



## **Investigating ground deformation and subsidence in Northern Metro Manila, Philippines using Persistent Scatterer Interferometric Synthetic Aperture Radar (PSInSAR)**

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The extent of ground deformation and subsidence in northern Metro Manila was examined using Persistent Scatterer Interferometric Synthetic Aperture Radar (PSInSAR) technique. Using the Multiple Acquisition Interferometric Synthetic Aperture Radar (MAINSAR) software, 21 descending Envisat radar imageries taken from 2003 to 2006 were processed. Interferograms that were generated from these images show high coherence due to the high density of PS points over the region of interest. The PSInSAR processing reveals several areas in northern Metro Manila, specifically in Caloocan, Malabon, Navotas and Valenzuela—collectively known as CAMANAVA—that exhibit ground subsidence. Results show that the areas manifesting subsidence are moving with a maximum rate of 4.38 cm/year relative to the satellite. This is consistent with the geodetic surveying results from 1979 to 2009 showing subsidence of approximately 1 m or 3.33 cm/yr. The National Mapping and Resource Information Authority (NAMRIA) also identify these areas as among those with the highest rates of groundwater extraction in Metro Manila, suggesting anthropogenic activities as the major cause of subsidence. A better understanding of rates of sinking and geographic location of the areas of Northern Metro Manila affected by subsidence hopefully can guide local government authorities to mitigate the effects of potential floods brought about by this phenomenon.