Establishing a time series of deformation is one of the keys to understanding and predicting the magmatic behaviour of active volcanoes. Satellite techniques represent an increasingly useful tool for measuring volcanic deformation over short to medium-timescales. Colombia contains numerous young or active volcanoes, many of which are inaccessible. We use L-band (23.6 cm wavelength) radar data acquired between 2006 and 2009 to survey 15 active volcanoes along the Colombian segment of the Northern Volcanic Zone. Analysis of 100 interferograms shows that the majority of volcanoes were not deforming. However, independent interferograms display an average subsidence of 3 cm on the northeast flank of Galeras, coinciding with the January 2008 eruption. We combine InSAR, field measurements and source modelling to determine the origin, size and location of the source of subsidence at Galeras. Our results suggest that this signal was caused by deflation of the magma chamber associated with the January 2008 event. Modelling provides insight into the depth to source (~2 km) and a volume change (-6.5×10^5 m^3) which is consistent with that derived from modelling contemporaneous tilts and the volume of material erupted. Previous studies based on various datasets support the existence of a resident/recurring chamber at this location, over a decadal timescale.