



**UNAVCO**

# VOLCANOES OF THE EASTERN SIERRA NEVADA

Geology and Natural History of the Long Valley Caldera



Presented by: Beth Bartel, UNAVCO  
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# THE INSTRUCTORS

John Rupp



Michael Hamburger



# THE COURSE

## VOLCANOES OF THE EASTERN SIERRA NEVADA

Geology and Natural History of the Long Valley Caldera

COURSE #: G188



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Intro course - open to all majors

“Some decide to do a major in geology or environmental studies. But even if they don't, it still affects how they see the world.” - MH



# COURSE STRUCTURE

- 14 - 18 students
- Half-semester-long seminar
- 15-day field trip
- SNARL (Sierra Nevada Aquatic Research Lab)
- Field books, no computers



# COURSE CONTENT



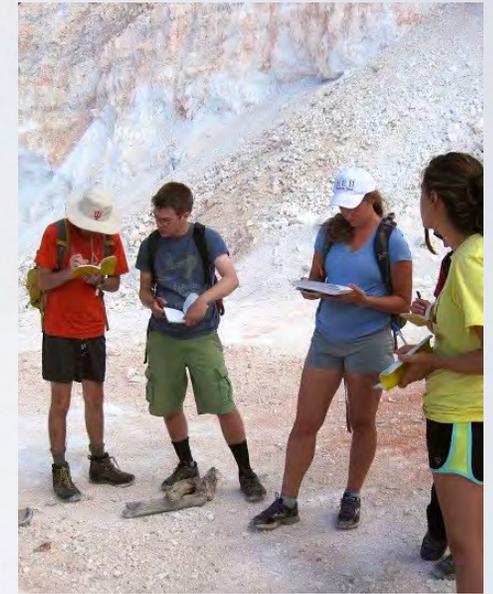
volcanology



hydrogeology



ecology



economic geology

# GEODETTIC COMPONENT: RTK GPS

- 2-3 days
- 2-3 informal lectures
- How GPS works
- Applications of GPS
- Career
- Field day



## “GPS DAY”

- Objective: Introduce students to multiple geophysical and geologic field methods
- Via: Study the active Hilton Creek fault where it crosses McGee Creek



# FIELD METHODS

- GPS & leveling:
  - Survey leveling line of ~28 markers established by USGS? UCSB? in the 1980s
- Field observations:
  - Strike of fault trace
  - Offset of moraine



# THE LARGE-GROUP CONUNDRUM



# GROUP WORK

- THREE (/FOUR) GROUPS:
- The group of students who self-identify as most interested in GPS start with me, help me set up the base and get the rover going - get the most in-depth intro
- Group of students leveling
- Group of students hike up a moraine to get an overview of the fault scarp and make observations with a Brunton
- Some students scout out leveling markers based on written instructions



# THE GPS SURVEY

- Real-time kinematic GPS
  - base & rover w/radio contact
  - real-time results



# NAVIGATION

- Paper map vs. leveling vs. RTK GPS



# TEACHING METHOD



- Explain the survey to the first student to take the controller
- That student explains it to the next, and so on, until all students have taken a turn
- Have one group explain the survey method to the next

# CONCEPTS



- GPS as a scientific tool
- Deformation
- Mapping
- Precision
- Error sources
- Repeatability
- Indirect measurements

# OUTCOMES



# CHALLENGES

“For a lot of students, it's not their most pleasant day. For some they really love it and for some it's really rough.” - MH



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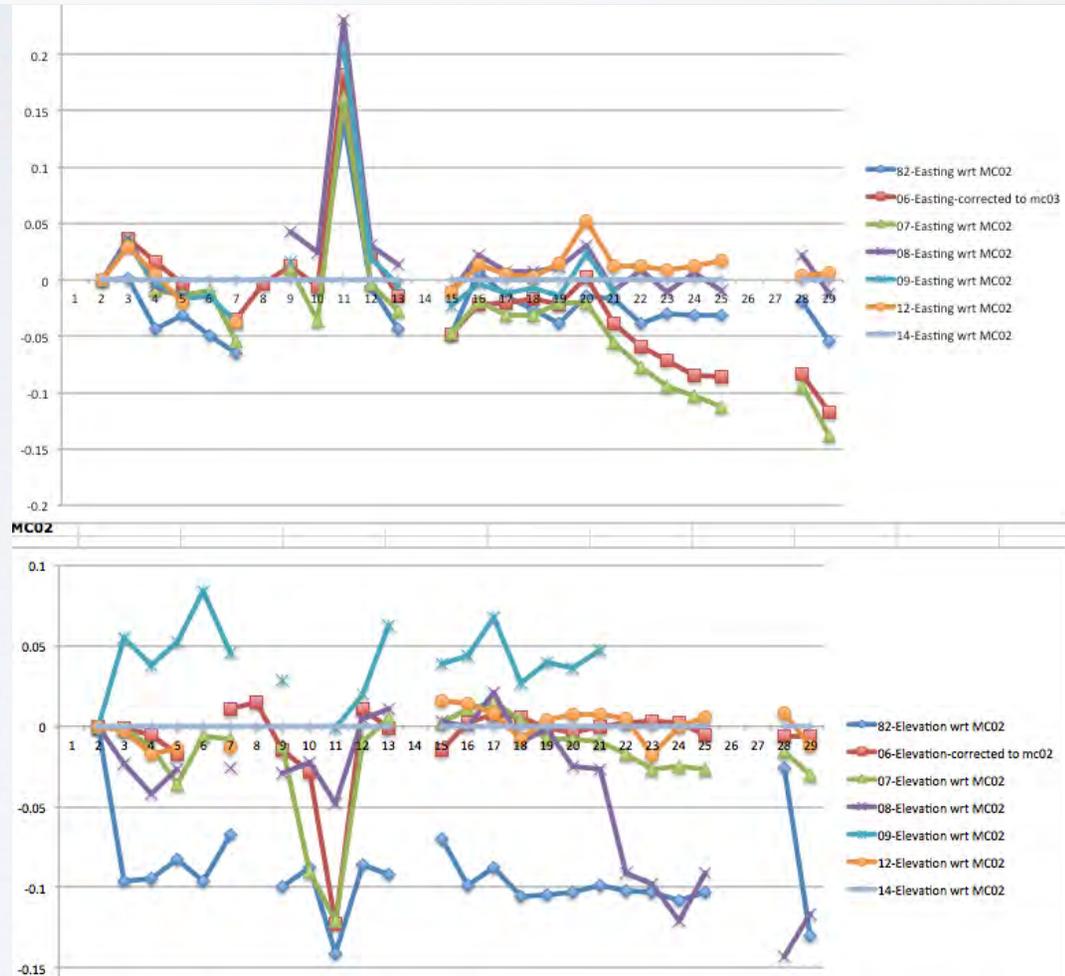


- Leveling is tedious
- Repetitive
- Difficult terrain
- Bad starting coordinates
- Lost radio lock

# CHALLENGES

## Where's the story?

- In GPS, errors are significant compared with the signal.
- In general, in introductory classes, you really want an experiment to go smoothly.
- Data in a format that's more accessible for introductory students.
- A clear pattern in the data.



# WORTH IT? WE THINK SO.

“GPS day was super fun and I thought it was a great team building activity, too.”

“One of my favorite days.”

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“The challenge of doing it at an appropriate level that's both comprehensive and gives them a window into the power and complexity of the methods.” - MH

