

Noise Effects on Compressed SAR Raw Data

Rahmat Arief¹, Dodi Sudiana², Kalamullah Ramli²

¹ Remote Sensing Technology and Data Center, Indonesian National Institute of Aeronautics and Space (LAPAN)

Jl. Lapan No 70, Jakarta Timur 13710

²Departement of Electronic Engineering, University of Indonesia

Email : rahmat.arief@lapan.go.id

Abstract—Synthetic aperture radar (SAR) system can observe the earth surface under day night and all weather circumstances. With the improvement of SAR technology larger areas are being imaged and the resolution of the images has increased. This causes larger images to be transmitted and stored. Due to the limited storage and/or down-link capacity on the airplane or satellite the data rate must be reduced. Compressive sensing, as a new method, gives solution to overcome those problems. With this method, the SAR image of sparse targets can be recovered by solving the convex optimization problem with a very few of SAR echo samples under Nyquist/Shannon theorem required. This paper introduces the effects of noise on SAR raw data compression based on compressive sensing. Analysis of the influence of noise was conducted by comparing the imaging results of single point target and Radarsat 1 with different signal noise ratio (SNR). The evaluation of SAR image quality values was in terms of PSLR, ISLR and 3dB resolution. The results of SAR image quality values indicate that the presented CS imaging method is better than MF method at high SNR.

Keywords-SAR, raw data, compressive sensing, point target, PSLR, ISLR.