How are Channel Floods Generated in Semiarid Regions?

Observations at the First-Order Catchment Scale
Sonora 2007 IRES Field Campaign
Rayon Eddy Covariance Tower Site in Subtropical Scrubland
Rayon Tower Site in Subtropical Scrubland

- Cliff
- Tower
- Undisturbed Channel
- Disturbed Channel
- Road
Four Consecutive Cloudy Days with Two Rainfall Occurrences Prior to an Early Morning Storm at Rayon Tower
Short, High Intensity Rainfall Periods Led to Ponding on Flat Alluvial Surface and Dirt Road Near Tower
Road Runoff Channelizes in Rills along Road Edge
Road Runoff Finds its Way Downhill
Rill Transport and Incision from Road through Hillslope
Channel Flow of Externally-Produced Road Runoff
Hillslope Runoff Sampling Bottle
Arrival of Locally-Generated Channel Flow at Confluence
Movie of Flood Wave Arrival at Channel Confluence
Travelling Upstream along Locally-Generated Channel Flow
Channelized Flow Diminishes Upstream in Width and Depth
Minimal Flow near the ‘Hard to Define’ Channel Head
Dry Hillslopes Upstream of the Channel Head
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Locally-Generated Channel Flow Processes

- Minimal Overland Sheet or Rill Flow on Hillslopes
- Saturated Regions near Channels (But no Surface Ponding)
- Clear, Sediment-Poor Water in Undisturbed Channel
- Slow Channel Velocities and Retarded Basin Response
- Subsurface Hillslope Contribution to Channel?

Externally-Generated Channel Flow Processes

- Minimal Overland Sheet Flow on Hillslopes
- Primarily Road Runoff Contributions
- Fast Velocities in Large Rills and Channel
- Muddy, Sediment-Rich Water in Channel
- Rill Transport Contributions to Channel