

# **Priority Research Issues**

## **Identified for the AGU Post-wildfire Chapman Conference**

### **25-31 August 2013, Estes Park, Colorado**

Updated: 6 March 2013

1. Organizing Framework
  - a. What are the characteristics of the fire, rainfall, and hydro-geomorphic regimes, and the associated post-wildfire runoff and erosion responses (or no response) for a particular site?
2. Precipitation
  - a. How does topography affect the spatial distribution of meso-scale rainfall?
  - b. What time-interval parameterization of rainfall variability is related to post-wildfire infiltration and how does this change with spatial scale?
  - c. How do the spatial scale and temporal patterns (within storms, multiple storms, and dry intervals) of precipitation influence post-wildfire hydrologic response?
  - d. What is the magnitude of the possible feedback mechanism in a burned area between the spatial distribution of soil properties and that of the meso-scale rainfall?
3. Infiltration
  - a. How can burn severity metrics such as water drop penetration time and normalized burn ratio be related to soil hydraulic properties such as saturated hydraulic conductivity and sorptivity?
  - b. What is the relative importance of special fire-related condition such as spatial variability of the wetting front, diffusion-adsorption process, soil sealing, mega-pore preferential flow pathways, multiple soil and ash 'layers', and the penetration depth of heating?
  - c. How can the spatial variability of post-wildfire soil properties, soil hydraulic properties, and infiltration be scaled up from the plot scale (1-10 m<sup>2</sup>) to the hillslope and basin scale?
  - d. How can the dynamic effects of changing soil-hydraulic properties be incorporated into post-wildfire infiltration models?
4. Runoff
  - a. How can we determine the effects of connectivity on post-wildfire runoff? How should it be parameterized and how is it linked with the spatial distribution of soil-hydraulic properties?
  - b. How does the contributing area changes with rainfall characteristics?
  - c. At what scales are the geomorphic characteristics of drainage patterns important in predicting post-wildfire runoff?
  - d. What are the underlying scale-dependent physical causes for rainfall thresholds that affect the timing and magnitude of different post-wildfire processes?
5. Soil and sediment erosion and transport
  - a. What are the relations between burn severity and erodibility parameters as a function soil depth, soil type and root properties?
  - b. What is the sediment entrainment processes for flow in steep channels?
  - c. What techniques can be used to assess the sediment supply on hillslope and in channels?