



Agricultural Land Use classification from Envisat MERIS

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This study focuses on evaluation of a crop classification from middle-resolution images (Envisat MERIS) at national level. The main goal of such Land Use product is to provide spatial data for optimisation of monitoring of surface and groundwater pollution in the Czech Republic caused by pesticides use in agriculture. As there is a lack of spatial data on the pesticide use and their distribution, the localisation can be done according to the crop cover on arable land derived from the remote sensing images.

Often high resolution data are used for agricultural Land Use classification but only at regional or local level. Envisat MERIS data, due to the wide satellite swath, can be used also at national level. The high temporal and also spectral resolution of MERIS data has indisputable advantage for crop classification.

Methodology of a pixel-based MERIS classification applying an artificial neural-network (ANN) technique was proposed and performed at a national level, the Czech Republic. Five crop groups were finally selected - winter crops, spring crops, summer crops and other crops to be classified. Classification models included a linear, radial basis function (RBF) and a multi-layer perceptron (MLP) ANN with 50 networks tested in training. The training data set consisted of about 200 samples per class, on which bootstrap resampling was applied. Selection of a subset of independent variables (Meris spectral channels) was used in the procedure. The best selected ANN model (MLP: 3 in, 13 hidden, 3 out) resulted in very good performance (correct classification rate 0.974, error 0.103) applying three crop types data set. In the next step data set with five crop types was evaluated. The ANN model (MLP: 5 in, 12 hidden, 5 out) performance was also very good (correct classification rate 0.930, error 0.370).

The study showed, that while accuracy of about 80 % was achieved at pixel level when classifying only three crops, accuracy of about 70 % was achieved for five crop types. Good classification accuracy was found in the case of winter crops. Lower classification accuracy of spring and summer crops need to be improved. The potential improvements are seen in use of the neural net with mixture model and increasing evenly distributed training data within the region of interest.

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