On March 20th 2010 a 300 m long fissure opened up on the east flank of Eyjafjallajökull volcano. The eruption was preceded by three months of unrest with increased seismic activity and surface deformation. The deformation, monitored with GPS and InSAR measurements, was both spatially and temporally complex. Early January 2010 a cGPS station on the south flank of the volcano started moving away from the volcano, suggesting inflation. Deformation observed at cGPS stations in January and February suggests formation of sills under the southeastern flank of the volcano. Time series from more distant cGPS stations show a small but distinct change around the 20th of February, with sites moving in toward the volcano, suggesting deep pressure changes that could correlate with observed deep seismic activity. In early March seismic activity intensified and observed rapid deformation is interpreted as northward and upward migration of the intrusion. When the effusive flank eruption started deformation almost ceased and the volcano remained at an inflated state. No detectable deformation was observed in TerraSAR-X interferograms spanning the flank eruption but interferograms from 2009/09/25 to 2010/03/20, spanning the pre-eruptive period, reveals the spatial extent of deformation and the cumulative amount just hours prior to the eruption. On April 14th 2010 a more explosive eruption began at the ice-capped summit of the volcano. Rapid deformation toward the summit of the volcano and subsidence observed both with GPS and InSAR measurements indicate contraction of a shallow source at 3-4 km depth below the summit.