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High-resolution Remote Sensing: Getting Information for Participatory Research

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High-resolution Remote Sensing: Getting Information for Participatory Research

Objective

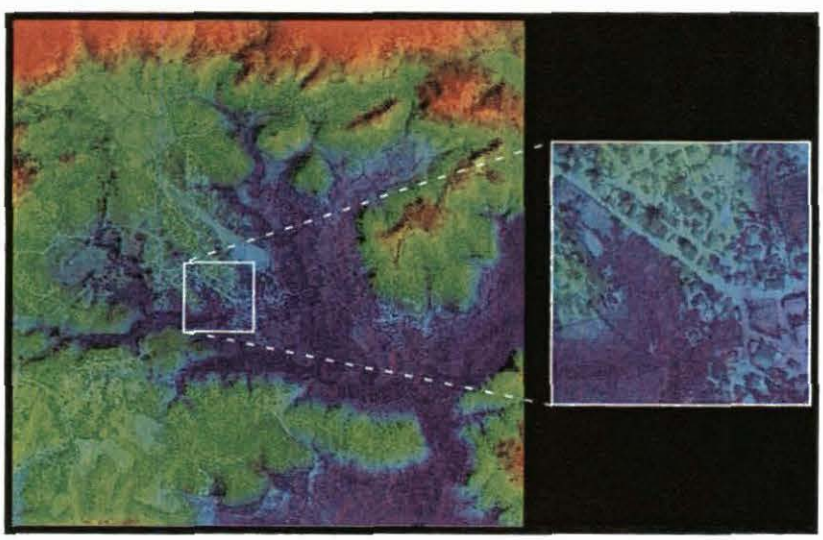
High-resolution imagery, either airborne or from space, together with advanced software, open the way to precision mapping, whereby 1:1,000 to 1:5,000 scale images can be routinely processed and provide detailed information on land-use and high precision digital elevation models (DEMs). This can be compared to a very efficient alternative to land surveying, and can also be used for participatory research. For example, unlike a Landsat TM imagery, high-resolution images may serve as a practical information input for a local community to recognise and localise such key elements farm boundaries, group of houses, trees and trails. High-resolution imagery can also be useful for understanding the behaviour of models and the loss of information as we go to smaller scales.

Method

Once a camera taking a series of images (e.g. airphotos) is properly positioned in space, orthoimages and DEMs can be produced. Using precise ground control points (determined with GPS), along with bridging techniques to tie overlapping images, the software matches the features in the overlap area and computes elevation at each match. A DEM typically has 5 m pixels with 1 m elevation precision. The orthoimage is derived from the original image by transforming it geometrically, using a DEM, to perfectly overlay a map. Its precision is typically 1 to 3 m, with a 1 m pixel size. Value-added products such as chromostereo images can be produced to increase the usability of orthoimages for participatory research, as alternatives to physical models. In the case of the Rio Tascalapa watershed in Honduras illustrated below, ground control points were taken with decimeter accuracy with a Dual Frequency Leica GPS. ERDAS Orthomax v. 8.2 on a Sun SparcStation 10 was used for processing.

Result

In the past, 1:1,000 scale styrofoam models have been built and used in the field to stimulate discussions on watershed management by the community. With the new 3D visualisation technique, users can delineate features (e.g. soil units, land-use, micro-watersheds) directly on a chromostereo image, therefore producing georeferenced information that can be readily transferred to a GIS. Detailed maps showing transportation networks, buildings and topography can be used to validate smaller scale maps as well as for cross-scale modelling.



Chromostereo image
of the Rio Tascalapa watershed, Honduras
(better viewed with ChromaDepth MD glasses, http://www.chromatek.com/)

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