The 6th BioGIS Forum – Spatial Information System in Biodiversity Sciences "GIS tools and data sources in the modelling of the spreading of pollen grains and fungal spores

is organized by:

Adam Mickiewicz University, Poznań; Faculty of Biology:
Laboratory of Biological Spatial Information

Co-organizers:

| Esri Poland | MGGP Aero
technology partner | ProGea 4D |

SCIENTIFIC AND ORGANISING COMMITTEE

Maciej Nowak (Chairman), Bogdan Jackowiak (Vice-Chairman), Maria Wojterska, Zbigniew Zwoliński, Paweł Bogawski, Łukasz Grewling, Katarzyna Pędziwiatr (Adam Mickiewicz University); Marta Samulowska, Edyta Wyka (Esri Poland).

Programme

Saturday, 03.06.2017, Collegium Biologicum, Poznań

10.30-10.45   *Registration and morning coffee*

10.45-13.00   Workshop Session part one (workshop 1 and 2)
Trainer: Adrian Kujda (ProGea 4D)

13.00-13.45   *Lunch time*

13.45-16.00   Workshop Session part two (workshop 1 and 2)
Trainers: Monika Grodecka, Edyta Wyka (Esri Poland), Paweł Bogawski (Adam Mickiewicz University)

Introduction

Geographical Information System (GIS) consists of computer devices, software, data, methods and professionals working in the institutional context. It can be treated as a platform for research that has a spatial reference, not limited to geographical research only, but also encompassing different biological phenomena. GIS is also used more and more frequently in aerobiology – a branch of biology studying organic particles such as bacteria, fungal spores, pollen grains that are airborne. This branch rapidly develops due to the increasing number of people suffering from inhalant allergy. To date, according to the World Health Organization, allergy symptoms involved millions of people all over the world. Airborne fungal spores and pollen grains are among the most important triggers of allergy symptoms. Therefore, there is a need for identification of pollen and spores sources, their prevailing inflow directions, estimation of pollen and spores emission and explaining long-distance transport mechanisms.

Such studies mostly have a spatial reference and thus problems can be solved by the use of GIS. It enables to obtain new results that could not be explored without GIS. To facilitate the transfer of GIS knowledge into aerobiology, GIS workshops in the framework of Bio-GIS Forum have been organized along with the Polish Aerobiological Symposium. GIS computer workshops together with a Forum BioGIS symposium are organized every year by Laboratory of Biological Spatial Information at Faculty of Biology AMU in Poznań and attract many GIS users for coming and sharing ideas of GIS application in biodiversity. This year, in a 6-th edition of BioGIS Forum, two 5-hour workshops have been planned. They focus on:

- Spatial data sources (above all: LiDAR data, satellite/aerial images, Forest Data Bank, Topographic maps TBD) and methods for aerobiology
- Using GIS in modeling of the spatial distribution of pollen grains.

ESRI Polska and ProGea 4D companies supported the organization of the workshops. MGGP Aero company was a technological partner of the event.

Dr Maciej Nowak
Chairman of the 6th BioGIS Forum

BioGIS Workshop I

"Different sources of geospatial data in aerobiology researches"

Trainer: Adrian Kujda (ProGea 4D)

The workshops aim at the use of Airborne Laser Data, satellite and aerial imagery and some vector data, as Forest Numeric Map and Topographical Features Base. Excercises will show how to process geospatial data to analyse forest regions, measure changes in forest cover, estimate vegetation condition or conduct automatic classification. The software that will be presented are LP360 (GeoCue) and SAGA LIS (LASERDATA) and allows acquiring information about individual tree characteristics (height, diameter at breast height, spread, automatic trees counting on selected area).

Plan of the workshop:

- Basic characteristics of the data, importing data to software.
- Point cloud automatic classification.
- Creation of Digital Terrain Model and Digital Surface Model.
- Individual trees characteristics in 2D and 3D cross-section.
- Automatic trees detection and counting on selected area.
- NDVI indice in estimating vegetation condition.
- Forest change detection (eg. forest succession)
- Supervised classification basing on satellite imagery.

BioGIS Workshop II

"Modelling of the timing of pollen release and spatial distribution of pollen grains"

Trainers: Monika Grodecka, Edyta Wyka (Esri Poland), Paweł Bogawski (Adam Mickiewicz University)

This workshop has been divided into three parts. In the first part the possibilities of AcrGIS online in describing and analysing the spatial distribution of air pollution (particulate matter, PM10). A participant will learn how to visualize the spatial data based on numerous measurement points and how to find the most probable location of air pollution emission.

In the second part of the workshop, a method for estimating the timing of pollen release will be presented, based on selected allergenic species as birch and grasses. The estimation will be performed on the basis of the data obtained from Pan European Phenological Database. During this part of the workshop, the most of the work, for example, identification of the area of the earliest pollination, will be performed in ArcMap application.

The last part of the workshop will involve modelling of the pollen emission and pollen inflow directions using one version of the HYSPLIT (*Hybrid Single Particle Lagrangian Integrated Trajectory*) model. The basic functionalities of the model will be presented and the user will learn how to determine trajectories of different types. Moreover, the participants will be able to visualize the results from the HYSPLIT model on different backgrounds, for example Corine Land Cover map.

Plan of the workshop:

- Introduction to the spatial data sources using during the workshop,
- Analysis of spatial variability of air pollution (particulate matter, PM 10), using simple, deterministic interpolation techniques,
- Searching for potential sources of air pollution on the basis of concentration data using ArcGIS Online,
- Transformation of data tables for using as spatial data,
- Joining attribute tables,
- Application of stochastic methods for estimation of the timing of the pollen release for large areas,
- Identification of the areas of the earliest pollen release,
- Conversion of vector files to .kml files enabling visualization in Google Earth,
- Description of the principles and assumptions of the HYSPLIT model as well as the basic functionalities,
- Calculating the backward trajectories indicating potential pollen source areas,
- Calculating the forward trajectories indicating possible directions of the pollen spreading from a known source tree or population,
- Description of different visualization possibilities.