

Detecting and analysing informal settlement structures in China by combining high resolution optical and SAR imagery

Chunzhu Wei*^a, Thomas Blaschke^a, Hannes Taubenböck^b

^aDepartment of Geoinformatics - Z_GIS, University of Salzburg,, Austria;

^bGerman Aerospace Center (DLR), German Remote Sensing Data Center, Germany

1. Introduction

Urban villages are Chinese version of informal settlements. They comprise mainly low-rise and congested, often informal settlements surrounded by new constructions and high-rise buildings whereby structures can be very different between neighboring areas.



Figure 1. Urban village phenomenon

2. Research Gap

There is still no definitive spatial description or a general systematical definition on such locations based on optical and SAR data. Therefore, the overall objective of this research is to develop an innovative framework for combined analysis of multi-spectral image GaoFen-1(GF) and single-polarization TSX imagery in urban village monitoring.

3. Methodology

Shenzhen is one of the most densely populated, most populous, rapidly commercialized and urbanized economic regions in China, with a population of 12 to 15 million people. and there are around 6 million residents living in urban villages.

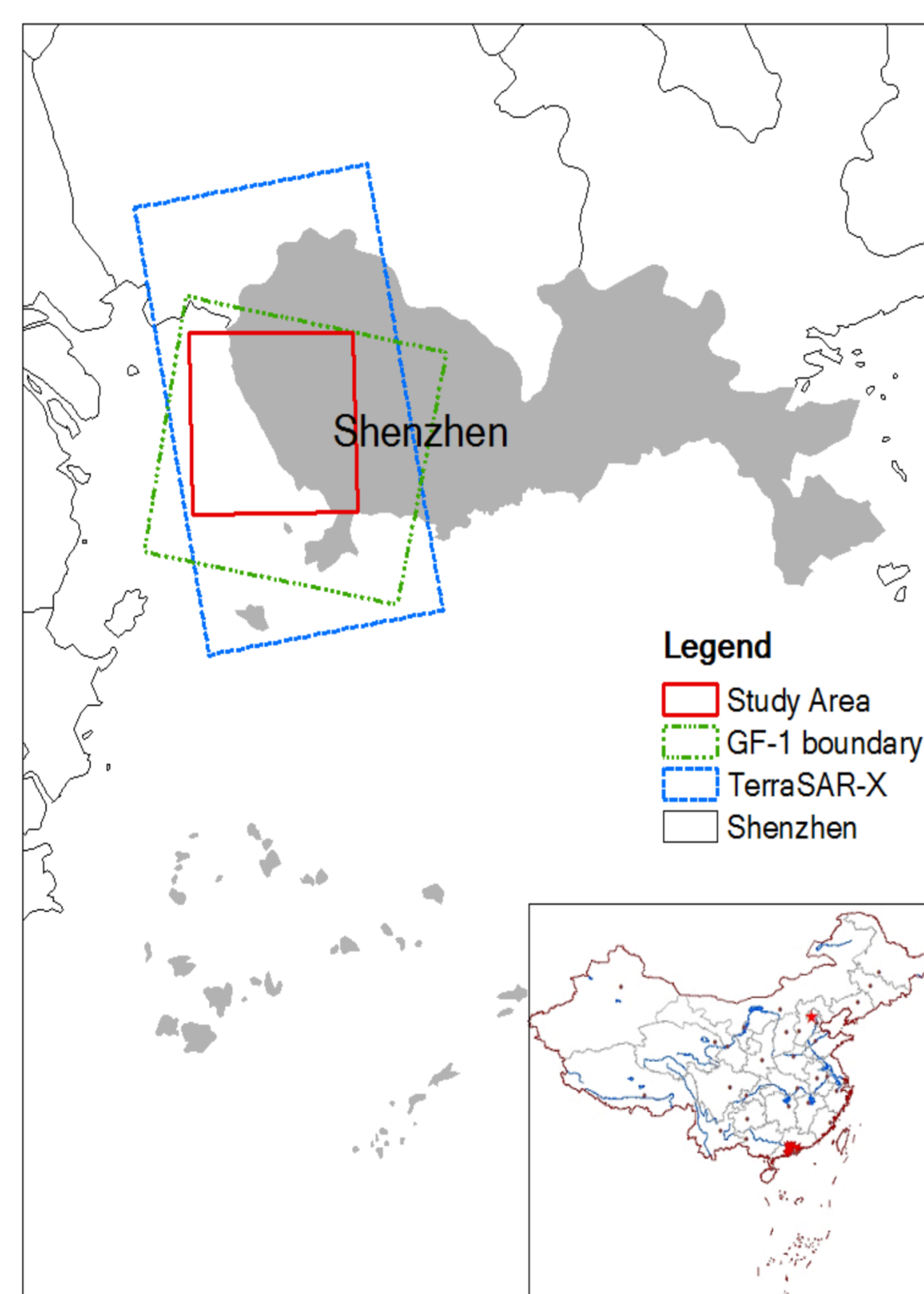


Figure 2. Study area-Shenzhen

The overall analysis procedure which mainly comprised four main stages is shown as follow:

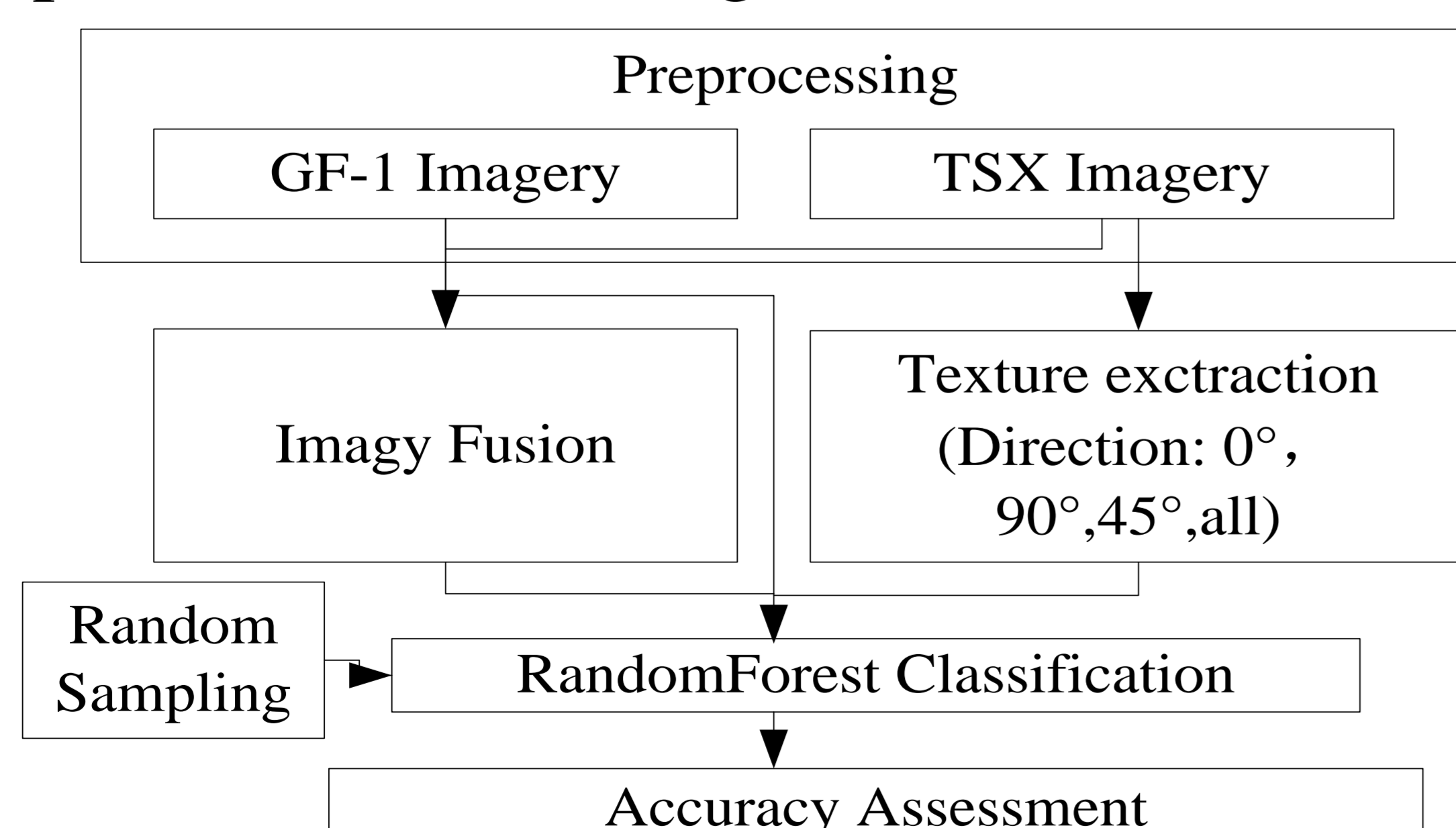


Figure 3. Flowchart of urban village classification

4. Results

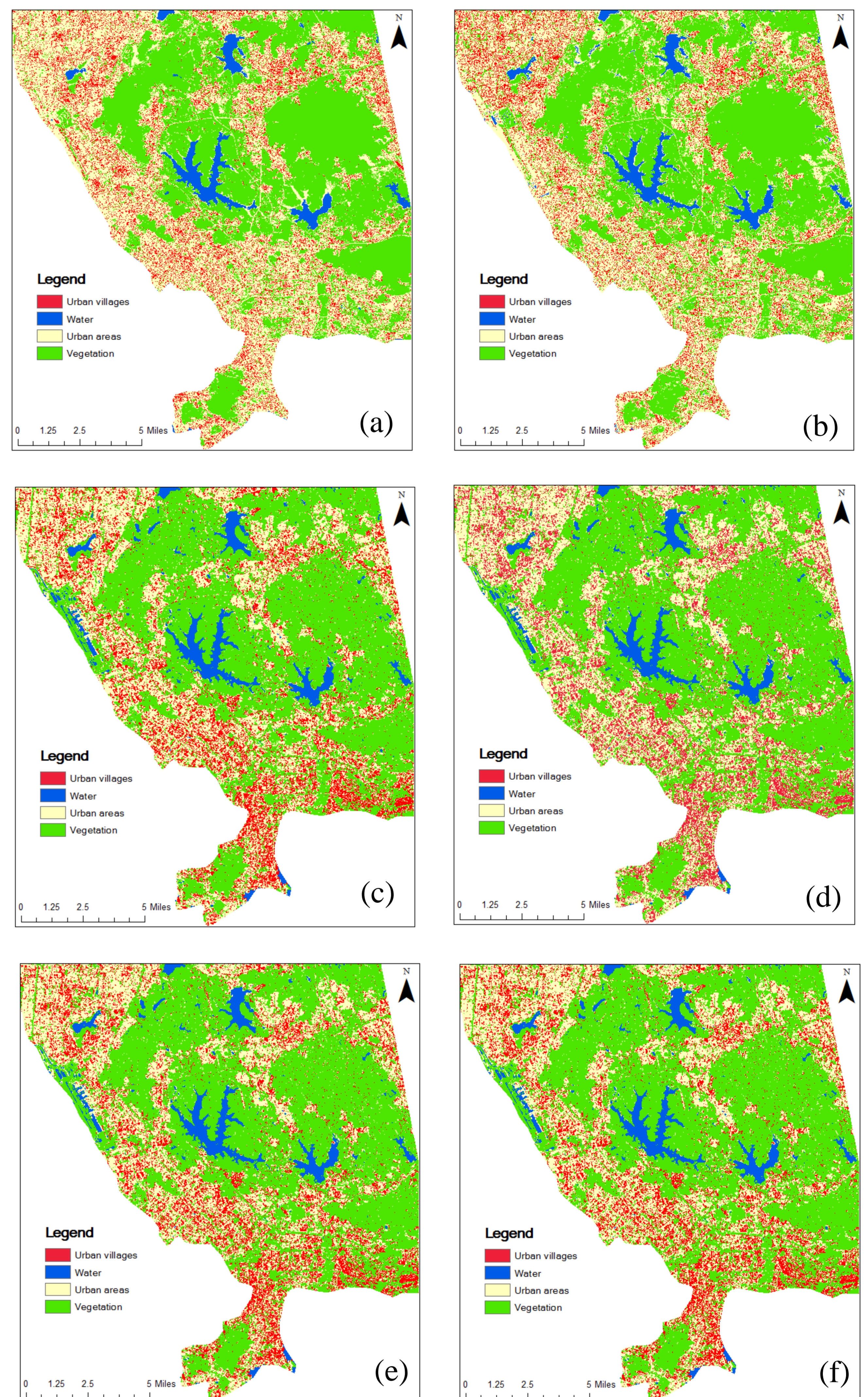


Figure 4. Urban villages extraction map derived through Random Forest algorithm using different input features: (a) GF-1 image, (b) GF+TSX, (c) GLCM 0°, (d) GLCM 90°, (e) GLCM 45°, (f) GLCM all

Table 1. Overall accuracy of urban village maps

	GF-1 (%)	GF-1+TSX (%)	GLCM All (%)	GLCM 90° (%)	GLCM 45° (%)	GLCM 0° (%)
Overall accuracy	79.10	79.98	80.96	82.33	80.87	80.97
Kappa	0.72	0.73	0.75	0.76	0.74	0.75

5. Conclusion

The GLCM texture information from the TSX image performed well in informal settlement mapping, adding the TSX data was significant importance since the texture feature input or fusion image input all enhance the overall accuracy of urban villages mapping in the city of Shenzhen, China.