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# Radiogenic isotopes of arc lavas constrain uplift of the Andes

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Orogenic plateaux are an ultimate expression of continental tectonics, but the timings and mechanisms of their formation are far from understood. The elevation history of the Andes is of particular importance for climatic reconstructions, as they pose the only barrier to atmospheric circulation in the Southern Hemisphere. Many varied techniques have been utilized over the last two decades to constrain Andean Plateau (AP) surface uplift. Two conflicting schools of thought are prominent: (1) recent, rapid rise since 10-6 Ma (Late Miocene), and (2) slow, continued uplift from ∼40 Ma. We propose a new, independent, approach to constrain AP surface uplift through time. By comparing isotopic compositions of Andean Quaternary arc lavas to present day crustal thickness and topography, we show that Sr and Nd isotopes are effective discriminants for the modern extent of the AP. As previously described, these isotopic systems are sensitive to crustal contamination, which in turn relates to crustal thickness, and, via isostasy, to regional surface elevation. We apply this relationship to a new compilation of published, age corrected, isotopic compositions of arc lavas, to constrain the surface uplift history of the Andes from the Jurassic to present day. Our results are consistent with significant AP surface uplift beginning in the Mid to Late Paleogene. We show that by 23 Ma, the AP was established at close to its modern elevations between at least 16-28 deg. S, thereby predating models for Late Miocene surface uplift. Between 23-10 Ma, surface uplift propagated south of 28 deg. S by a further ∼400 km. Our model has implications for understanding magma plumbing systems in regions of thick, wide crust, especially other orogenic plateaux.