INSTITUT CARTOGRÀFIC DE CATALUNYA

V. Image cartography

Large scale true orthoimages

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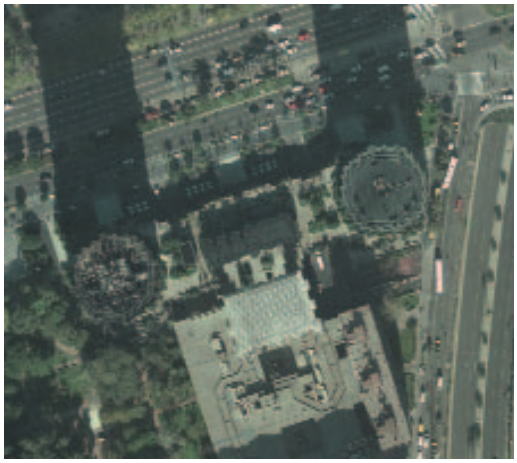

True orthoimage.

The digital orthoimage is a widely used cartographic product, both as a complementary element for traditional cartography, when this is not sufficiently up to date, and to enable information different from that usually found on a topographic map to be extracted.

It has been demonstrated that the results obtained when working to high resolution over complex terrains, such as urban zones, are inappropriate with standard procedures. In the first place, the digital terrain models (DTM) normally used are derived from existing cartography, which represent the terrain at ground level without reflecting the structures that that can be found on it (trees, buildings). Secondly, buildings normally produce hidden zones, in other words, areas that should be present in an orthogonal projection of the terrain, but which are hidden by a building in the photograph to be corrected. Thirdly, there is also a regular structure of data storage structure (grid) with fixed grid separation (sufficient to resolve the standard case with precision).

For these reasons, in order to produce a true orthoimage, an approach that differs from the standard approach is suggested. The alternative approach uses a tree-dimensional model of the existing structures, whereupon the hidden zones on each photograph are determined and the mosaic of the set of images of the same place obtained from various observation points can be generated. This mosaic is then used to create a product free of hidden elements (True Ortho), since it is expected that any point of the orthoimage can be seen from at least one of the images obtained.

Two storage properties of the information about the relief are needed for the correct generation of true orthoimages: adaptive density of the information, and capture and storage in a vectorial mode. The TIN (triangulated irregular network) models respect both properties.

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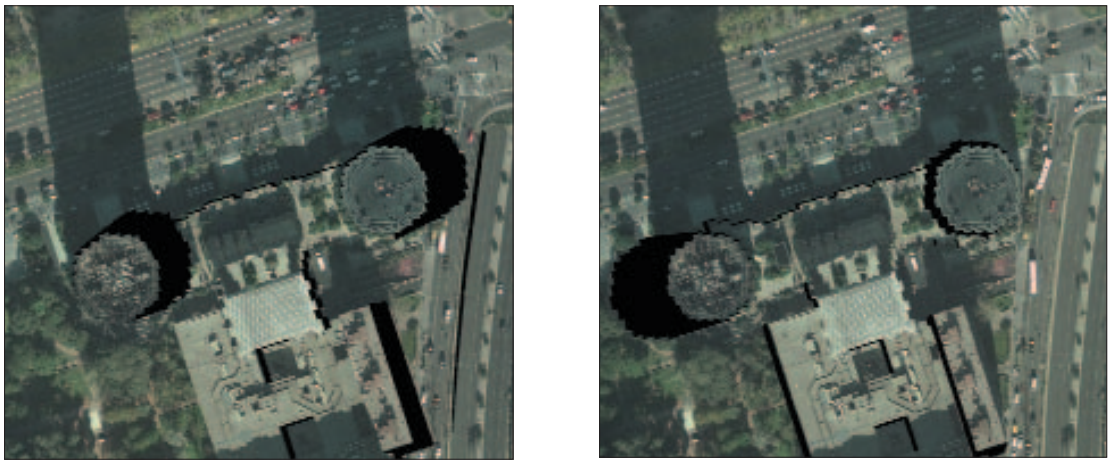
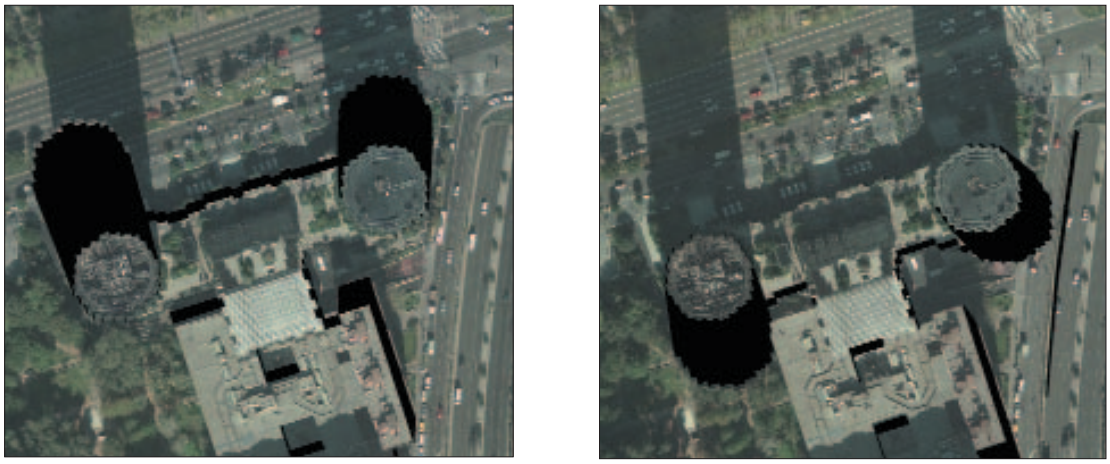
During the mosaic process it is necessary to resolve a series of problems: radiometric matching of the set of images, effects due to the imperfections of the DTM, objects not modeled (small structures: trees, urban furniture, etc.) and objects in movement. The present solution to these problems demands manual work by an expert operator and the use of a group of images with a high degree of transversal and longitudinal overlapping.



Photographs rectified without the elimination of hidden parts.



True orthoimages in combination with 3D visualization systems make it possible to navigate intuttively and interactively through the city.