The amount of rainfall between data acquisition and perpendicular baseline are used to select a good pair SAR data for interferometry process. From interferometry process, coherence images will be obtained. Those images state similarity value of the surface character. The high coherence values are required to observe interferometric fringes. Therefore, there is selection again based on the coherence value (>0.45). Only ALOS PALSAR 20100616-20100916, 20100916-20101101, and 20101217-20110201 image pairs are selected and can be considered as the good pairs SAR images to be able produce a good image of the interferogram.

DEM (Digital Elevation Model) is a very effective tool for terrain analysis. DEM generation using D-InSAR is more appropriate to use long baseline. Based on this concept, the 20100616-20100916 image pair is the most appropriate for DEM generation because it has long baseline (308.79 m). The error value of the DEM result from interferometry pair is about -11 m.

The 2010 Merapi eruption event creates huge changes in surface, include land cover and ground deformation. Related to phase difference analysis, the ground deformation pattern before, during and after the eruption can be detected. During the pre-eruptive period (20100616-20100916), there are movement in most areas of Merapi up to about -7 cm seen from the Line of Sight (LOS). Vertical displacement rate during this period shows deflation up to -1 mm/day due to extended period of deflation that followed the 2006 eruption. But in small areas in the south of Merapi summit area, there is inflation due to early indications of increased seismic activity.

Over the first eruption period (20100916-20101101), there are displacements up to about -4 cm at the north summit crater area due to the explosive eruptions removed the 2006 lava dome. Deflation up to -2.5 mm/day is indicated by vertical displacement rate. Yet, some inflation occured because of Merapi spewing lava down its southern and south-eastern slopes make ground movement occurs up to about 6 cm.

After eruption (20101217-20110201), the area around Merapi affected by the distribution of materials eruption with displacements up to about 5 cm. The vertical displacement rate indicated inflation up to 2.5 mm/day. The betanought
images of backscattering intensity images confirms that inflation by showing the presence of the newest volcanic product consist of hot material, which has reported a pyroclastic flow, visible on the southern flank of Merapi. The betanought images show temporal changes in the distributions of pyroclastic flow deposits. It also show the change of Merapi dome open to the south after the eruption.