TURBO FILTER APPLIED TO THE POLARIMETRIC RADAR SAR IMAGES

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Abstract: POLSAR radar images are affected by a granular multiplicative noise called speckle. This noise degrades the quality of these images and makes it difficult to interpret. That is why a polarimetric filtering is necessary.

In this paper, our goal is to study a new method of speckle filtering in POLSAR radar images, not only in intensity but also in complex images. This method called Turbo combines two complementary filters: the refined Lee filtering based on the estimation of the minimum mean square error MMSE and the wavelet filtering by using the stationary wavelet transform SWT. One filter can boost up the results of the other. We propose to optimize this method by adding a parameter in the calculation of the threshold in the wavelet filtering using multi-scale edge detection and sum of squared coefficients SSC technique for the wavelet coefficients improvement, this parameter will control the filtering effect and get a good compromise between smoothing homogeneous areas and preserving linear structures. The advantage of this algorithm is to use the advantages of both filters and to obtain images with well reduced speckle.

Visual and statistical evaluation and a comparative study are performed to validate the studied methods according to the following criteria: best filtering in terms of smoothing homogeneous areas, preserving edges and conservation of the polarimetric information.