
[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-HW Hydrology & Water Environment

[A-HW21] Human-Natural system interactions and solutions for environmental management

convener: Yuei-An Liou (National Central University)

Sun. May 20, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

Natural system, environmental quality, and anthropogenic processes have strong relationship.

Environmental changes and their causes increase the needs to address the consequences taking place in the structural and functional ecosystems. Much progress of anthropogenic activities has been made and significantly improves social economics. However, human system has been altering and raising burden on the natural system by alerting land use and land cover, bringing up water, soil and air pollution, changing regional and global climate, and increasing frequency of natural disasters, e.g., floods, landslides.

Planners are increasingly pressured with challenges of balance between demands and developments while lessening the detrimental impact of social processes on environment. Remote sensing and GIS have been proved with their advantages in providing data and tools to model and visualize spatiotemporal environmental changes and influential factors so that practical policy for environmental protection and management can be proposed.

This session seeks for papers on advancements in the development of techniques and models with remote sensing and GIS to contribute environmental applications, to exhibit and visualize influences of human activities on environmental changes and to improve understanding of the relationship between anthropogenic activities and natural system and climate patterns. Solutions for environmental management in short- and long-term visions are very welcome.

[AHW21-P03] Exploring Impacts of Land-Cover Conversion on Regional Convective Heavy Rain Events in Metropolitan Areas in Taiwan

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Keywords: Convective rainfall, Land cover change, Urbanization, Surface energy budget

The heavy rainfall is recognized as one of the most frequent and widespread severe weather events in many regions. In the recent years, the intensity and frequency of heavy rainfalls and the consequent hazards (e.g. urban flooding, flash floods, landslides, and so on) are becoming major environmental issues over different temporal and spatial scales. Many studies regarding the long-term statistics of rainfall events found that in many regions, the characteristics of heavy rainfall events are underlying significant variations and strongly affecting the regional water cycles and microclimate. Among these factors, the conversions of land-use/land-cover (LULC) is drawing much more attentions because the changes in LULC directly lead to the variations in thermodynamical and mechanical properties of the different land surface types, and further alter the triggering patterns of the consequent convective heavy rainfall events.

In this study, we used a series of analysis to quantify how the conversion of LULC and urbanization process influence the properties of convective heavy rainfall events in the Taipei metropolitan area in northern Taiwan. First, we used analytical slab model to capture the triggering of convectively rainfall events by simply using the surface observation. Second, we applied the long-term statistics to quantify

the trends of convective rainfall events and the results showed that the frequency of convective rainfall events is increasing in the past decades in Taipei. Finally, we used a mesoscale numerical weather forecast model to simulate the physical properties of the convective heavy rainfall events under different historical land use compositions, and the results showed that the patterns are highly correlated with the LULC in Taipei.