Xuelian Meng, J Remote Sensing & GIS 2016, 5:3(Suppl)
http://dx.doi.org/10.4172/2469-4134.C1.001

World Congress on

GIS & Remote Sensing

August 01-03, 2016 New Orleans, Louisiana, USA

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New era of 3D coastal morphology mapping using LiDAR and unmanned aerial vehicle

Coastal morphology addresses the evolution of coastal features such as sediment, vegetation and their interaction with hydrodynamics, which is an important subject in coastal studies. Previous researches mainly used historical data from satellite or airborne sensors to map coastal morphology in land cover and 3D structure, which are limited by the availability in time, location, cost and resolution of existing data. Other commonly used approaches are field data collection through RTK (Real Time Kinematic) GPS, total station, leveling sensor and manual survey of vegetation plots. Although elevation profiles and vegetation plots provide insight into terrain morphology and sediment dynamics, these discrete survey methods faces major challenges in coastal environments with spatial heterogeneity and unpredictable locations with severe morphological changes. In recent years, the development of high-resolution and portable survey instruments of terrestrial light detection and ranging (LiDAR) and unmanned aerial vehicle (UAV) provide flexible field mapping tools to fill in the gap between the existing imagery and discrete field elevation survey, which have gained popularity in morphological mapping. This presented study focuses on our recent applications of terrestrial LiDAR and UAV on coastal morphological mapping by addressing the following questions: How effective and accurate are terrestrial LiDAR and UAV for coastal terrain mapping? What are the uncertainties and causes in areas with low accuracy? What are the main challenges to map densely vegetated coastal environment and how to correct elevation under dense vegetation? In the end, this study applies recently developed coastal morphology analyst (CMA) for sediment change and evolution analysis.

Biography

Xuelian Meng is an Assistant Professor at Louisiana State University and Fellow of the Coastal Studies Institute. Her research interest is to apply geospatial technologies to investigate fragile ecosystems that are sensitive to human activities. Specific topics of her research include LiDAR, unmanned aerial vehicle (UAV), 3D modeling of coastal morphology, image processing, feature extraction and land cover and land use analysis. Her recent studies focus on applying terrestrial LiDAR and UAV for coastal morphological mapping under dense vegetation and fine scale sediment change analysis. She is a life-time Member of the International Association of Chinese Professionals in Geographic Information Sciences (CPGIS), Member of Association of American Geographers (AAG) and American Society of Photogrammetry and Remote Sensing (ASPRS).

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