THE CALCULATION OF BUILDING VOLUMES TO ESTIMATE URBAN POPULATION AT MEDIUM AND SMALL-AREA SCALE FROM HIGH-RESOLUTION SATELLITE IMAGES

Baiocchi, V.[1], Bianchini, R.[2] and Salerni, A.[1]

1. DITS – Area di Geodesia e Geomatica, Università degli Studi di Roma "La Sapienza", Via Eudossiana 18, 00184 Roma, Italy; Tel. +39644585068, Fax +39644585515; valerio.baiocchi@uniroma1.it
2. Centro Interuniversitario di Ricerca per lo Sviluppo Sostenibile (CIRPS), Università di Roma "La Sapienza", Valmontone (RM), Italy; roberto.bianchini@uniroma1.it

Accurate and updated data on population amount, density and spatial distribution is essential in growing urban areas for different activities, such as urban planning, environmental and resource management, service allocation, etc.

These aspects are of a great interest both, in developing countries where urban growth is generally extremely rapid and important, and in industrialized countries where large suburban sprawls may occur during inter-censual periods.

In recent years, remote sensing techniques have become an important resource in population estimation due mainly to the progressive improvements in the spectral reflectance and spatial resolution of the orbital remote sensors. However, the robustness of all of them is restricted without an adequate consideration of the building height and volume.

The actual availability of stereo images from high-resolution satellite sensors may provide adequate information for the estimation of building volumes as a primary element to estimate population at medium and small-area level.

This work describes the methodological aspects and results of a preliminary phase of the research aimed at experimenting correlation relationships between estimates of the volumes of groups of buildings calculated from stereo satellite images and the corresponding residents.

The building volumes were also derived from satellite monoscopic acquisitions using recently commercialized commercial software.

The study area comprises a portion of the municipality of Pozzuoli, located in the province of Naples. The remote sensing data is composed of a 1 meter resolution panchromatic stereo image IKONOS II acquired in November 2000 covering a ground area of about 117 km.

The validation procedure of the methodology will be based on the comparison between the results obtained from the analysis of the satellite images and the 2001 census data at enumeration area level.

In this paper we give a brief introduction into the topic and describe our first results on the determination of building volumes to develop a methodology for the estimation of urban population at medium and small-area scale comparing different techniques.

REFERENCES

i.   Tseng Y-H & S Wang, 2003. Semiautomated Building Extraction Based on CSG Model-Image Fitting, In: Photogrammetric Engineering & Remote Sensing, 69(2), 171-180 pp.