

A Web-Service based Tool to Generate Crop Rotation Management Input Files for Spatially distributed Agroecosystem Models

Holm Kipka¹, Olaf David, Jim Lyon and Luis A. Garcia

Civil & Environmental Engineering Department, Colorado State University, Fort Collins

Timothy R. Green and James C. Ascough II

United State Department of Agriculture (USDA) – Agricultural Research Service (ARS), Agricultural Systems Research Unit, Fort Collins

Ken Rojas

United State Department of Agriculture (USDA) – Natural Resource Conservation Service Fort Collins

Abstract. For water quality assessment, there are currently models available like the Soil and Water Assessment Tool (SWAT), Agricultural Policy / Environmental eXtender (APEX) model and the component-based AgroEcoSystem-Watershed (AgES-W) model. These models use similar conceptual components to simulate nutrient and chemical transport by water using spatially distributed ecosystem response units (ERUs) and require input data about agricultural management operations for each ERU. The USDA Natural Resource Conservation Service (NRCS) is developing a Land Management and Operation Database (LMOD) which contains input data suitable as potential model input including crop species, dates for planting and harvesting, and details for tillage operations. However, LMOD only provides such data for 78 large-scale crop-management zones (CMZs) in United States rather than small scale data at the individual field level as required by these models. A Java-based web-service tool, the Crop Rotation and Management Builder (CRMB), provides the missing spatial information for LMOD by using a spatially enabled data provider, the CropScape web service from the USDA National Agricultural Statistics Service (NASS). The NASS CropScape service offers a remote sensing based raster Crop Data Layer (CDL) for a specific year and a spatial Area of Interest (AOI). The ERUs are represented in an ESRI shape file or as a polygon point text file. CRMB queries the annual main crop information from the NASS CropScape web-service for available CDL years. After reclassifying crop information within each AOI to adjust the final crop area using NASS CropScape provided accuracy values, CRMB selects the crop information by majority area size. CRMB will detect a sequence of main crops for every AOI and year. It matches the crop sequence to actual available crop rotation information in LMOD and links the AOI to an actual crop rotation with all available management operation information. Finally, CRMB generates the required management input files. The presentation will review the process of supplying AgES-W with the required crop rotation management input files as derived from the CRMB, and provide a detailed description of the CRMB web-service tool workflow. A demonstration using spatial test data from Colorado and Iowa will also be given.

¹ Civil & Environmental Engineering Department
Colorado State University
Fort Collins, CO 80523-1372
Tel: (970) 492-7360
e-mail: holm.kipka@engr.colostate.edu