Estimating River Discharge from Aerial Imagery

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Global Decline in River Gauging Stations
The Rise of Remote Sensing of River Discharge

**Pros**
- Remotely sensed
- Global coverage
- Low operational cost

**Cons**
- Coarse resolution
- Weather interference
- High initial costs
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Hydraulic Modeling

Elevation

Distance across river
Estimating Discharge

Aerial Imagery

Model Output
Hydraulic Modeling

Observed Discharge:
- 2.8 m$^3$ s$^{-1}$

Modeled Discharge:
- 2.8 m$^3$ s$^{-1}$
- 18.6 m$^3$ s$^{-1}$
- 17.8 m$^3$ s$^{-1}$
- 38.3 m$^3$ s$^{-1}$

Discharge [m$^3$ s$^{-1}$]

Wetted Width [m]
Hydraulic Modeling

River Kilometer: 35  
River Kilometer: 22  
River Kilometer: 13
Conclusion

• River discharge can be accurately estimated through coupling of high resolution aerial imagery, photogrammetry, and hydraulic modeling

Significance

• This provides an opportunity to extend and densify our current gauging station network while avoiding issues with satellite based remote sensing

Limitations

• Requires:
  • A clear view of the channel (minimal overhanging vegetation)
  • Assumptions about basic channel shape
  • Wide range of widths in response to discharge

Next Steps

Thank you

Funding:
• NSF-ARC 1204220 and NSF-ARC 1204216
• NSF Arctic LTER (NSF-DEB 1026843)
• Utah Water Research Laboratory, Utah State University

Additional thanks to:
Austin Jensen, Milada Majerova, Randy Fulweber, Jason Stuckey, Madeline Merck, Katie Harrold, Rob Gieck, Jorge Noguera, Shannon Syrstad, Bayani Cardenas, Mike O’Connor