



First flush phenomenon in flash floods in the semiarid northern Negev, Israel

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Our objective is to understand further the first flush phenomenon in upland dryland rivers basins, including its impact on suspended sediment (SS) and dissolved solids (DS) concentrations during discrete flash floods. Our emphasis is on the intra-seasonal differences in catchment response associated with synoptic and antecedent conditions. We report temporal patterns of SS and DS transport in Wadi Eshtemoa, northern Negev desert, Israel. The catchment area (112 km²) has a mean annual rainfall of 240-350 mm. Floods are rain fed and discrete, resulting from two types of meteorological system: widespread frontal and localized convectional. Vegetation is sparse, though winter rains encourage annuals to germinate. Surface materials range from bare rock pavement, through regosols to colluvial loess. Data for SS and DS were obtained either manually or with a number of automatic samplers and sensors. The first flush response of both SS and DS is determined by rainfall intensity and runoff source areas, both functionally related to synoptic conditions. Seasonal changes in vegetation cover also have an impact on the SS and DS response. Convectional storms produce short times of concentration and flushing, as reflected in a clockwise hysteresis between SS or DS and river discharge. It is suggested that this typifies arid zone rainfall-runoff response. Frontal storms produce an anticlockwise hysteresis that is more akin to the behaviour of more humid areas. Implications of the balance between the two trends for the quality of impounded water are briefly explored.