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Understanding the large-scale deformation in shield volcanoes

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In this work we will study tomographic results obtained on shield volcanoes to infer their major, large-scale, structural elements. At that scale some of these edifices may be modelled by a high P-wave velocity, dense core of intrusive origin, surrounded by a peripheral low P-wave velocity, relatively low-density cover of extrusive origin. In Hawaii, drilling and rock mechanics experiments show that rocks constituting the extrusive cover are characterized by low friction angle and cohesion. We therefore examine the mechanical consequences of this distribution of density and rheological parameters by using finite-element modelling. Using realistic geometries and mechanical parameters in this modelling shows that the dense elastic core may heavily deform the light, elasto-plastic peripheral cover, and may lead to flank instability in these shield volcanoes.