Rangeland Hydrology: Research Issues and Questions

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Hydrologic Nature of Rangelands

• Topographic variability
  – Limited large scale
  – Some small scale

• Vegetation
  – Grasses
  – Shrubs

• Soils variability
  – Depth – groundwater interaction
  – Hydraulic characteristics

Köppen-Geiger Climate Classification

Rangeland Hydrology Influences

• Semi-arid regions
  – Low Precipitation (P < 500 mm)
  – Low Humidity
    • Large daily temperature fluctuations

• Low vegetation
  – Possible strong winds

• Variable Snow
  – Length of snow-cover
  – Snow depth

Rangeland Hydrology Changes

• Precipitation Shifts
  – Totals, Rates
  – Timing, Phase

• Temperature Increases / Decreases

• Vegetation Changes
  – Succession
    • Native
    • Invasive (e.g., Bromus tectorum)
Snow-cover Albedo

- Reflectivity of short-wave radiation

- Snow albedo
  - New snow 0.8 – 0.95
  - Old snow 0.7
  - Wet snow 0.5
- Vegetation albedo 0.1 – 0.3
- Soil albedo 0.1 – 0.3

Snow-Shrubland Interaction

Snow Variability

Snow Redistribution

Small Scale Variability

Snow Depth Transects
Overview of Questions

- Change
  - Climate (P, T)
  - Land Cover / Land Use
- Space, Time and Scaling
  - Interpolation
  - Variability
  - Uncertainty
- Modelling