

When it rains in the desert of Patagonia: heavy rains, sediment laden flash floods and hazard management challenges.

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Abstract

Ephemeral streams in dry environments can produce high intensity sediment-laden flash floods. The research of these events is quite difficult due to far locations with limited accessibility, unexpected events, and rough weather conditions. Hence combined data of rainfall, flood hydrograph and sediment transport is rather scarce in the world. Recent extreme events (RI > 550 years) in arroyos (ephemeral streams) of the central Patagonia (Argentina) has called the attention of public and scientific community. The Sagmata basin (total drained area of 129 km²), located in the Lower Valley of the Chubut River (Province of Chubut, Argentina) has been equipped with 4 raingauges, a weather station, four cameras and sediment sampler in four reaches of the arroyos. Data from a two-year monitoring provides valuable insights about the hydrological response of basins in Patagonia, such as the time of response, the shape of hydrographs and its relations with the hyetographs and duration curves. The arroyos are wetted a short period of the time (8 to 21 hours a year). Single-peak, multi-peak and flat top hydrographs have been observed. The lag-time decreases with the increase of the rainfall intensity and the maximum water stage. Moreover, the bore front moves with mean speed which value is between 0.8 to 1.6 m s⁻¹. The wash load in the arroyos depends on geological settings and vegetation cover of the basin. Mean values are between 23 – 46 gr l⁻¹. The complex hydrograph shape produced by the basin has been linked to the rainfall features (duration, mean intensity and patchiness) and the basin physiography of the basin. Findings from the present study provide valuable information both for the comprehension of arroyos in drylands and hazard management as well.

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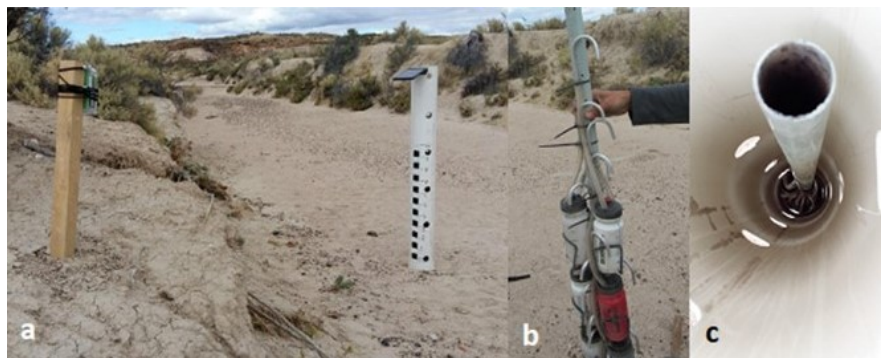
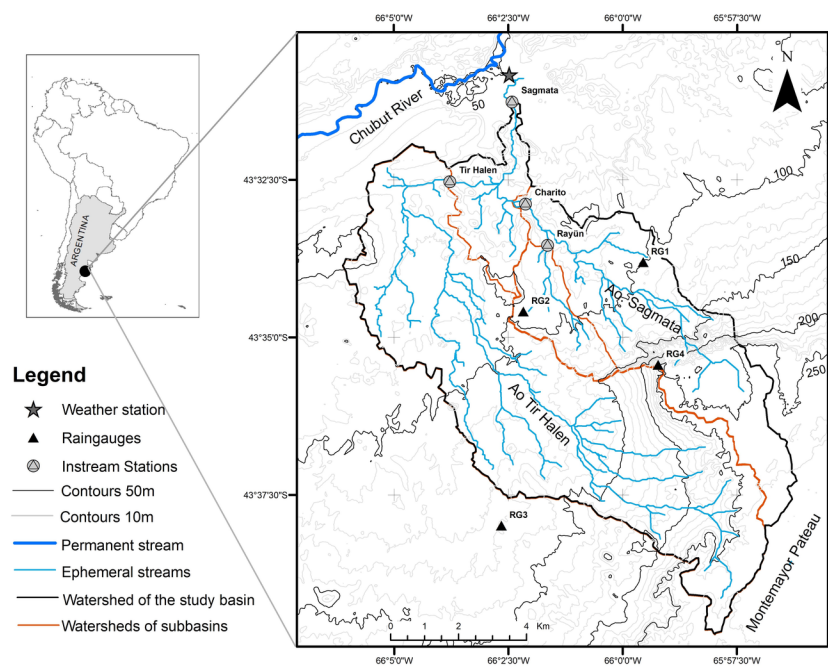
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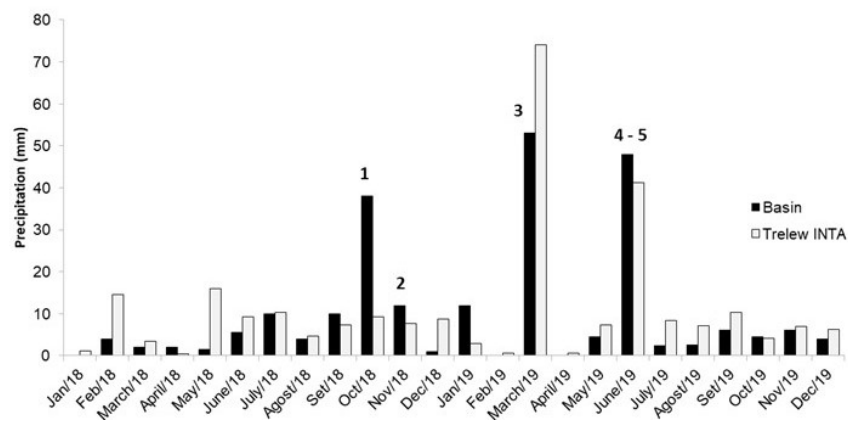
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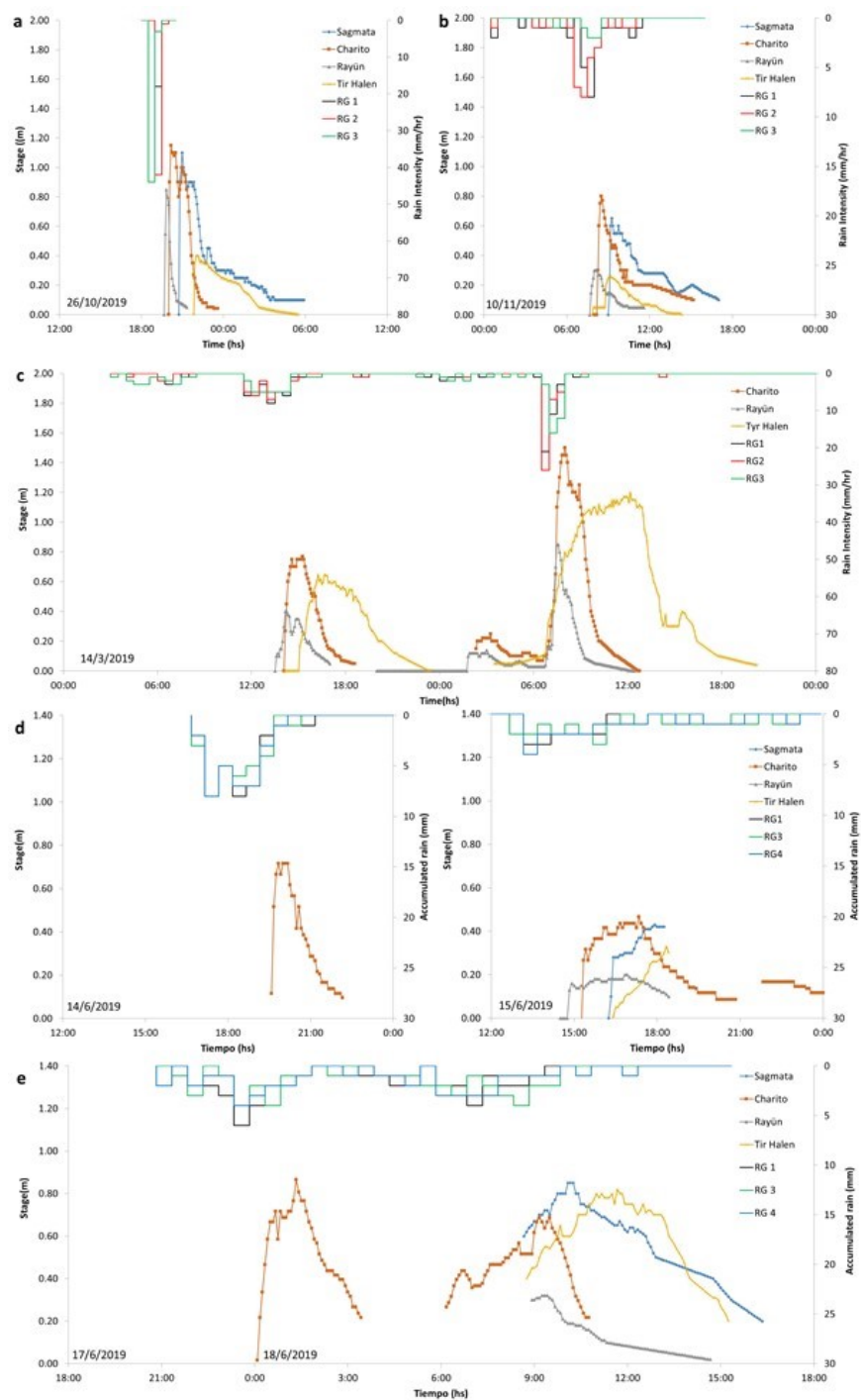
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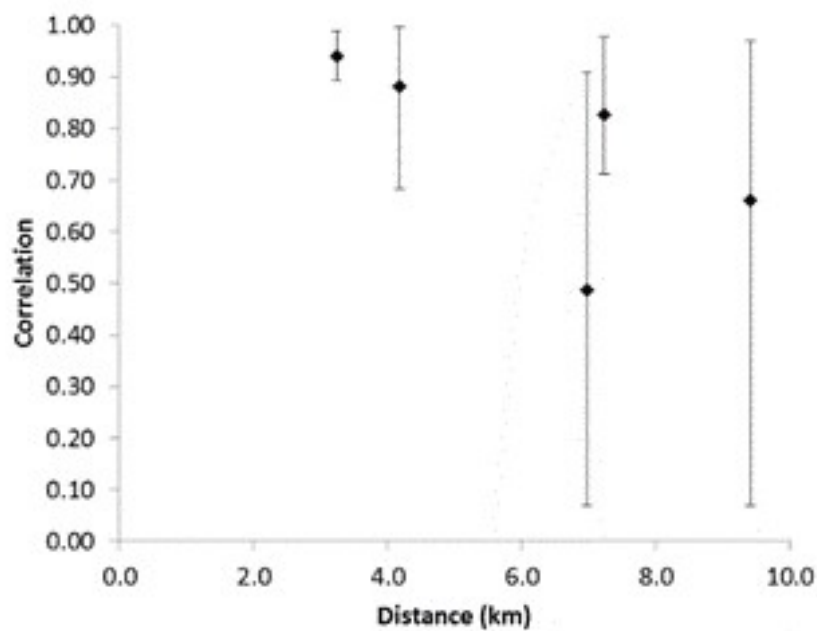
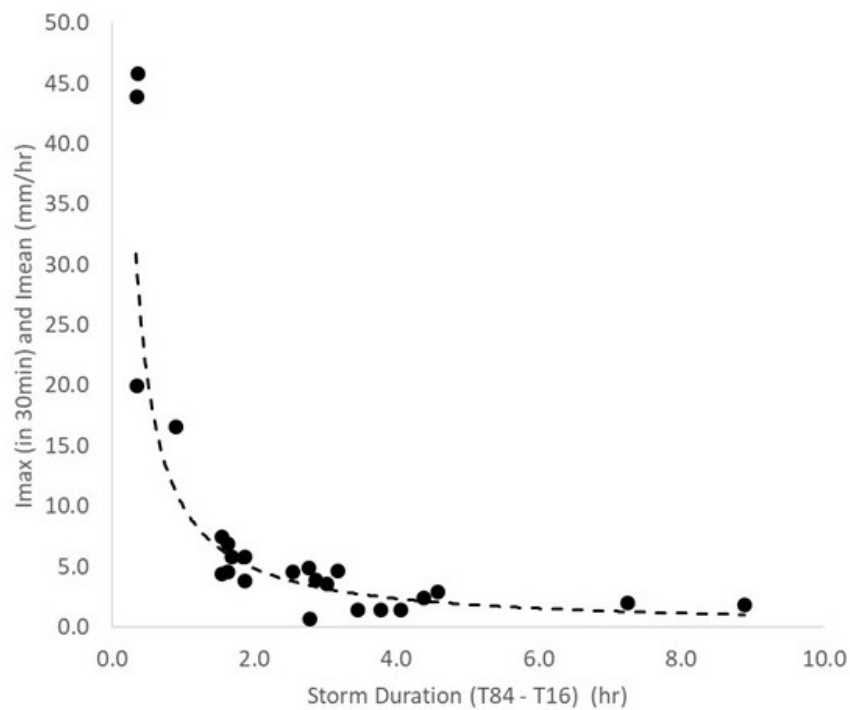
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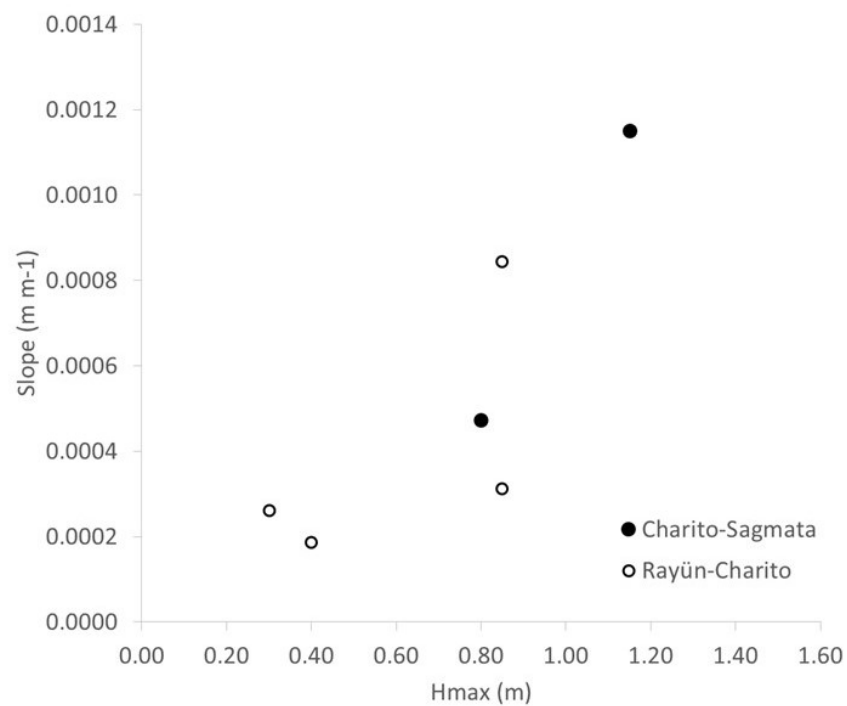
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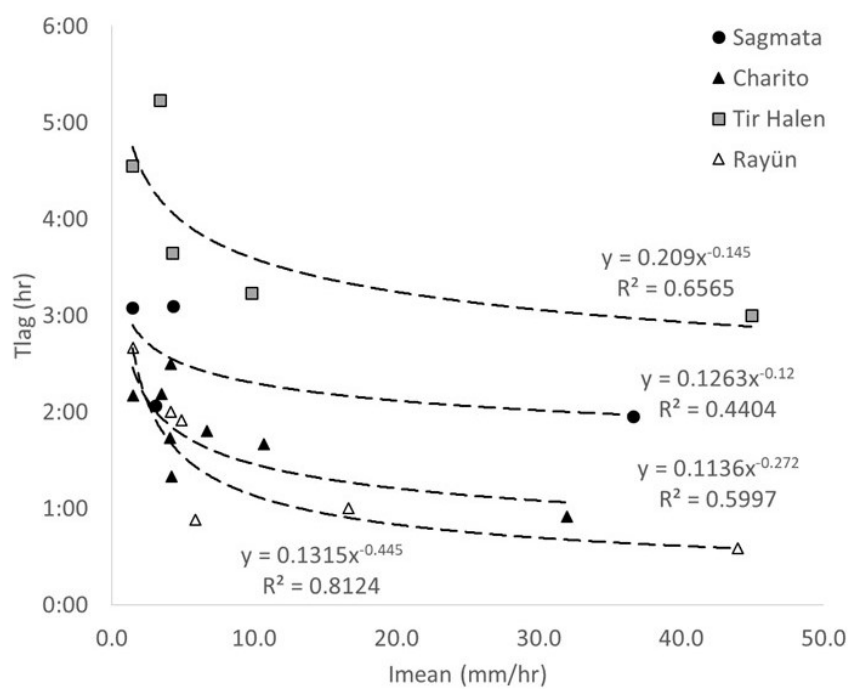
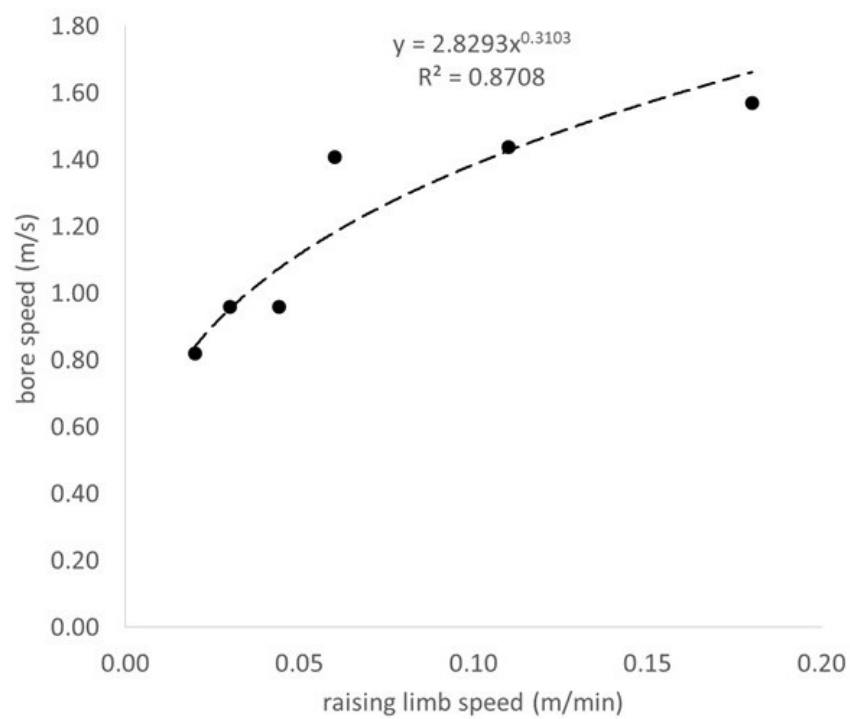


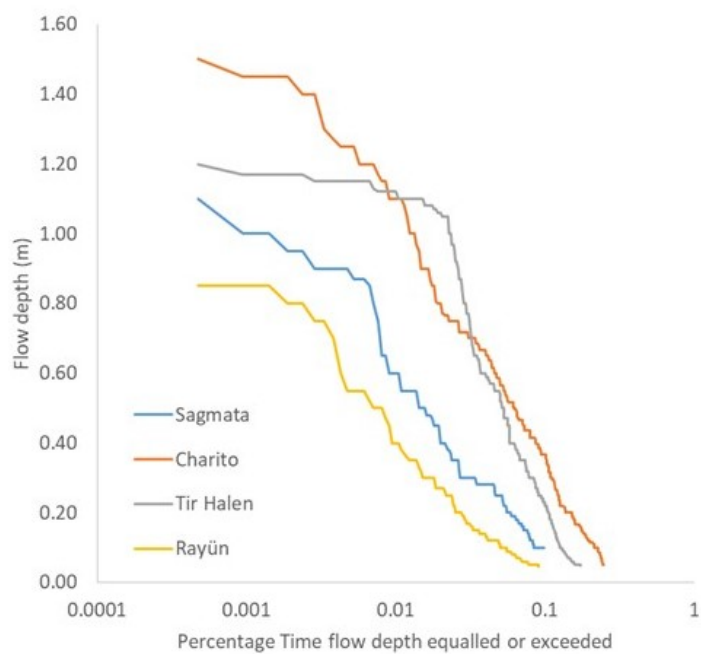
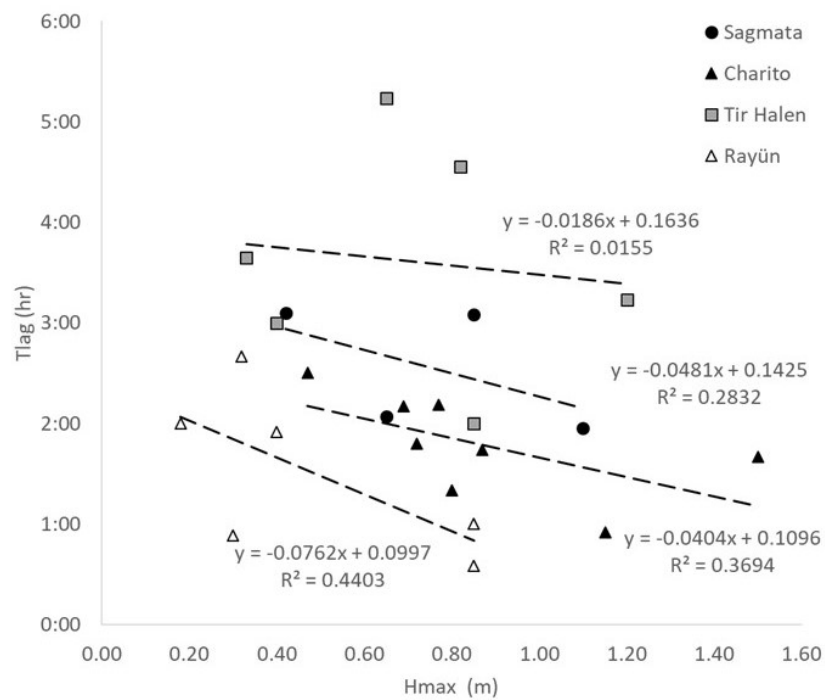


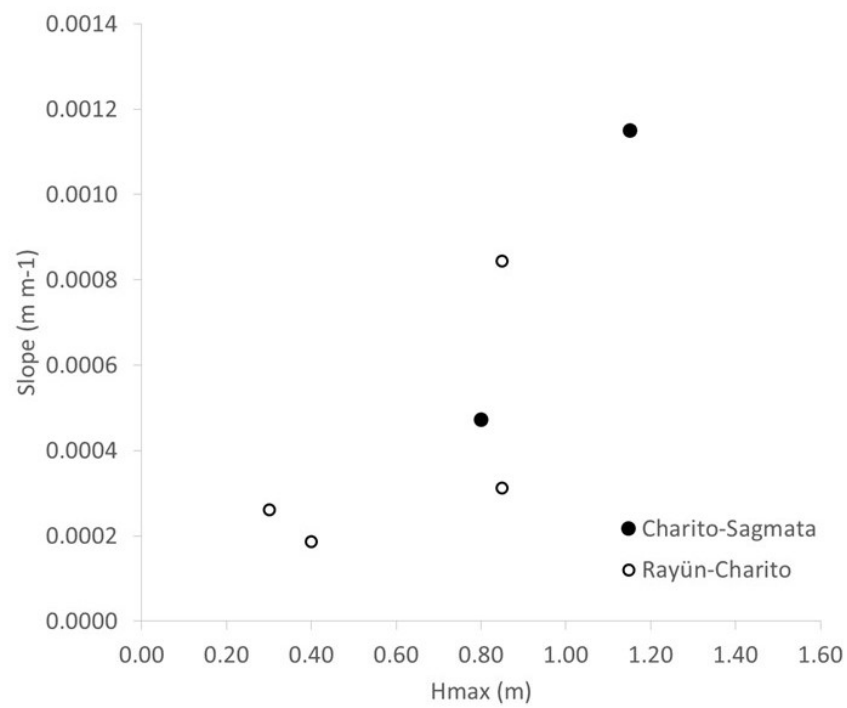




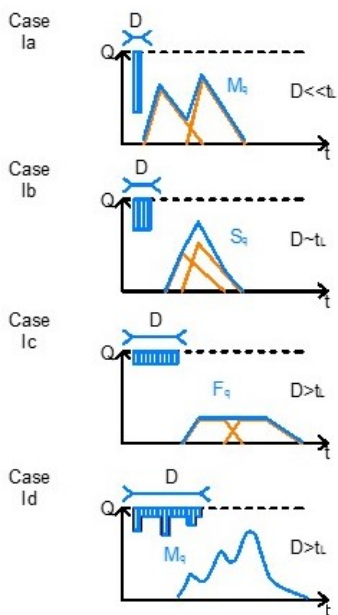
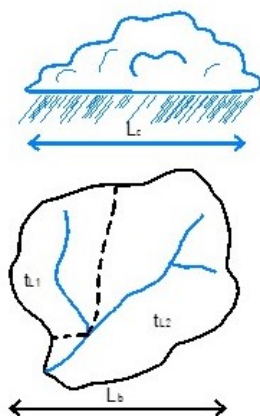








Case I : $L_c \sim L_b$



Case II : $L_c \sim L_b < L$

