S.U.A.S.
The Drone Group
What We Do Well with UAS

- DEM (slope analysis, geomorphology)- especially drivers for hydrologic phenomena
- Vegetation health
- Surface-related boundary conditions
- Filling spatial resolution gaps (between point to satellite)
- Seasonal dynamics
- Response to extreme events
- Hot spots assessment
What We Need Improvement

- Battery life affecting drone flight/coverage
- Cannot penetrate surface (ground/vegetation)
- Steep learning curve (personnel requirements, knowledge, preparation time, mission planning)
- Weather considerations (flight stability and sensor requirements)
- Post-processing requirements
What We Did

- 2 raster flights spanning meanders of interest
  - Sony A5100 for DEM recreation
  - Micasense Rededge for multispectral vegetative analysis

_quadcopter on lunch break.
Data Products

- Stitched imagery (342 photos) of field site
- Qualitative identification for points of interest
- DEM analysis
- Multispectral analysis - using vegetation as identifiers for lateral hyporheic exchange
Imagery identification

- Bedrock outcrop
- Boulder-rich surface
- Deep pools > 3 ft?
- Channel-spanning fills-gravel?
DEM analysis (Go to software)

**Upper Reach Thalweg Slope** ~ 0.001

**Overall Thalweg Slope** ~ 0.002

(1.07 km reach)

**Valley Slope** ~ 0.005

**Sinuosity** ~ 2.3

**Oxbow Cutoff Chute Slope** ~ 0.01
• Vegetation: NDVI > 0.5 (above Red)
• Proxy for vegetative health
Multispectral- NDRE

- Normalized Difference Red Edge Index (NIR and Red Edge bands)
- More “valuable index” monitoring stress/health for mature plants
Summary & Potential Future Analyses

• UAS provided impressive initial snapshots at high resolutions for DEM and spectral analysis

• Compare w/ other groups (surveyed locations) and relations of GW-SW exchange hotspots with river and sediment structure

• Further spectral analyses (single/multi-band analyses) and interpretation identifying potential vegetative interactions with local hydrology
Other things we did (can cut)

• DJI flight videos (skip if played already…)

DJI (↑) Phantom 3 spying on Raz injection spots (→)
- Near Infrared/Red/Green
- Red = amount of Near IR reflected
- Green = amount of Red reflected
- Blue = amount of Green reflected