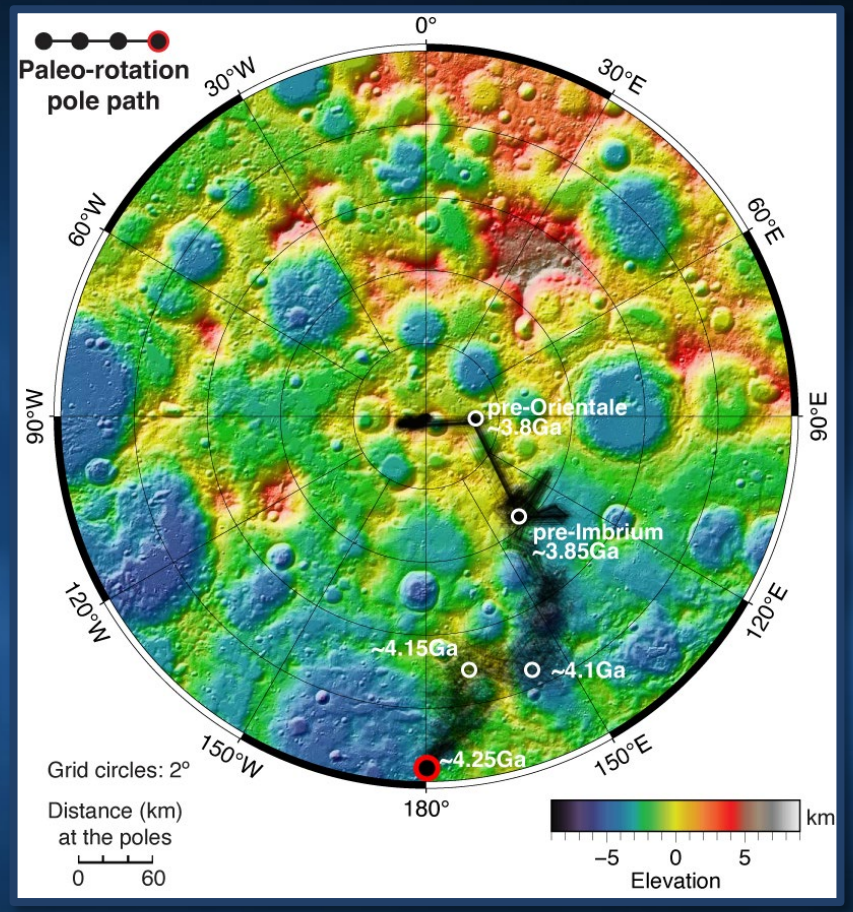
Small But Mighty Craters Contribute to Moon's Wandering Poles



The Moon's polar wander path (black) overlayed on the present-day topography. Paleopole position at ~4.25Ga is ~80.4°S,180°E.

Small craters are a significant contributor to the shift in the Moon's pole location ~10° in latitude.

PROBLEM Prior works on lunar True Polar Wander did not consider the gravitational contribution of craters with diameters <200 km.

METHOD Using GRAIL and LOLA data, and a novel method, we sequentially removed gravitational signatures of nearly 5200 craters, thereby reconstructing the path of the poles over ~4.25 billion years.

IMPLICATIONS The polar cold traps could have been relatively stable for polar volatile accumulation since the beginning of the Late Imbrian (3.8-3.2 billion years ago), assuming little change in lunar obliquity.

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