QUANTIFYING GEOMORPHIC CHANGE IN THE ENVIRONMENT

ESPRESSO WORKSHOP

Sponsored & Hosted by:
Dr. Francesco Brardinoni
INSTRUCTOR

• Joseph Wheaton
  - Fluvial geomorphologist
  - Associate Professor @ USU
TELL US ABOUT YOU? BRIEFLY...

• Name & Hometown
• What do you call yourself? / Affiliation
• Have you used GCD before?
• What do you want out of this workshop
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 = Geomorphic Change Detection

DoD ≠ DEM of Difference =
WORKSHOP LEARNING OUTCOMES

• Or you could just say...

YOU
WORKSHOP WEBSITE

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

http://gcdworkshop.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
  - But we are offering our software to help
IF YOU EXPERIENCE MELT-DOWN

• DO NOT PANIC!
• If it’s something a majority of people are experiencing or we can address quickly as a group we will
• If it requires more attention, one of us will 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!
LET’S BREAK SOMETHING…

- Make sure ArcGIS 10.X is Installed, but Not Open
MAKE SURE IT WORKED!

1. Start ArcGIS
2. Go to Add-In Manager
3. Check it's there
4. Turn Toolbar on
To Make Exercises Efficient:
• Start up ArcGIS (leave idle in blank document)
• Make sure extensions are on
• Make sure GCD 6 toolbar is loaded
• Keep workshop website open in browser
  [http://gcdworkshop.joewheaton.org](http://gcdworkshop.joewheaton.org)
• Make sure exercise data is copied to:
  `c:\0_Worshop\` or similarly easy place to find...
1 Day Workshop

Workshop Topics
A. Introduction & Course Outline
B. Restoration Applications of Change Detection
C. Review of Topographic Data Sources & Surveys
D. Review of Building Surfaces from Raw Topographic Data
E. Essential Best Practices to Support Change Detection
F. Spatial Analysis Approaches to Change Detection
G. Introduction to GCD Software
H. Thresholding Alternatives
I. Approaches to Estimating DEM Error
J. Spatially Variable Error Modelling
K. Spatially Variable - Introduction to Fuzzy Error Modelling
L. GCD Budget Segregation
M. Interpreting Outputs of GCD
N. Self-Paced Change Detection Exercise
O. Recap of Workshop
A. Introductions & Course Outline

Background

Synopsis of Topic

In this first half hour we will make introductions of all the participants and instructors to each other. We will also go over the syllabus and discuss the structure of the workshop.

Why we're Covering it

- To break the ice and get everyone talking to each other and in the mode of asking questions and being an active participant in discussion and lecture
- To layout expectations for the workshop and highlight what we will and will not cover

Resources

Slides and/or Handouts

- 📒 Lecture Slides
GCD 6 Help Portal

These help pages apply to all versions of GCD 6. If you don't find the help you need here, please search the forum and make a post there if appropriate.

GCD Command Reference

1. Project Menu
   A. New GCD Project
   B. Open GCD Project
   C. Close GCD Project
   D. GCD Project Report

2. Data Preparation Menu
   A. Clean Raster Tool
   B. Create Bounding Polygon
   C. Survey Preparation Menu
      i. Create Point Feature Class
      ii. Create TIN and/or DEM
   D. Add DEM Survey
   E. TopCAT Submenu
      i. TopCAT Preparation Tool
      ii. TopCAT Point Cloud Decimation Tool

GCD Concept Reference

Data Preparation - Best Practices
   Concurrency
   Consistent Area of Interest Extents
   Orthogonality

DEM Differencing

Error Propagation

Fuzzy Inference Systems for Modeling DEM Error

Project
   *.gcd Files
   Analyseses Folder
   Inputs Folder
   ToPCAT Decimation

Example Data Sets
SYLLABUS

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