Geophysical Research Abstracts
Vol. 20, EGU2018-3205, 2018
EGU General Assembly 2018


# Distributed Modelling of Stormflow Generation: Assessing the Effect of Ground Cover

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Strong scientific evidence indicates increased quantities of sediment are entering the Great Barrier Reef lagoon and grazing lands are a key source. Understanding the effects of grazing management and land cover changes on surface hydrology is important for water resources, controlling erosion and land management. A distributed hydrological modelling platform, wflow, (that was developed as part of Deltares's OpenStreams project) is used to assess the effect of land management practices on runoff generation processes. The model was applied to Weany Creek, a small catchment (13.6 km2) of the Burdekin Basin, North Australia, which is being studied to understand sources of sediment and nutrients to the Great Barrier Reef. Satellite and drone-based ground cover data, high resolution topography from LiDAR, soil properties, and distributed rainfall data were used to parameterise the model. Wflow was used to predict total runoff, peak runoff, time of rise, and lag time for several events of varying magnitudes and antecedent moisture conditions. A nested approach was employed to calibrate the model by using recorded flow hydrographs at three scales: (1) a hillslope sub-catchment: (2) a gullied sub-catchment; and the 13.6 km2 catchment outlet. Model performance was evaluated by comparing observed and predicted stormflow hydrograph attributes using the Nash Sutcliffe efficiency metric. By using a nested approach, spatiotemporal patterns of overland flow occurrence across the catchment can also be evaluated. The results show that a process-based distributed model can be calibrated to simulate spatial and temporal patterns of runoff generation processes, to help identify dominant processes which may be addressed by land management to improve rainfall retention. The model will be used to assess the effects of ground cover changes due to management practices in grazed lands on storm runoff.