Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

HTT09-P01 Room:Convention Hall Time:May 25 18:15-19:30

Simple Evaluation Method for Flood Risk Using Rainfall Intensity Data and Machine Learning

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Floods especially pluvial flooding, is a major disaster in Japanese urban areas. Simulations are often used to assess flood risk, but such approaches tend to be highly complicated. Therefore, some simple methods using topographical indices, land use and rainfall data with statistical approach have been proposed. However, the accuracy of such methods is still low. This study aims to analyze the characteristics of flooded areas in the 23 wards of Tokyo and construct a simple method for evaluating flood risk using rainfall intensity data and machine learning. Radar rainfall data from the Japan Meteorological Agency were analyzed using Random Forest, a method of machine learning. The accuracy of the models constructed by Random Forest for flooded areas is almost 100% in many districts, but the accuracy for non-flooded areas are low. It means that the models can well predict flood occurrence, but many non-flooded areas are estimated as flooded areas. Therefore, it is necessary to improve the model.

Keywords: flood, rainfall inrensity, machine learning, GIS

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Survey on grain roughness in a mountain river by using airborne LiDAR point cloud data

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Small-scale topographic features are commonly found on a mountain river. One of the important features is grain roughness for affecting the water flow or debris flow resistance of the mountain channel. One of the difficulties is to measure grain roughness in a mountain river because a lot of grains and rocks are larger than a few meter diameter.

In this study, we use a point-cloud data earned by airborne LiDAR to calculate simple statistical indexes of the roughness in the lattice bins covered with the objective region of the mountain river. The results comparative with the in-situ grain size distribution earned by the grid count method show relatively good relationship.

Keywords: mountain river, grain roughness, airborne LiDAR

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The annual net ecosystem exchange in a subtropical broadleaf plantation in southern Taiwan.

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Carbon flux of regenerating vegetation is considered as a major factor in determining the sequestration strength and associated uncertainty of terrestrial ecosystems and its role in slowing down the increase of atmospheric CO_2 concentration. In the purpose to quantify the long-term net exchanges of carbon, water, and energy between the broadleaf plantation and the atmosphere, this study picked an existed reforested sugar cane farm which was reforested by multiple broadleaf species from 2002 to 2005 in Pingdong, southern Taiwan as a field site and installed an open-path eddy-covariance tower since 2008. The tower-based annual net ecosystem exchange (NEE) were -1.0, 1.3, 0.5, and -1.0 Mg C $ha^{-1}yr^{-1}$ for 2009-2012, respectively. However, these results were conflicted with biometric investigation. A further study using Hsieh's footprint model (Hsieh et al., 2000) combined with geographic information system (GIS) showed most of the flux sources were within the range of 250 m and monsoon and periodic winds existed clearly. The tower-based NEE could be mis-explained because the daytime and nighttime flux sources actually came from different plantations/species. The tower-based Re (ecosystem respiration) was over-estimated about 0.56 umol $m^{-2}s^{-1}$. The annual mean NEE in plot no.10 and no.11 was -3.12, -0.87, -1.58, -3.09 Mg C $ha^{-1}yr^{-1}$ for 2009 to 2012, respectively after a simple revision.

Keywords: carbon dioxide flux, eddy covariance, net ecosystem exchange (NEE), plantations of multiple broadleaf species, footprint