Using TRMPA and MODIS time-series high-level products to identify spatio-temporal patterns of water yield.

Mazlan Hashim[1], Mohd Idris Ali[2], Mohd Izuan Nazri[1], Aisya Aziza Abas[1]

[1] Institute of Geospatial Science & Technology (INSTeG)
Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Malaysia
Email: mazlanhashim@utm.my
[2] Civil Engineering & Earth Resources, *Universiti Malaysia Pahang*,
Lebuhraya Tun Razak, 26300 Gambang, Kuantan, Pahang Darul Makmur, Malaysia

Abstract: Advances in the entire earth observation technology are phenomenal. This is evident with wide spectrum operational applications of satellite remote sensing, covering regional to local scale. Satellite remote sensing missions over the last decade have seen a major breakthrough in data sharing, particularly for applications related to environmental and natural resource management. Apart from the above, parallel advancement in computing technology including the internet-industries has also catalyst the generation of enormous volume of satellite high level products that are generated through specific developed algorithms. Amongst examples of these high levels products are MODIS and TRMPA, and there numerous various other sensors covering products of land, marine as well the as atmosphere. In this paper, we report a part of study on water yield determination using high-level product of TRMPA and MODIS sensors.   The major purpose of this study is to devise a method to determine spatio-temporal patterns through data mining of selected web-source of appropriate high level products. Specific objective of the study is to retrieval long-term (including to near real time) of water yield for all watersheds in the country, hence enable the understanding on availability of surface water resource in planning and managing water resources in line with the physical developments of the local economic activities. This study adapted the water balance analysis as main method for water yield determination where the main input are precipitation and actual-evapotranspiration rate derived from TRMPA and MODIS high level products, respectively. As such long-term time-series analysis of spatio-temporal of water security of any watershed could be monitored to assist the local landscape sustainable development. Comparing the results for entire Peninsular Malaysia using two independent studies by the government water related authorities and appointment international consultant, satellite-based water-yield for Peninsular Malaysia were estimated at 1204mm, with -0.5% and 1.6% difference, respectively.   Further analysis over selected watersheds, the annual satellite-based water yield was estimated at 1393 mm, with 9.5% more over flow rate. The devised method in this study provides a major contribution to an alternative approach for the determination of water yield, which could be customized to other regions through localized calibration. Thus the method devised allows the related authorities with timely and comprehensive information on water yields, providing a crucial source of information for planning and monitoring of sustainable water resources for ensuring long-term water security needs.

Keywords: MODIS, TRMPA, Data Mining, Surface Water Resource, Water Security