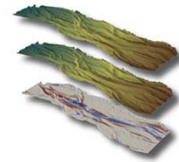

GEOMORPHIC CHANGE DETECTION WORKSHOP FOR US ARMY CORPS OF ENGINEERS

USACE Workshop

Kansas City

May 30- June 1, 2012



**US Army Corps
of Engineers®**



USGS
science for a changing world



UtahStateUniversity
ECOGEO MORPHOLOGY & TOPOGRAPHIC
ANALYSIS LABORATORY

INSTRUCTION TEAM

- Joseph Wheaton
- Philip Bailey
- Wally Macfarlane



Special Thanks to Dr. John Shelley for Organizing

HOW ABOUT THE WORKSHOP CREW?

- Name
- What do you call yourself?
- USACE Affiliation
- What do you want out of workshop?



UtahStateUniversity
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BY END OF WORKSHOP

You should understand:

1. GCD techniques and how they are applied to monitoring rivers
2. How to account for unreliability uncertainties in DEMs
3. How to interpret DoDs

GCD \neq Glen Canyon Dam
GCD = Geomorphic
Change Detection



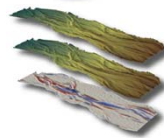
\approx



DoD \neq



DoD = DEM of Difference =



WORKSHOP LEARNING OUTCOMES

1. A comprehensive overview of the theory underpinning geomorphic change detection
2. Instill background necessary to design effective repeat topographic monitoring campaigns and distinguish geomorphic changes from noise
3. Methods for interpreting and segregating morphological sediment budgets quantitatively in terms of both geomorphic processes and changes in physical habitat
4. Hands-on instruction on use of the [GCD software](#) through group-led and self-paced exercises
5. An opportunity to interact with experts on geomorphic monitoring and the software developers of GCD to help you make better use of your own data



WORKSHOP LEARNING OUTCOMES

- Or you could just say...



WORKSHOP WEBSITE

gcd-usace.joewheaton.org

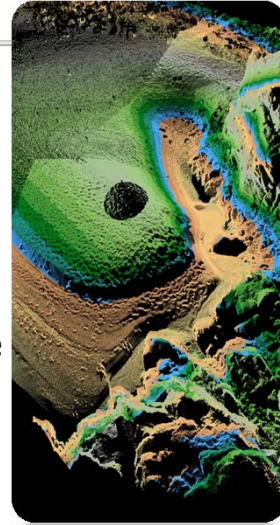
- No need for frantic note taking...
- Syllabus
- Learning Outcomes
- Workshop Topics
 - Lecture Slides
 - Exercises
 - Additional Resources & References
- Links to Software & Help Forums

<http://gcd-usace.joewheaton.org>



WORKSHOP CAVEATS

- Emphasis is on Concepts & Application.. Not just the tools
 - Assume you know enough GIS to be dangerous
 - Assume you knew/know how to build DEMs but could use a refresher
 - Arc is buggy & expensive; Our software is Free (i.e. it also has bugs!); EXPECT CRASHES
 - Lots of way to do GCD... not advocating any single approach



IF YOU EXPERIENCE MELT-DOWN

- **DO NOT PANIC!**
- If its something a majority of people are experiencing or we can address quickly as a group we will
- If it requires more attention, we've got 2 helpers all the time to catch you up
- If we can't fix it immediately, focus more on following conceptually... video tutorials for later reference
- A secondary skill we hope to help you with in this workshop is **troubleshooting GCD problems!**



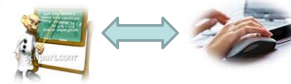
WORKSHOP BIG PICTURE PLAN

A. DAY 1 – All About Distinguishing Signal From Noise

B. Day 2 – Interpreting the Signal & Cool Applications

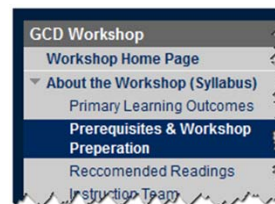
C. Day 3- Hands-On with your own data

- Attempt not to have any lecture longer than 30-45 minutes...
- Intersperse Lectures with Discussions & Hand-On Exercises



TO INTERSPERSE...

- Start up ArcGIS (leave idle in blank document)
- Make sure extensions are on
- Make sure GCD toolbar is loaded
- Make sure exercise data is copied to: `c:\0_workshop\` or similarly easy place to find...



gcd-usace.joewheaton.org/syllabus/pre-requisites/system-checks-we-will-do



DETAILED PLAN

- This is a plan... not a contract
- We'll adjust as we need to based on your needs...



WHERE HAVE WE APPLIED GCD?






- River Feshie, Scotland
- River Rees, New Zealand
- Bridge Creek, Oregon
- Asotin Creek, Washington
- Logan River, UT
- Sulphur Creek, California
- Mokelumne River, California
- Yuba River, California
- Highland Water, England
- Provo River, Utah
- Grand Canyon, Arizona
- Yampa River, Colorado
- Trinity River, California
- Lemhi River, Idaho
- Salmon Falls Landslide, Idaho



Workshops for USGS, Idaho Power, USBOR, ICRRR...



WORKSHOP PLAN – DAY 1... (MORNING)







	A. Introductions	9:00 to 9:30
	B. Review of Topographic Surveys & Data	9:30 to 10:00
	C. Review of Building DEMs	10:00 to 10:45 <i>10:45 to 11:00 Break</i>
	D. Working with Cross Section Data	11:00 to 11:30
	E. Essential Best Practices to Support change Detection	11:30 to 12:00 <i>12:00 to 13:30 Lunch</i>

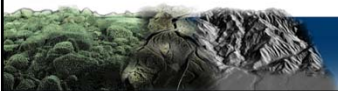


A Plan.. Not a Contract



WORKSHOP PLAN – DAY 1... (AFTERNOON)






	F. Traditional Approaches to Change Detection	13:30 to 14:30
	G. Intro to GCD Software	14:30 to 15:00
	H. Thresholding Alternatives	15:00 to 15:30 <i>15:30 to 15:45 Break</i>
	I. Alt. Approaches (Spatial Coherence + Bayesian)	15:45 to 16:15
	J. Spatially Variable Error	16:15 to 16:30
	K. Multi-Method Surveys	16:30 to 16:45
	L. Recap & Preview of Day 2	16:45 to 17:00ish



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WORKSHOP PLAN – DAY 2... (Morning)

-  Q & A: Misconceptions from Day 1 9:00 to 9:15
-  M. Fuzzy Inference Systems 9:15 to 10:00
-  N. Building Your Own FIS 10:00 to 11:00
-  O. Closure of Sediment Budgets & Transient Storage Analysis 11:00 to 11:30
-  P. Interpreting Outputs of GCD – Tips & Tricks 11:30 to 12:00
- Lunch On Own 12:00 to 13:30

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WORKSHOP PLAN – DAY 2... (Afternoon)

-  Q. GCD Budget Segregation 13:30 to 14:30
-  R. Budget Segregation Exercise 14:30 to 15:30
- Break 15:30 – 15:45*
-  S. Guided Examples with ACE's OWN Data 15:45 to 16:45
- 
-  T. Workshop Synthesis 16:45 to 17:00ish

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WORKSHOP PLAN – DAY 3...

- | | |
|--|---------------|
|  U. GCD Feature Wishlist | 9:00 to 9:30 |
|  V. Working with Your Own Datasets in GCD | 9:30 to 12:30 |



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ACKNOWLEDGEMENTS

- Sara Bangen, Alan Kasprak, Ryan Leary, Susannah Erwin, Rebecca Manners & Nicole Czarnomski
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- James Brasington & Damia Vericat
- Chris Garrard, Nick Ochoski & Frank Poulsen
- Numerous GCD Testers & Guinea Pigs

