Multitemporal Multisensor Spaceborne SAR Data for Urban Land Cover Mapping and Change Detection: Preliminary Results

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The overall objective of this research is to investigate Multitemporal Multisensor Spaceborne SAR Data for urban land cover mapping and change detection in China. The specific objectives are to:

- Improve our knowledge and understanding on the interaction between X-, C- and L-band SAR and urban land cover features
- Evaluate L-SAR, C-SAR and X-SAR data and their synergy for urban land-cover mapping
- Develop effective methods for change detection using multitemporal SAR data

During 2008, multitemporal ENVISAT ASAR, ALOS PALSAR and Terra SAR-X data were acquired over Shanghai. ERS-2 SAR and JERS-1 SAR data from the 1990s were collected for change detection. Fieldwork was conducted to facilitate calibration and validation.

The methodology for this research involves image pre-processing, segmentation and classification, change detection and accuracy assessment. Segmentations were performed on the multisensor SAR data using eCognition. Classifications were then carried out using support vector machines (SVM). Decision level fusion of EVNISAT ASAR, ALOS PALSAR and Terra SAR-X data are being investigated to improve urban land cover classifications. Several change detection algorithms including a minimum error thresholding algorithm were tested for detecting urban expansion using multitemporal SAR data. The urban land-cover classifications and change detection results are being validated based on in-situ field survey data, orthophotos and other existing information.

The preliminary results showed that, for classification of single sensor data, ALOS PalSAR data yielded better overall classification accuracy than ENVISAT ASAR and Terra SAR-X data. Decision level fusion of multisensor SAR data is expected to produce better urban land cover classification than the single SAR data. For change detection, the initial results showed that unsupervised method using the minimum error thresholding algorithm was effective to detect positive changes (i.e., urbanization) while the detection of negative changes still need further research.