Improving Methods of Crop Monitoring with Envisat Data

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For crop identification, the fusion data of Envisat ASAR VV polarization backscatter data and HJ satellite multi-spectral data is investigated using different classifiers. The results indicate that fusion data can take full advantage of spectral information of HJ multi-spectral data and the structure sensitivity feature of ASAR VV polarization data. The fusion data enlarges the spectral difference among different classifications and improves crop classification accuracy. HJ multi-spectral data can effectively classify crop in the study area and the classification accuracy reaches 89.2% using Support Vector Machine classifier. But problems with the classification results of HJ multi-spectral data are that field border cannot be effectively recognized and misclassification. It can obviously improve accuracy of crop classification with fusion of HJ multi-spectral and ASAR data. The classification accuracy using fusion data can be increased 5 percent compared to the single HJ CCD data. Furthermore, ASAR VV polarization data is sensitive to non-agrarian area of planted field, and VV polarization data joined classification can effectively distinguish the field border. VV polarization data using in crop classification enlarges the application of SAR data and has potential of spread in agricultural filed.

In addition, Multi-temporal C-band Envisat ASAR data and an X-band TerraSAR data were investigated for crop classification in the North China Plain, and texture information of SAR data was also investigated. Support vector machine classifier was selected for classification using different combination of these SAR data. The classification results indicated that multi-frequency SAR data could measure the different backscattering characters of crop based on different scattering mechanisms and improved crop classification accuracy. Furthermore, texture information contained in SAR data were also important for crop classification and been useful for improving classification accuracy. For crop classification, combination of two frequencies (X and C band) SAR data was better than the combination of multi-temporal C band SAR data. Furthermore, only two periods of SAR data were enough for crop classification, and the SAR data in jointing and flowering periods of wheat were better for wheat identification, much more periods of SAR data had little help for improving classification accuracy. SAR data was an attractive data source and had great potential for agriculture monitoring, and would be the suitable substitution or complementarily of optical data in the future.