Jul 13th, 9:30 AM - 9:50 AM

Comparison of flood modeling approaches in semi-arid Mountainous catchments (High-Atlas, Morocco)

El Mahdi El Khalki
*Université Cadi Ayyad*

Yves Tramblay
*IRD-HydroSciences Montpellier*

Mohamed El Mehdi Saidi
*Université Cadi Ayyad*

Follow this and additional works at: [https://scholarsarchive.byu.edu/iemssconference](https://scholarsarchive.byu.edu/iemssconference)

Part of the [Civil Engineering Commons](https://scholarsarchive.byu.edu/civil-engineering-commons), [Data Storage Systems Commons](https://scholarsarchive.byu.edu/data-storage-systems-commons), [Environmental Engineering Commons](https://scholarsarchive.byu.edu/environmental-engineering-commons), [Hydraulic Engineering Commons](https://scholarsarchive.byu.edu/hydraulic-engineering-commons), and the [Other Civil and Environmental Engineering Commons](https://scholarsarchive.byu.edu/other-civil-and-environmental-engineering-commons)


This Event is brought to you for free and open access by the Civil and Environmental Engineering at BYU ScholarsArchive. It has been accepted for inclusion in International Congress on Environmental Modelling and Software by an authorized administrator of BYU ScholarsArchive. For more information, please contact scholarsarchive@byu.edu, ellen_amatangelo@byu.edu.
Comparison of flood modeling approaches in semi-arid Mountainous catchments (High-Atlas, Morocco)

El Mahdi EL KHALKI\textsuperscript{a}, Yves TRAMBLAY\textsuperscript{b}, Mohamed El Mehdi SAIDI\textsuperscript{a}

\textsuperscript{a}Laboratoire de Géosciences et Environnement - Département des Sciences de la Terre, Faculté des Sciences et Techniques, Université Cadi Ayyad, Av. A. Khattabi, BP 549, 40000 Marrakech, Maroc.  
\textsuperscript{b}IRD-HydroSciences Montpellier (UMR 5569), Montpellier, France.

Abstract: In semi-arid regions such as the Mediterranean basin, floods usually represent a large contribution to water resources. In addition, climate scenarios indicate a possible increase in extreme events in the Mediterranean region. Therefore, it is necessary to model floods to better understand the processes involved and predict these risks. The Moroccan catchments flowing downstream of the High-Atlas Mountains are among the areas most vulnerable to flooding. The Issyl catchment (170km\textsuperscript{2}) is located at the foothills of the High Atlas Mountains, with altitudes ranging from 632 to 2295m, and producing floods that directly affect the city of Marrakech. The Rheraya catchment is a mountainous basin with altitudes ranging from 1000m to 4165m, and affected by violent floods that constitute a threat for the villages located in low elevation areas. This paper compares the efficiency of two model structures, based either on the Soil Conservation Service - Curve Number (SCS-CN) method or the Green and Ampt model. In addition, the comparison is also performed using global and semi-distributed model structures to account for the spatial variability of rainfall. A total of 21 flood events that occurred between 2008 and 2014 were tested for the two watersheds. The results of the global approach show a good reproduction of the maximum discharge with both models, but the flood volume are not adequately reproduced for the Rheraya catchment. The results of the semi-distributed approach show a clear improvement for several events, with better Nash criterion values on average with the SCS-CN model. In conclusion, we found that the Green and Ampt model outperforms the SCS-CN model in global mode, and it is the opposite in semi-distributed mode. Since the parameters of the Green-Ampt model can be successfully approximated using soil information, this model appears adequate for climate changes studies or real time flood forecasting.

Keywords: Flood modeling, SCS-CN, Green and Ampt, High-Atlas