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E u r o p e

Land classification from old aerial panchromatic photographs

Highlignts the potential of old aerial images which represent a huge sources of information from past decades before the advent of modern satellite and aerial imagery.

Background

UNEP/DEWA/GRID-Europe received a mandate from DCMO (Direction Cantonale de la Mensuration Officielle) of Geneva Canton to carry out a pilot study on the rectification of old aerial panchromatic photographs. DCMO owns hundreds of aerial photographs, already digitized, but not orthorectified. Complete coverage of the canton is available since 1937. The pilote study was done for 1937 on a northern portion of the Genevan territory (Versoix).

Methodology

Aerial photographs are geometrically distorted for several reasons, such as lens aberration, irregularities of the flight line and the height of the objects. If today these problems are solved through recording of camera properties and flight parameters, this was not the case 70 years ago: the lack of available information implies that it is not possible to use automatic orthorectification operations. The best solution is then to apply geometric corrections through mathematical transformation functions. This method involves selecting a large number of control points, both on the image to be rectified and on a reference image. To this end, a modern orthophoto of 2005 with corresponding vector layers was used to determine hundreds of points. Geometric rectification was carried out either through a polynomial fit or by "rubber-sheeting". After this phase, the rectified images were joined as a mosaic to cover the whole commune of Versoix.
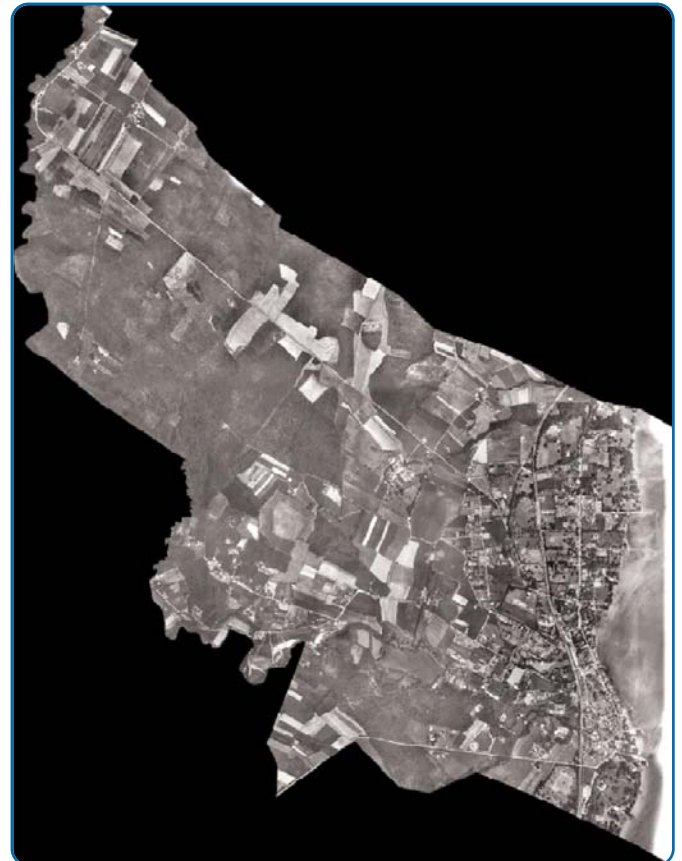
Vector layers of the Geneva Territorial Information System (SITG) can now be overlaid onto this raster layer. The precision obtained is between 1 to 10 meters in some areas, varying according to the method used. The worst distorsion was identified in areas having characteristics such as an important altitude gradient, a lack of control points in forest and cropland, or being at the edge of photos, where optical distortion is strongest.

Aerial panchromatic photographs, once rectified and georeferenced, represent potential sources of landcover information. Although they do not have multi-spectral information (colour), which is degraded as gray levels, they yield information like intensity (light to dark), texture, form and context. With the help of the **eCognition** software, it is possible to segment the image in an object mode. These objects are then classified using various criteria. For example, roads can be identified as objects having high reflectance, important asymmetry and specific shape ratio, whereas forest can be classified as dark-toned objects, with a non-homogeneous texture.

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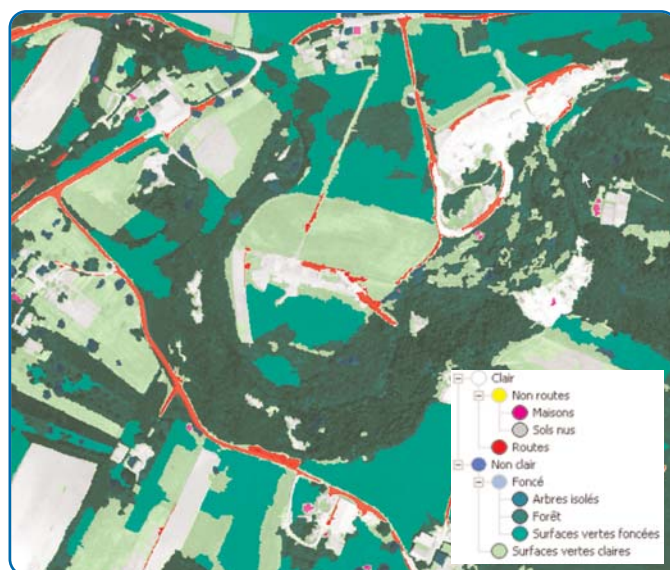## Partners

> Direction Cantonale de la Mensuration Officielle (DCMO)

Upcoming Activities/Results

This pilot study shows the potential of these old aerial images which represent a huge source of information for past decades before the advent of modern satellite and aerial imagery.

Preliminary classification obtained for the region of Versoix in 1937 on the basis of a rectified panchromatic aerial photograph.

About GRID-Europe

UNEP/DEWA/GRID-Europe is one of UNEP's major centres for data and information management, with a unique, "value-adding" mandate in the handling of global and regional environmental data, which in turn support the environment assessment and early warning activities of UNEP and its partners. Located in the "Maison Internationale de l'Environnement" or "International Environment House" (MIE/IEH) in Geneva, GRID-Europe serves as the unique francophone centre for the global GRID network. DEWA/GRID-Europe is supported by a "Partnership Agreement" between UNEP, the Swiss Federal Office for the Environment (FOEN) and the University of Geneva.