# 3D stress-strain field around an ascending Stokes sphere: an analogue experiment

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An analogue modeling approach was employed here to elucidate 3 dimensional stress-strain fields around gravity-driven structures such as mantle plume and salt dome.Buoyant polybuten layer overlain by transparent silicon poly-dimethyl siloxane layer formed a Stokes sphere rising through it. 3D stress-strain fields around the Stokes sphere were estimeated quantitatively from serial photographs of deforming carbon grid printed on free surface, internal surfaces and a vertical surface of the siloxane.

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Vertical shortening on the top and elongation underneath were observed during the rise of the Stokes sphere. Strong shear accompanied by equatorial elongation is visualized along the flank of the sphere.

The carbon grid printed on the free surface revealed the isotopic extension on the spreading sphere near the free-surface, whereas strong radial shortening were observed along the margin of the spreading sphere. This zone of shortening migrates from the centre of the spreading sphere as it continue widening laterally. This surface deformation, however, disappear when the free surface is covered by thin brittle layer.