Opening address: Workshop on Earth Observation for Urban Planning and Management

The technology of earth observation has advanced rapidly over the last 30 years since the launch of NASA's first earth observation satellite in the early 1970s. Over the last 15 years the technology has passed from experimental to operational mode, and profit-making private organizations are replacing governments as the main sponsors and operators of Earth Observation data. The whole earth is now observed many times a day by satellite sensors orbiting at altitudes of several hundred kilometers, many of which are capable of capturing details well below one metre in size. Applications range from global scale, including climatic and ocean-atmosphere changes, soil erosion, land cover changes and ozone monitoring, to local scale flood hazard asessment, disaster monitoring, slope instability, urban growth, air pollution and traffic flow monitoring. An example of a brand new growth area is the emerging ecosystem services sector. The carbon market, for example is evolving quickly, and will benefit from the use of space imagery for measuring biomass, and recording carbon credits gained from changes in land use.

Although some medium resolution sensors of the last two decades such as Landsat and SPOT are reaching the end of their active lives and their future seems doubtful, at the same time there is a move toward smaller satellites that are cheap to build. A good example is one university in UK (Surrey), which has teamed up with developing country governments for disaster monitoring, resulting in countries such as Nigeria, Indonesia, Algeria, Turkey and Thailand launching their own small satellites. China's experience in the development of small satellites will be described by one of our guest speakers, Professor Tong Qingxi.

Such small satellites are robotic with programmable acquisitions, and PolyU (LSGI) researchers have teamed up with the European Space Agency to develop the applications of the PROBA (Project for On Board Autonomy) satellite carrying the CHRIS (Compact High Resolution Imaging Spectrometer) hyperspectral sensor, for aerosol monitoring in Hong Kong. The satellite has been able to capture images over Kowloon during pollution episodes over the last two months: September and October 2006.

Recent developments in technology have provided Very High Spatial Resolution (VHR) satellite sensors which are now available to the public through interfaces such as Google Earth and Microsoft's Virtual Earth.

These rapid developments in sensor technology have been of particular benefit for urban areas. By the year 2007, more than half of the world's population, currently at 6.45 billion, will live in urban areas (United Nations, 2006) and trends suggest the number of urban dwellers will rise to almost 5bn by 2030, out of a world total of 8.1. This rapid urbanisation is a global phenomenon giving rise to a variety of social and environmental problems In affluent cities, planning procedures become more complex with higher density living, and the quality of the urban environment is of great concern. Common to both of these is the need for information to assist governments in management and planning, the most basic of which is to record the spatial distribution of population, land

cover and infrastructure, and their trends over time. The synoptic view of cities afforded by earth observation confers great potential for data collection over urban areas although in reality urban areas have been the most challenging to remote sensing. The reasons for this, and some solutions will be addressed by this workshop.

The main issues include the nature of the data itself: activities and land use are not directly observable either on the ground or from a remote platform, and people are not static. The actual uses of objects such as buildings, building complexes or patches of land may be unknown even upon inspection at ground level. The same is true in attempting to evaluate urban environmental quality, which is largely a subjective concept, and is based on numerous parameters which vary at different scales over a city.

The convergence in resolution and interpretability between traditional aerial photographs and digital satellite images offers new exciting opportunities in the use of Earth Observation for urban planning and management. It also poses new challenges in the development of methodologies and software for the automated interpretation and extraction of objects from high resolution images. Today's speakers are working at the cutting edge of such developments and will describe their work.

Involved in these new and exciting developments in Earth Observation are two main interest groups: the researchers and system developers on the one hand, and the users on the other. The strength of this workshop lies in the bringing together of these two groups in Hong Kong, to examine the application of Earth Observation to Urban Planning and Management., and hopefully to arrive at some realistic assessments, recommendations and solutions. In Earth Observation the users are ultimately the most important, and their inputs and opinions are vital to steer the technology in the right direction. Researchers ignore users' opinions at their peril.

The setting of this workshop in Hong Kong is particularly appropriate since Hong Kong is perhaps the world's most extreme case of modern high density living. Its government and planners therefore have to be open to, (and up to date in), the latest techniques of data collection and analysis. The problems and solutions identified in Hong Kong are likely to be of relevance to many other world cities. Resulting from this workshop a policy document will be produced, which will be widely circulated locally and internationally. The contribution of everyone attending this workshop, especially in voicing their experience and opinions will therefore be invaluable, and will help to determine future directions in the discipline of Earth Observation.