Title of the thesis: Continental wetland and forest mapping using MODIS data

Summary of the thesis

Land cover maps developed by the satellite remote sensing are very important for estimating the global carbon cycle and climate model, and for assessing the global environmental change. However, in the existing global land cover maps, land cover classes related with wetland and forest have lower categorical accuracies compared with other land cover classes. With these issues in mind, in this study, we developed the new continental maps for wetland and forest using MODIS data.

The whole thesis is focused on the following two points:

(1) Wetland mapping in North America by decision rule classification using MODIS and ancillary data

Wetland plays an important role in the maintenance of water resources and biodiversity of the earth. However, in recent years, the global distribution of wetlands has been changing due to the global climate change and land cover change. To monitor the temporal and spatial variability of the wetland environment is very important in improving flood prevention, water purification and biodiversity. In this study, we used the 500 m MODIS data of 2008 together with 1 km elevation data (GTOPO30) and a climate map to develop the wetlands map in North America. For this purpose, a multi-level decision rule method was developed. The decision rule method includes the following steps: (a) using the threshold method to separate non-vegetation land types from vegetation land types, (b) using the elevation data and the threshold method to mask the high altitude area where wetlands do not probably exist, (c) using the climate – vegetation correlation to divide the study area into five sub-region, (d) using the MODIS tasseled cap indices and the decision tree method to extract wetlands from non-wetland vegetation classes, and (e) integrating the results from (a) to (d) to generate the final wetlands map for North America. Results from accuracy assessment and comparison with existing global land cover datasets demonstrated that the decision rule classification method developed by integrating the advantages of different data improved the spectral and spatial resolution of the classification data, and proved effective for mapping wetlands at a continental scale.

(2) Forest mapping in Northern Eurasia using MODIS vegetation indices

Northern Eurasia is mainly composed of needleleaf evergreen forest and needleleaf deciduous forest. In the validation of the existing global land cover map – Global Land Cover by National Mapping Organiza-