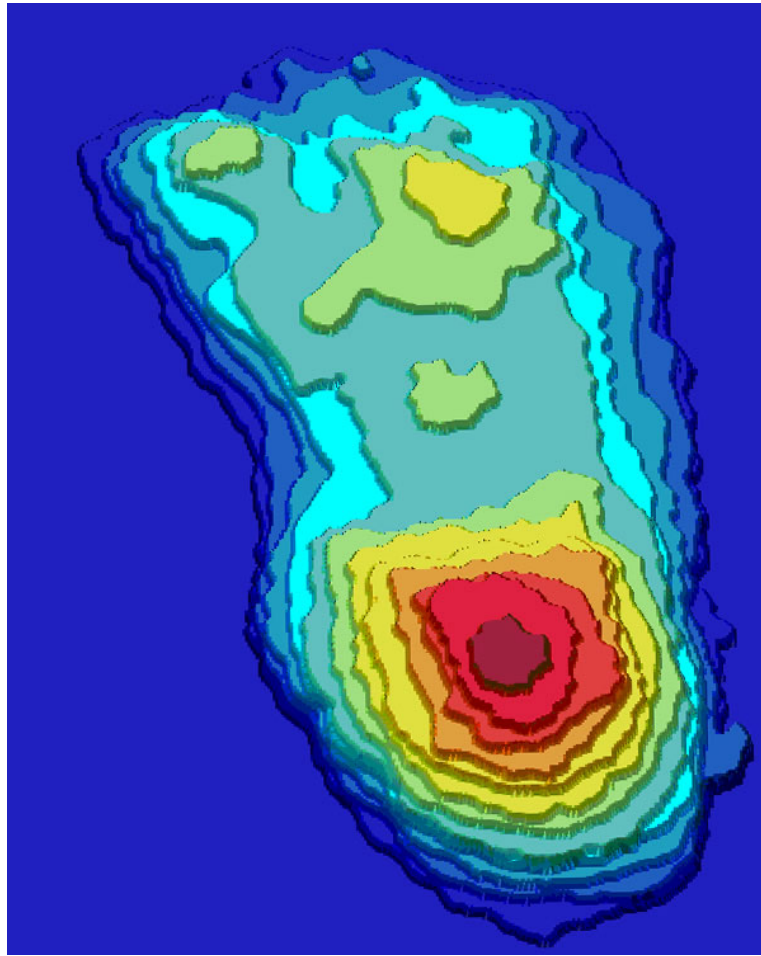


Biomechanical analysis of the Laetoli footprint trails

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Abstract

The Laetoli footprint trails, dating to around 3.8 Ma and most commonly attributed to the only early hominin known from postcranial fossils in the Laetolil beds, *Australopithecus afarensis* remain our most direct evidence of the function and biomechanics of the foot in early human ancestors. Just as gait of *Au. afarensis* continues to be the subject of much debate, primarily as to whether it would have been upright ('stiff') walking or bent-hip, bent-knee ('compliant') walking, so interpretations of the footprints, most based largely on the juvenile, G-1 trackway, range from claims, as recent as 2007, that they are completely consistent with a chimpanzee-like bipedalism, (and hence compatible with a recent knucklewalking ancestry) to claims that they are completely modern in functional aspect. We report progress in biomechanical analysis of the Laetoli footprint trails based primarily on on: 1) quantitative experimental studies of human foot pressure in a variety of gaits both directly over a pressure/forceplate combination and measured under 4 mm of fine damp sand, and 2) both forwards-dynamics and finite-elements modelling of foot pressure and footprint formation.