Flow Depth from GRWL Width, SRTM Slope & WBM Q

Results, Validation & Caveats

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With data provided by T. Pavelsky, C. Lion, A. Kettner & G. Allen

Inputs: Q, W, S

Water Balance Model (annual mean Q over 50 years): A. Kettner CU Boulder

UNC GRWL (width @ mean annual GRDC): NB SWOT is only required to see yellow, orange and red



SRTM-based slope (regression optimized): C. Lion

Manning-based depth



Rectangular channel assumption where R = D Solving for D numerically with the initial "guess" of D<W

Validation

- 1141 USGS station measurements closest to a GRWL section (credit: G. Allen)
- Mean error: -16%; after removing sign. large outliers (n = 8): -25%
- Depth categorization (USGS percentiles) hit rate: 0.81
- Distribution (CDF) assessment: 2-sample KS test: significant differences at low alpha levels (high confidence) & smaller than ≈3.5 m depths (<85th percentile)



End slide

- Better performing over CONUS than regionalization approach based on hydraulic geometry
 - Based on observed width and more Q "samples"
- "Universally effective" Manning n: 0.03
- Can easily be done globally
- Not too bad given high slope errors and high slope sensitivity in Manning's equation
- Q, W, and S come from very different sources (independent). This is ideal but tough to get right with Manning's where for a given situation Q, W and S have to "play ball"
- Questions?