Protecting Queensland’s waterways

Space time image velocimetry

Measuring high flow events in Queensland, Australia

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Measuring high flow events – challenging yet important

- Rivers are at their most dynamic
- Erosion/damage to infrastructure
- Sediment/nutrient transport
- Requires staff to be onsite
- Dangerous
Space time imagery velocimetry

- Calculates a rivers surface velocities from a video clip
- Uses natural tracers
- Gradient analysis of pixels (x axis) and time (y axis)
- Surface velocities
Current inspection lines

Velocity: 1.81 m/s

STIV (Space-Time Image)

velocity

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Image filter

- Color histogram equalization
  - Not always applied

- Gaussian filter
  - No Filter
  - Not always applied

Change the number of line segments

- 5 quantity

The average gradient

- 67.630

Mean velocity

- 1.96 m/s

Coherency
Advantages of image velocimetry

- Traditional methods – difficult and dangerous in extreme flows, need onsite staff to collect data
- Image velocimetry – inexpensive, safe, uses existing cameras, data easily reprocessed
Fixed camera installations
Major flood event – Herbert river at Ingham

Water level – 4 metres

Water level – 14.7 metres
- 14.7 metres water level
- 280m across
- 25 velocity points measured
- Discharge = 5824 cumecs
Drones for discharge measurements – DJI Phantom 4
Barron River at Myola

- Water level 8.42m
- 2009 cumecs
- Max velocity 3.15 m/s
- Highest measurement since 1967 – Cableway
- 3% off of Rating Curve.
Burdekin River at Selhiem

- 450m wide
- 16.57m depth
- 13800 cumecs
- -6% rating
Flow tracker 2 compared to drone
Low flow comparison measurements of accepted methodologies and STIV

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<th>Site</th>
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Crowdsourcing – Flood videos
Crowdsourcing – Flood videos
Conclusion

• STIV discharge data comparable to accepted methods
• Cost effective data solution
• Improves data collection capabilities
• Improvement in health and safety
• STIV now accepted as a standard methodology
• World leading authority in application of STIV
• Future development – onsite automated data processing
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