Land cover change mapping using MODIS time series to improve emissions inventories

Gerardo López-Saldaña, Tristan Quaife, and Debbie Clifford
University of Reading, Department of Meteorology, Reading, United Kingdom (g.lopezsaldana@reading.ac.uk)

MELODIES is an FP7 funded project to develop innovative and sustainable services, based upon Open Data, for users in research, government, industry and the general public in a broad range of societal and environmental benefit areas.

Understanding and quantifying land surface changes is necessary for estimating greenhouse gas and ammonia emissions, and for meeting air quality limits and targets. More sophisticated inventories methodologies for at least key emission source are needed due to policy-driven air quality directives. Quantifying land cover changes on an annual basis requires greater spatial and temporal disaggregation of input data. The main aim of this study is to develop a methodology for using Earth Observations (EO) to identify annual land surface changes that will improve emissions inventories from agriculture and land use/land use change and forestry (LULUCF) in the UK. First goal is to find the best sets of input features that describe accurately the surface dynamics.

In order to identify annual and inter-annual land surface changes, a times series of surface reflectance was used to capture seasonal variability. Daily surface reflectance images from the Moderate Resolution Imaging Spectroradiometer (MODIS) at 500m resolution were used to invert a Bidirectional Reflectance Distribution Function (BRDF) model to create the seamless time series. Given the limited number of cloud-free observations, a BRDF climatology was used to constrain the model inversion and where no high-scientific quality observations were available at all, as a gap filler. The Land Cover Map 2007 (LC2007) produced by the Centre for Ecology & Hydrology (CEH) was used for training and testing purposes. A land cover product was created for 2003 to 2015 and a bayesian approach was created to identified land cover changes. We will present the results of the time series development and the first exercises when creating the land cover and land cover changes products.