* Abstract
  + Investigate role of soil moisture on the threshold runoff response in a small headwater catchment in the Italian Alps.
  + Focus on temporal dynamics of soil moisture, streamflow, and groundwater in response to rainfall in dry and wet periods.
  + Focus on combined effect of antecedent wetness and rainfall amount on hillslope and riparian zone.
* Introduction
  + Understanding the controls exerted by thresholds is essential to understand streamflow response at catchment scale.
  + Soil moisture is non-linearly related to runoff
    - Runoff is a threshold process controlled by catchment wetness condition, runoff coef. Abruptly increasing when a moisture threshold is exceeded (Western and Grayson, 1998) and other sources (2005, 2007, 2009)
  + Flat areas close to the stream have the potential to store water, to quickly saturate even during small rainfall events and to rabidly deliver water to the stream network.
  + Conversely, soil water stored in far-stream hillslope zones may be released only during wetter conditions.
  + Runoff is generated first in riparian zones.
  + The influence of rapid soil saturation in riparian zones on catchment runoff response has been highlighted in various studies.
  + For small rainfall events, contribution from riparian zone to total storm runoff is largest. For larger event contribution from hillslopes is largest.
  + Questions to answer:
    - Is there a soil moisture threshold that controls both surface and subsurface response and how does the catchment topography affect this control?
    - What are the main factors determining the atchment response time during dry and wet periods?
    - What is the combined influence of antecedent wetness condition and rainfall event size on runoff?
  + Study area
    - Rio Vauz Basin (1.9 km2), alpine catchment in Italian Dolomites. Elevation from 18353 to 3152 m.a.s.l. Annual precipitation of 1220 mm and average monthly temperatures from -5.7 to 14.1.
  + Materials and method
    - Precipitation measured from 1 June to 10 October 2005 and 1 Juno to 10 October 2006.
    - Soil water content at 0-6, 0-12, 0-20, 0-30 cm
    - Rainfall events: more than 6 mm of precipitation separated by at least 6 h of no precipitation.
    - Value of 15 degrees steepness from streamflow as threshold for riparian zone
  + Results and Discussion
    - Variable runoff coefficients (dimensionless coefficient relating the amount of runoff to the amount of precipitation received. Large value: high runoff (pavement etc.). Low value: low runoff (forest etc.)) from 0.02 to 0.69. Reflects variability in the storms.
    - Strong non-linear relationship between soil moisture and runoff coefficient, soil moisture threshold value around 45% (Similarly found I Western and Grayson, 1998)
    - Clear threshold in soil moisture and streamflow relationship. Sharp increase in streamflow discharge for 45% moisture threshold.
    - Strong influence exerted by wetness conditions on subsurface and surface response.
    - Majority of runoff coefficients was lover than 0.09 (9%) – same value as size of riparian zone (8.6%).
      * Specualte that low runoff ratios, derived from small storms with dry antecedent soil moisture conditions, were likely du to runoff from the riparian zone that was characterized by high soil moisture conditions and is therefore prone to rapid runoff response.
    - During wetter conditions and larger events, when the moisture threshold was exceeded, higher runoff rations occurred.
    - These findings confirm strong control exerted by topography on runoff generation and the essential role of hillslopes and riparian zones as fundamental landscape units in determining the catchment hydrological response.
    - During wet conditions (hillslope): soil moisture and streamflow started to rise app. At the same time, while soil moisture peaked earlier than streamflow.
    - During dry conditions (hillslope): Streamflow started to rise and peaked prior to soil moisture
    - During dry periods, streamflow likely mainly increased due to channel interception and riparian runoff, resulting in peak stream discharge prior to peak hillslope soil moisture.
    - When wetness conditions increased, hillslope runoff commenced and became the main source of catchment runoff and hillslope soil moisture peaked prior to streamflow.