Hydrology and
Earth System
Sciences
Discussions

Interactive comment on "The role of forest maturity on catchment hydrologic stability" *by* Oscar Belmar et al.

Anonymous Referee #2

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General comments

The present manuscript intends to clarify the influence of land-cover on hydrological regime, particularly in extreme events (floods and droughts). The subject fall within the general scope of "Hydrology and Earth System Sciences" journal. The authors suggest the use of Ordinary Least Square (OLS) regression modelling to related explanatory precipitation and land-use variables to three dependent hydrological variables (3 flow indices). My main concern with the manuscript is that the proposed methodology offers several weaknesses, especially regarding the hydrological modelling and the causal relationships between selected explanatory and depending variables, sometimes circular relations. This makes the conclusions, especially the capability to predict extreme hydrological events based on land-cover characteristics, highly questionable. Also, the Introduction does not provide an appropriate "stat-of-the-art". Authors should deepen

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the literature review and clearly describe the objectives of the paper, supported by current knowledge about main drivers of change for extreme hydrological events in temperate Atlantic region.

Specific comments

Introduction: Line 28: ".."land use changes may also affect flood and drought phenology (Scott and Lesch 1997)". What is flood and drought phenology? Also, Scott and Lesch, 1997 study does not address land-cover effects on extreme hydrological events.

Material and Methods 2.2 Land cover characteristics Why did the authors choose to obtain the land-cover information from a supervised classification of a Landsat image and didn't use Corine Land Cover data? The CLC2012 is a free inventory of land cover in 44 classes available for Europe. Forest classes in CLC usually represent mature stages of development and are classified according to forest types (broad-leaved woodlands, coniferous forests, mixed forests). Also, It is not justified why such particular land-use classes have been selected. For instance, what about impervious surfaces? Impervious areas have also impacts in runoff patterns. In my opinion this is more a land-use land-cover (LULC) classification system than only a restrict biophysical description of land type.

Authors should clarify this aspect and include a measure of the accuracy assessment for this supervised classification.

2.4 Hydrological analysis The methodology is not well described: Authors should explain what is considered a "flood" and a "drought" in this study. 10-year flood? 50-year flood? What is an extreme hydrological event in this climate region? And why the three selected flow indices are the most appropriate to characterize "flood" and "droughts" in this climatic region? What are "quick flows" and "slow flows"? Authors should explain the cause-effect with the three flow indices?

Results Authors need to detail the results. What is the percentage of the hydrological

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variance that is explained by the precipitation component and by the land-use component? Please give more information in the results section to support our arguments. Probably explore the joint impact of climate and land-cover effects on extreme hydrological events. The poor correlations with the forest surface can be related with some misclassifications errors of the supervised classification?

Discussion I would urge the author to not over-conclude the results of this study regarding those 10 small-catchments.

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