Pre-collapse ground motion analysis at Anak Krakatau, Indonesia using time-series InSAR

Young Cheol Kim[1,2], Christelle Wauthier[1,2]

[1]*Department of Geosciences, The Pennsylvania State University, USA*
[2]*Institute for Computational and Data Sciences, The Pennsylvania State University, USA*

Volcanic flank instability may culminate in disastrous lateral collapse and be accompanied by surface deformation, seismicity, eruption, landslide formation, and tsunami generation which can be a multi-hazard threat. In Indonesia, a volcanic eruption and flank collapse occurred at Anak Krakatau on 22 December 2018. The collapse entailed a tsunami that took the life of hundreds of people living in the surrounding region. Anak Krakatau had been active with Vulcanian eruption to Strombolian eruption and formed a steep slope which led a research group to model tsunami hazards related to a flank collapse of Anak Krakatau in 2012 [Giachetti et al., 2012].

Time-series analysis of Interferometric Synthetic Aperture Radar (InSAR) can retrieve ground motion with statistically valuable pixels. Persistent Scatterer InSAR (PS-InSAR), one method of time-series InSAR, selects persistent scatterers with statistical analysis and obtains time-series results from selected Persistent Scatterers (PS) [Hooper et al., 2012]. Previous research applied PS-InSAR to Anak Krakatau using one year span of 2018 Sentinel-1 data showed trend changes in June and October 2018 [Walter et al., 2019]. However, the number of selected PS were small due to eruptive conditions that caused coherence loss. Since the result of statistical analysis is sensitive to the number of scenes, time span, and PS pixel counts, this study will modify those factors and obtain the time-series trend before the flank collapse. The trend will be retrieved from 2017 to 2018 and the PS pixel counts will be increased using information from dual-polarization (VV and VH) of Sentinel-1 data [Shamshiri et al., 2018].

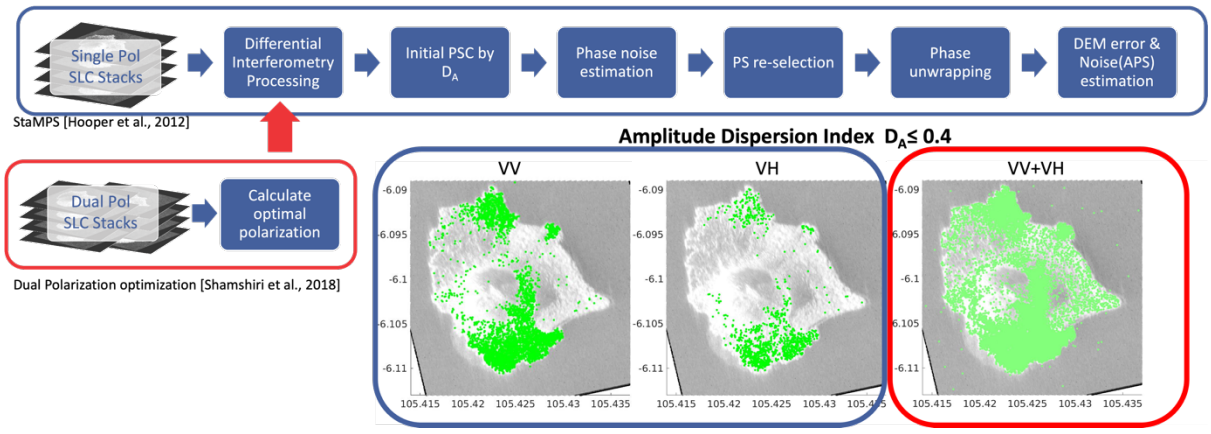

Figure 1. Processing steps for time-series InSAR (StaMPS) with dual polarization optimization and the increased pixel counts of initial persistent scatterer candidates by optimization.