Designing and Implementing Field Experiences through Distance Learning

Saturday Seminar
June 27, 2020

Schedule for today

- **12:00 - Kurt Burmeister & Chris Atchison**: News & announcements

- **12:10 - Alison Duval**: Landslide mapping & analysis module

- **12:20 - Shannon Dulin**: Combined stratigraphy/mapping exercise

- **12:30 - John Geissman**: Geology of White Mesa area, Ojito Wilderness, San Ysidro, north-central NM; A splendid introductory field geology mapping exercise

- **12:40 - John Geissman & Bob Krantz**: 20 min discussion on challenges & best practices w/ online instruction

Announcements

Teach the Earth - list of activities growing!!

https://serc.carleton.edu/NAGTWorkshops/online_field/activities.html

Confronting racism in the field -- open forum

Tomorrow (6/28), 1-2 PM PDT

Zoom invite in email, or contact me

Please invite whomever you think might benefit/contribute

Mapping and Analyzing a Landslide Inventory with lidar data –

Alison Duvall (University of Washington) and Erich Herzig (University of Washington)

Landslides along Cedar River, King County, WA

Landslide in Mt. Rainier Natl. Park, WA

Images from Washington Geospatial Open Data Portal

Your Account

GETSI
GEodesy Tools for Societal Issues

GETSI's Earth-focused Modules for Undergraduate Classroom and Field Courses

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Planning for Failure: Landslide Analysis for a Safer Society

Stephen Hughes (University of Puerto Rico-Mayaguez)
Bobak Karimi (Wilkes University)
Editor: Beth Pratt-Sitaula (UNAVCO)

100   200   300   400
Advanced

2-3 Weeks
4 Units

identify, map, and classify landslides.

3. Students will **analyze** and **compile** characteristics of mapped landslides for **comparison** across the mapping area.

4. Students will **synthesize** mapping and data analysis results into a comprehensive written report.

Products for Assessment

1. Part 1 culminates with a short group presentation

2. Part 2 culminates with a comprehensive written report that includes mapping products and tables.

Part 1: Examining the Distribution of Mass Wasting Events - Puerto Rico and Arizona

Part 2: Landslide Mapping from lidar & Susceptibility Analysis - Seattle, WA

Part 1: Examining the Distribution of Mass Wasting Events - Puerto Rico and Arizona

[Unit 2 of the 4 part GETSI module]

Calculating and Analyzing LSI Student Exercise –

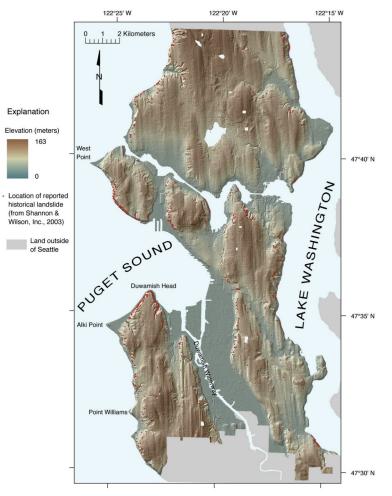Bobak Karimi (Wilkes University) and Stephen Hughes (University of Puerto Rico – Mayaguez)

- Use ArcGIS to explore factors that contribute to the distribution patterns of mass wasting events in Arizona and Puerto Rico using a frequency-ratio method
- Categorize geospatial factors (elevation, slope, aspect, mean annual precipitation and calculate landslide susceptibility index (LSI) values for each category
- The LSI is based on the frequency of landslides and areal extent of each category and can be used to quantitatively estimate the relationship between the spatial distribution of landslides and each geospatial factor explored.

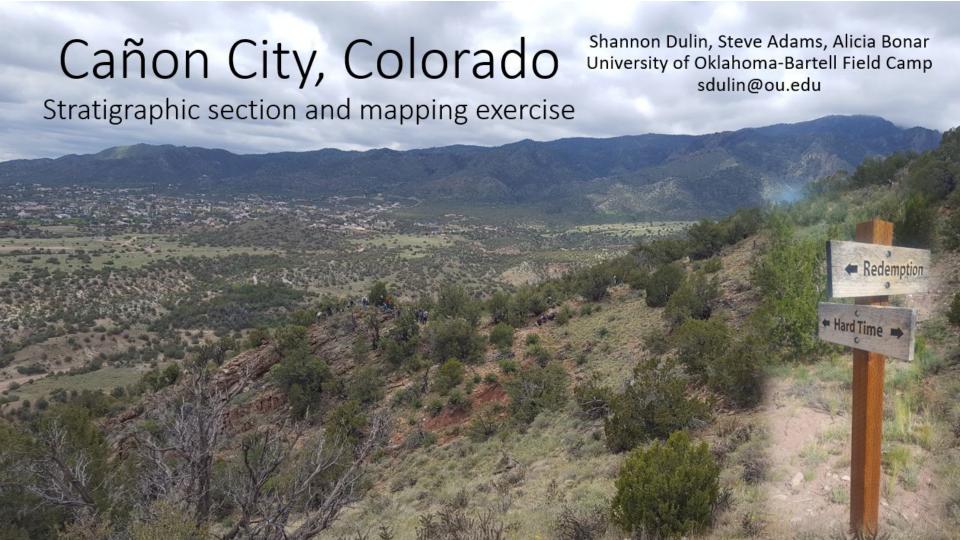**1.2 Days - Group analysis & oral presentations of findings**

Part 2: Landslide Mapping from lidar & Analysis of landslide inventory- Seattle, WA

- Use ArcGIS to map a landslide inventory on lidar for 14 separate mapping areas in city of Seattle

- Perform analysis of landslide inventory, including: LSI (based on Part 1), landslide area, roughness, runout length, and failure style

- Students share landslide inventories and write (individual) reports discussing spatial patterns in landslides around Seattle

3.8 Days - Group (or individual) mapping + Individual Student Written Reports

Explanation

Elevation (meters)
163
0

- Location of reported historical landslide (from Shannon & Wilson, Inc., 2003)

Land outside of Seattle

West Point

PUGET SOUND

LAKE WASHINGTON

Duwamish Head

Alki Point

Duwamish Waterway

Point Williams

Map from Schulz (2007)

Cañon City, Colorado

Stratigraphic section and mapping exercise

Shannon Dulin, Steve Adams, Alicia Bonar
University of Oklahoma-Bartell Field Camp
sdulin@ou.edu

2 weeks of curriculum

- Stratigraphic Section
- Mapping Project

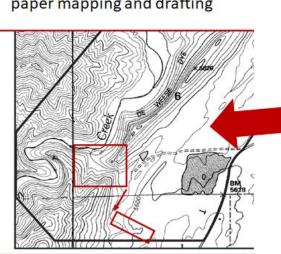- Intro TourBuilder to stratigraphy of the area and to Google Earth web
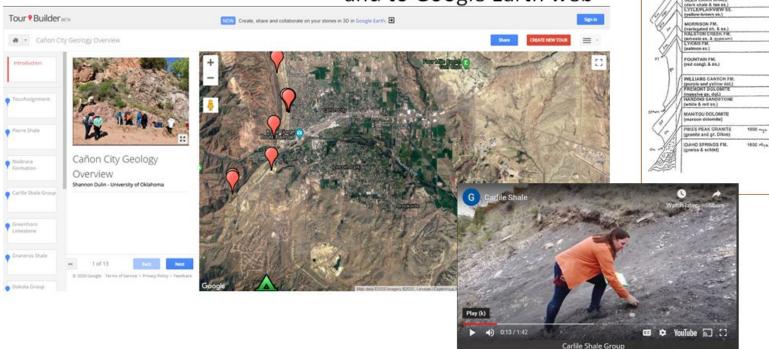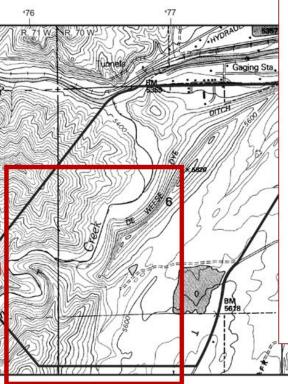
Grape Creek Strat and Mapping Area

- Built mapping area in Google Earth Web and provided intro kml file with follow-along pdf
- Subset of mapping area provided as a kml file and was used for stratigraphy
- Students could choose digital or paper mapping and drafting

Scale 1:12000

C. I. = 40 feet

Strike and Dip Stop

Strike and dip placemarks indicate where you should use your browser protractor to measure the dip of the inclined beds. The strike you acquire using the bearing provided in the oriented photo. (see note above). These stops have an Easyzoom link, which you can use to make additional observations along with measuring dip angle. You should place this data directly on your topo map after you make your observations and measurements. This information should also be recorded in your field notebook. ← Bold and underlined to emphasize importance

Easyzoom page with protractor activated. Notice that when the blue line is horizontal the angle between the blue and green lines is the dip, and is displayed in degrees as the top number in the protractor text box.

Good job. Now you are ready to explore Grape Creek.

Strat and Mapping Symbol Key

Information (place name to reference)

Outcrop locations

Outcrop scale zoomable links and oriented photos (ThingLink, EasyZoom)

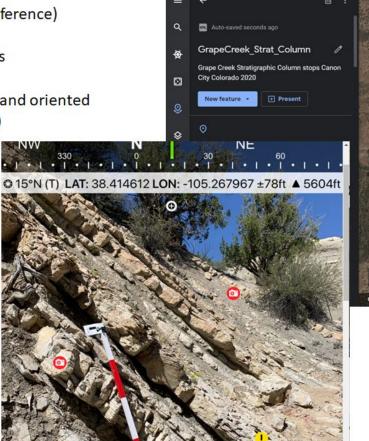Zoomable panoramas

360° Kuula panoramas

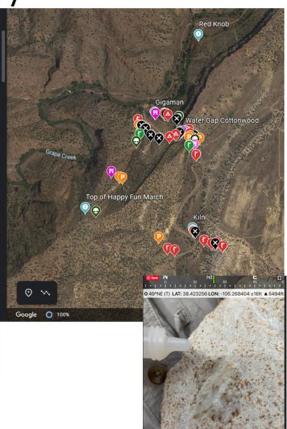Oriented along-strike images (measure dip here! Solocator app)

ThingLink symbols

Zoomable high-resolution image
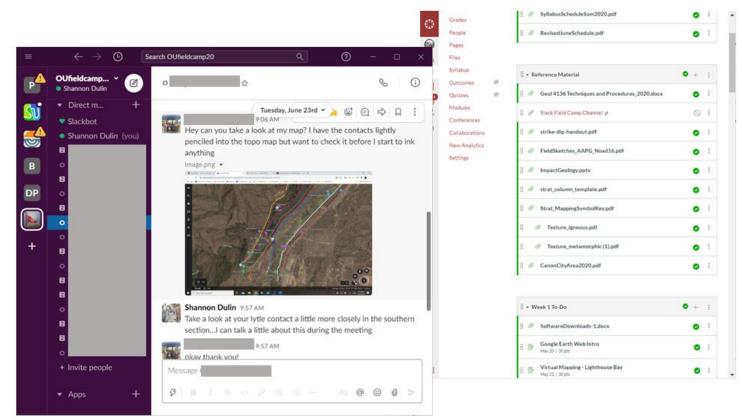
Additional exploratory images

Acid Test

Grape Creek Mapping
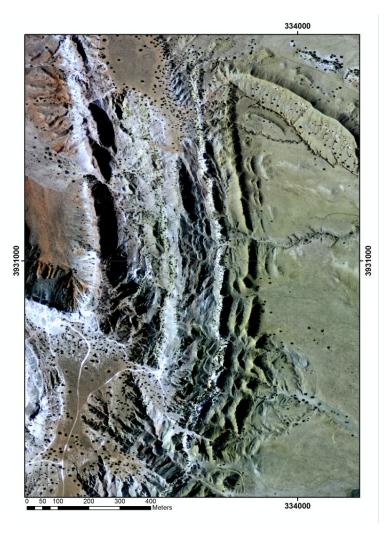
Lessons learned
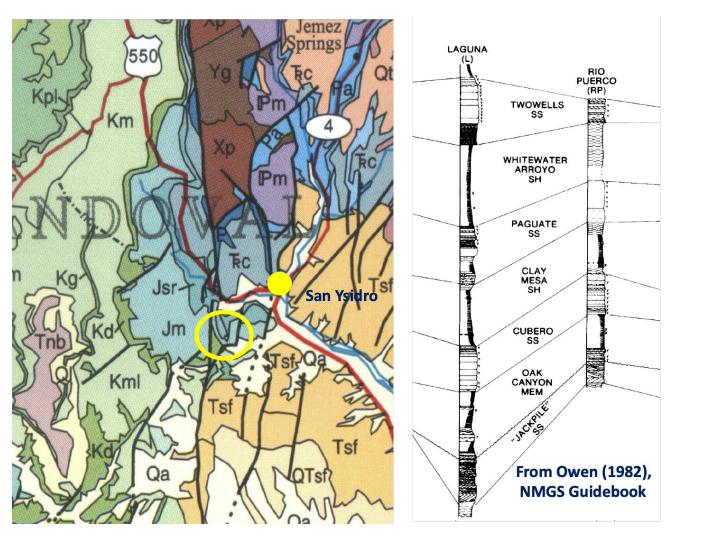
- Specific Zoom times
- Slack as a method to discuss questions, check notebooks, etc
- VERY organized LMS helped immensely
- Very hard to get student involvement
- Digital vs. hardcopy option worked well
- Importance of detailed instructions
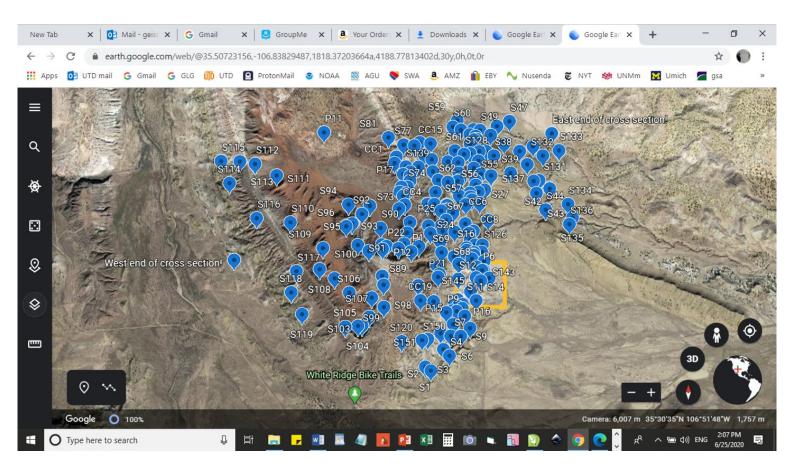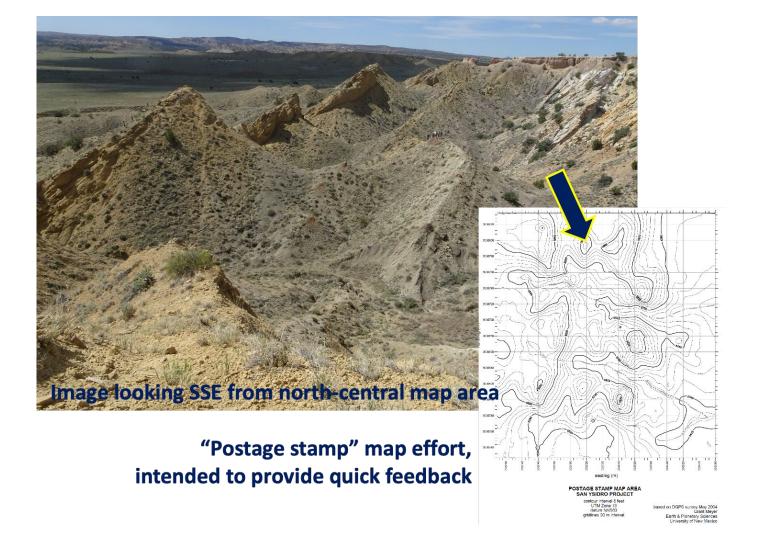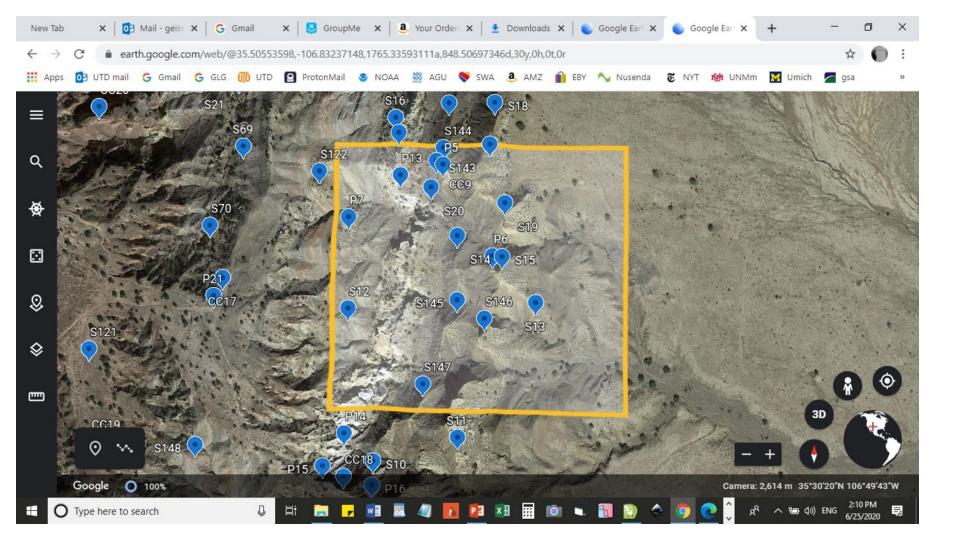
SSSSee you next year!

Ojito Wilderness Mapping Project,
San Ysidro, north-central New Mexico

Saturday, 27 June, 2020

John Geissman
Emeritus, UNM
Dept. Head, UT Dallas
jwgeiss@protonmail.com

looking SSE

Phot courtesy of
Professor Grant Meyer, UNM

From Owen (1982), NMGS Guidebook
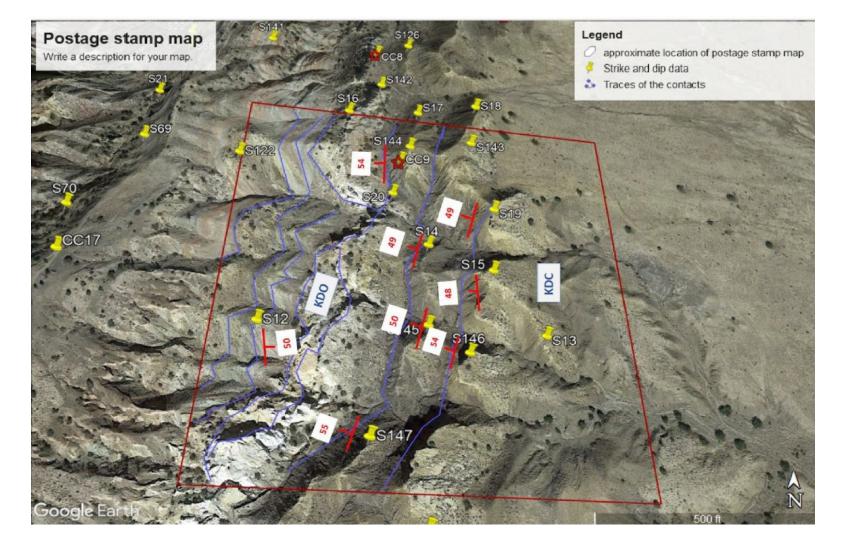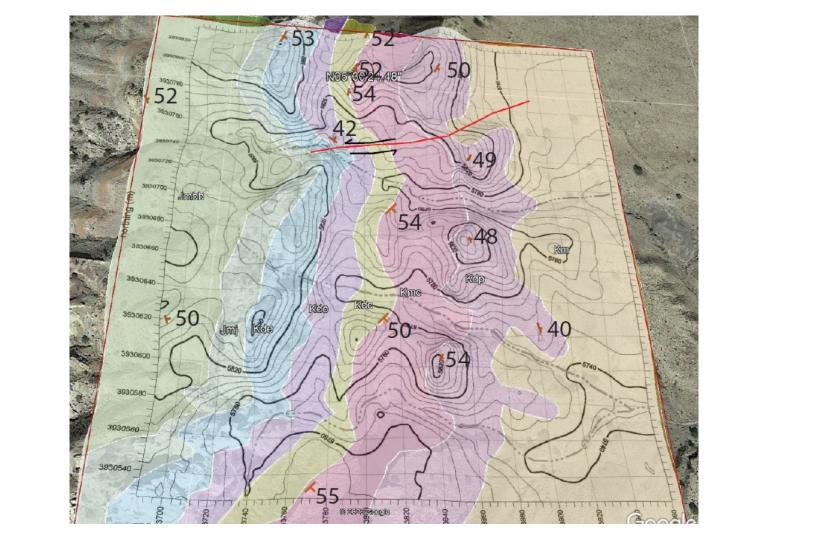
Google Earth stations: (1) map unit and bedding orientation; (2) specific map unit contacts; (3) field images, including 360° photos

Image looking SSE from north-central map area

"Postage stamp" map effort,
intended to provide quick feedback

POSTAGE STAMP MAP AREA
SAN YSIDRO PROJECT
contour interval 5 feet
UTM Zone 13
datum NAD83
gridlines 20 m interval

based on DGPS survey May 2004
Grant Meyer
Earth & Planetary Sciences
University of New Mexico

Postage stamp map
Write a description for your map.

Legend
- approximate location of postage stamp map
- Strike and dip data
- Traces of the contacts

S22
S141
S126
CC8
S142
S21
S16
S17
S18
S69
S144
S143
S122
54
CC9
S70
S20
49
S19
CC17
49
S14
S15
KDO
48
KDC
S12
50
50
45
54
S146
S13
S147
55

Google Earth

N

500 ft

Handwritten annotations:
- steep
- A.P.
- shallow
- 17/20
- Overall v. reasonable! good try w/ parallel folds - still a few probs -
- good job labelling - map units
- include map unit symbol
- evidence??
- Kdp ridge
- Syncline - geometry a bit diff!!
- ??
- Trc
- Createceous
- older rocks

Unit labels on cross-section: Jt, Js, Jt, Jr, Jt, Js, Jms, Jmb, Jmj, Kde, Kdc, Kmc, Km, Kdp, Qa, Kdo

Scale bar values: 0, 480, 640, 800, 960, 1120, 1280, 1440, 1600, 1760, 1920, 2080, 2240

Scale: 80m = 1 tick

Legend:
- Kdp — descr
- Stratigra
- Fault
- Quaterna
- Mancos S
- Paguate
- Clay Mes
- Cubero S
- Oak Cany
- Encinal C
- Jackpile
- Brushy B
- Saltwash
- Summer
- Todelito — slp
- Entrada
- Chinle Fe — Trc

great!

Ojito Wilderness/San Ysidro, NM
Cross-Section

Data

S57-352/53
S62-352/54
S64-350/54
S84-348/69
S85-345/54
S92-170/47
S46-122/23
S47-126/25
S111-162/17

Legend

Qa		Jms	
Km		Js	
Kdp		Jt	
Kmc		Je	
Kdc		Trc	
Kdo			
Kde		— — — Extension	
Jmj		Fault	
Jmb		Left fault	

1 tick = 80m

Meters

160 320 480 640 800 960 1120 1280 1440 1600 1760 1920 2080 2240

A   A'

Meters

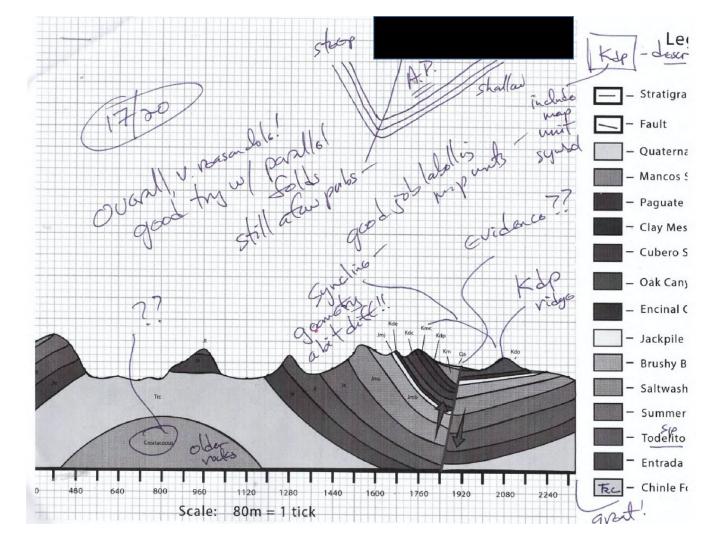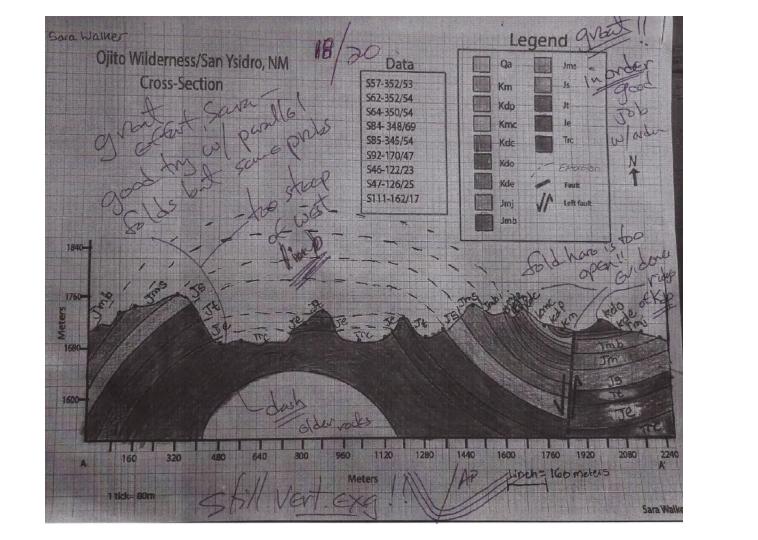1 inch = 160 meters

Sara Walker

The Virtual Experience Mission: Thinking Like a Geologist

Bob Krantz

Fort Lewis College, Durango, Colorado

June 2020

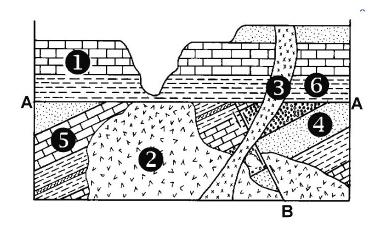# VFC Follow-up: Thinking Like a Geologist

- What is it?

- How do we teach it?

- How do we assess it?
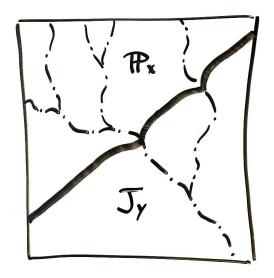
How Does a Geologist Think?

- Uses geologic reasoning
    - Looks for (and expects) geologic meaning and significance
    - Relates form and process to bridge from observations to interpretations
    - Always checks for geologic "sensibility"
- Applies geologic concepts
    - Micro concepts (minerals, anticline, cross-bedding)
    - Macro concepts (mineral assemblage, fluvial dep systems, plate tectonics)
- Connects to geologic contexts
    - Works across spatial and temporal scales
    - Integrates across disciplines
- Expert vs. novice
    - More about strategies than knowledge?
- Examples
    - Classic cross-cutting relations cross sections
    - Determining type of fault from map patterns

Opportunities to Think Like a Geologist

Intro Level
Determine the order and
history

"Field Camp" Level
Determine the type of
fault

How Do We Teach Geologic Thinking?

- Be mindful!
- Be observant!
- Show how to seek meaning—promote inquiry
- Promote geologic fluency
- Avoid superficial recipes and black boxes
- Avoid activities where a non-geologist can follow instructions and complete the task
- Consider **ALL** geologic expression, but select the most significant (and useful)
- Relate goals to strategy (and available info and tools)
- Model expert (or apprentice) thinking (conduct pilot project?)

How Do We Assess Geologic Thinking?

- Look for logic (and logical consistency)

- "Dumb mistakes" might reveal lack of thinking

- Conversations (and assignments) that include explanations of reasoning

- Intentional queries:
  - Why some observations or data used (or not used)
  - Why some interpretation fits better (or not)
  - What a given interpretation implies
  - What geologic concepts proved useful

Making Virtual Field Camp Better

- A virtual field camp, especially as a capstone experience, must inspire geologic thinking and applications
- The virtual experience should also encourage some degree of immersion and personal engagement
- The experience should make the rocks, and first order interpretation, the primary focus
- Potential strategies:
  - Represent the rocks as realistically as possible and as the first source of information
  - Require student plans for geographic and geologic navigation and investigation
  - Provide field data and other information by request
  - Have more discussion (interrogation?) about what a student "sees"
  - Model expert thinking and methods more
  - Improve the game delivery and engagement (and rely less on a stand-alone resource)

Discussion
Challenges & best practices w/ online instruction