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Hydrological characteristics of Mediterranean catchments: a review

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The Mediterranean is a water stressed environment due to its limited water resources and to increasing anthropogenic and climatic pressures that threaten not only the amount of available water but also its quality. Moreover, catchments in this region exhibit high sediment yields that may increase in the future, due to land cover change and higher frequency of intense rainstorms, further deteriorating the quality of surface water. This work presents a review of hydrological studies carried out in the Mediterranean region. It contributes to the ongoing hydrological research initiative on "Hydrology in a changing world" launched by the IAHS in 2014 and aims to characterize the hydrological response of Mediterranean catchments and its implications for sediment transport and the overall quality of surface water in the region. It also aims to compare different methods and modeling approaches used for individual-catchment studies. The study region is divided into three sub-regions: Northwestern Mediterranean (NWM), Eastern (EM) and Southern Mediterranean (SM). Information on catchments responses and modeling approaches at different time scales (annual, dry season and event) were extracted from published studies, and analyzed. In terms of hydrological response characteristics, results indicate regional discrepancies (between NWM, EM and SM sub-regions) in the distribution of hydrological response characteristics at the annual and the event scale. The NWM catchments are the wettest, and the SM catchments are the driest, while the EM catchments are intermediate and exhibit the largest variability. The NWM sub-region shows the most extreme rainfall regime in the Mediterranean, particularly, in an arc that extends from Northeastern Spain to southern Italy. Observations indicate decreasing tendency in water resources due to both anthropogenic and climatic factors, and a more extreme rainfall regime. Moreover, Mediterranean catchments show very heterogeneous responses over time and space, resulting in limitations in hydrological modeling and large uncertainties in predictions. Nevertheless, the models in use are classical ones; very few were developed to address the specificities of the region. These results will be further analyzed to assess the implications of Mediterranean hydrological response characteristics on catchments sediment yields and water quality.