

## A Novel Sea-Land Segmentation Based on Integral Image Reconstruction in MWIR Images

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### Appendix A Introduction

The general evaluation indicators “precision”, “recall” and “F-measure” can explore algorithm performance with varying parameters. Our proposed method has some parameters, such as integral image reconstruction window size “S1”, down-sampling of medium filtering window size “S2” erosion and dilation intensity “D” and iterated circle “N”. The calculation below define “Precision” and “Recall” respectively:

$$P = \frac{TP}{TP + FP} \quad (1)$$

$$R = \frac{TP}{TP + FN} \quad (2)$$

Where “TP” indicates the total number of true positive pixels, “FP” denotes the number of false positive pixels, and “FN” is the number of false negative pixels in our sea-land segmentation application.

### Appendix B More Information

To optimize the parameters of proposed method, we need to choose values for “S1” and “S2” in a 30m spatial resolution MWIR image. In the binary image hole-filling process, the erosion and dilation intensity “D=3” which tends to remove small holes and noise candidates. Subsequent iterations can improve hole-filling in binary patterns, but each iteration includes down-sampling of the medium filtering, which causes slightly deformation of the sea-land segmentation result; therefore, the parameter “N” was set to 3, to balance the hole-filling performance and the deformation of down-sampling with medium filtering. We also needed to optimize the window size parameters “S1” and “S2”. By changing the parameters “S1” and “S2”, we obtain the recall-precision curve RPC below. The Fig. S1 shows the relationship between true and false positive rates. All curves are statistic from the average of nine MWIR images.

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Form Fig. S1, the black line inflection point shows the best performance of parameter optimization; at this point, the parameters chosen are “S1=3”, “S2=3”, “N=3” and “D=3”; therefore, our proposed algorithm used these parameters. In addition, in all curves in Fig. S1, we observe that performance worsens when the filtering and down-sampling window sizes increase. Under different parameter configuration, the integral image reconstruction filtering window size chosen was “S1=3” which performed best in our method.

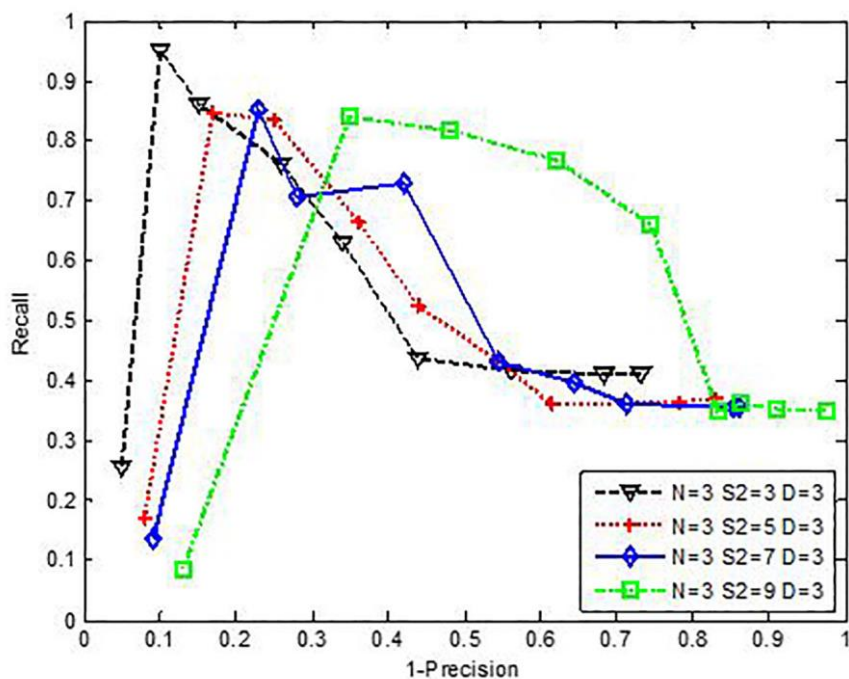


Figure S1 RPC with different parameters