Building Quantitative Literacy Through Science, Education, and Art

Hannah Perrine Mode

AGU, December 2021

ART AS EXCHANGE + ENGAGEMENT

Interdisciplinary methodology promotes more inclusive approaches to Earth Science learning

Valuing different kinds of knowledge production deepens connections to climate science for students, educators, and public

Platforms for qualitative learning create increased access to, and engagement with, quantitative information in fieldwork and outreach

ART AS DOCUMENTATION

Geologic forces and the passage of time

Tool for recording, processing, and sharing complex information

HANNAH'S WORK: field sketching + painting

HANNAH’S WORK: cyanotype photography

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HANNAH'S WORK: cyanotype photography

BLIND CONTOUR DRAWING

Deep observation and close looking

Easy intro to field sketching for “non-artists”

Helps cement features to memory + more
fully understand complex visual information

STUDENT WORK: blind contour drawings

ART AS PROXY

Objects and installations using geologic material, data, and ideas

Diverse pathways to connect with scientific data and abstract concepts

HANNAH'S WORK: ice core installations

HANNAH'S WORK: ice core installations

HANNAH’S WORK: glacier cyanotypes

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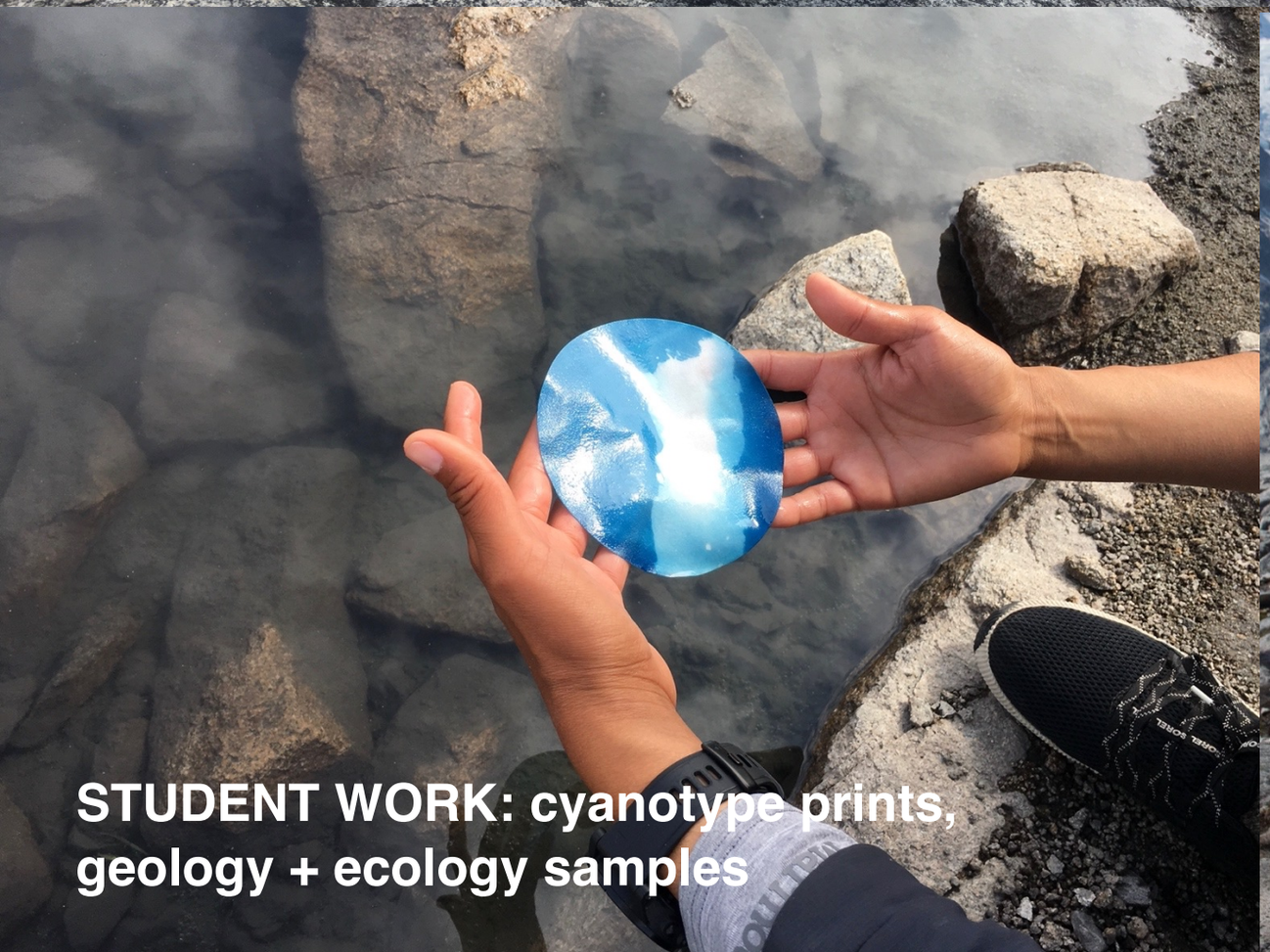
HANNAH'S WORK: glacier cyanotypes

CYANOTYPE PRINTMAKING

Recording material + specimen in the field

Specific to place, time, and human interaction

Photographic process of objects and information



STUDENT WORK: cyanotype prints, geology + ecology samples

COLLABORATIVE HYDROLOGY FIELDWORK:
cyanotype prints of firn samples at depth

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cyanotype prints of firn samples at depth

ART AS STORYTELLING:

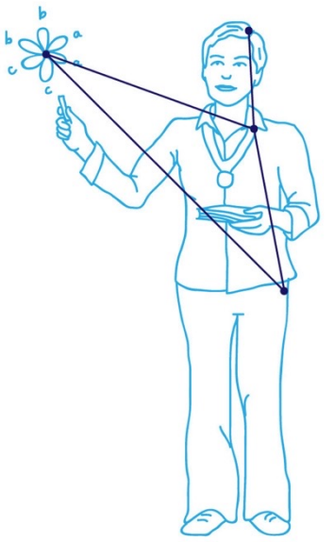
Collaborative research opportunities

Participatory experiences for engagement, deepening connection to fieldwork and data

Diverse forms of sci comm + outreach

HANNAH'S WORK: women in STEM mural

HANNAH'S WORK: women in STEM mural



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MARYAM MIRZAKHANI

Mathematician
1977 - 2017

Maryam Mirzakhani was an Iranian mathematician and professor at Stanford, and the first (and only) woman to win the Fields Medal. Her work in theoretical mathematics, specifically concerning the geometry of curved surfaces, could impact the theoretical physics of how the universe came to exist.

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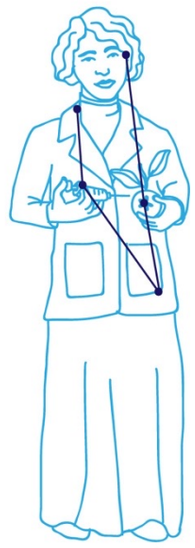
ANNIE EASLEY

Mathematician
1933 - 2011

Annie Easley was a computer programmer, mathematician at NASA, and one of the first African-American women rocket scientists in the field. During her 34-year career, she worked on technologies that led to hybrid vehicles, and developed software for the Centaur rocket – critical to making modern spaceflight possible.



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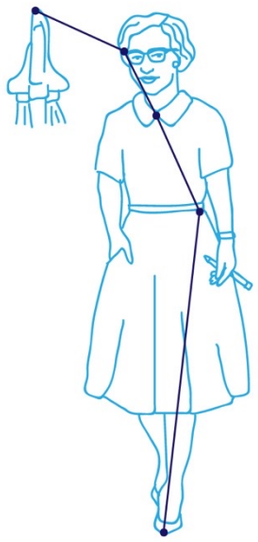
ALICE BALL

Chemist
1892 - 1916

Alice Ball was an African-American scientist who developed the first successful treatment for Hansen's disease (leprosy). The "Ball Method," an injectable treatment using oil from the chaulmoogra tree, was used on thousands of infected individuals for over thirty years, until modern drugs were introduced.



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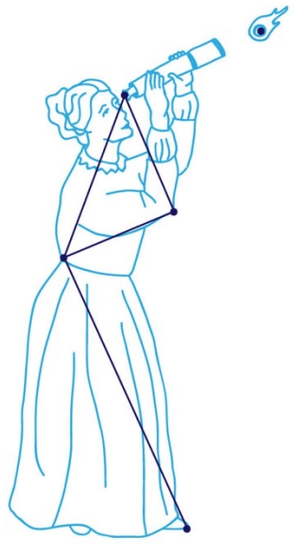
KATHERINE JOHNSON

Mathematician + Engineer
1918 -

Katherine Johnson is an African-American mathematician whose calculations of orbital mechanics were critical to the success of the first and subsequent US-manned space flights. Throughout her career at NASA, she mastered complex calculations and helped pioneer the use of computers.



2

CAROLINE HERSCHEL

Astronomer
1750 - 1848

Caroline Herschel was a pioneering German astronomer. The first woman to discover a comet, she discovered 8 over the course of her career, including 35P/Herschel–Rigollet, which bears her name. She worked closely with her brother, astronomer William Herschel, who is credited to discovering the planet Uranus.

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EUNICE NEWTON FOOTE

Climate Scientist
1819 - 1888

Eunice Newton Foote was an American scientist, inventor, and women's rights campaigner. She was the first person to identify the greenhouse gas effect, critical in modern studies of climate change. Although physicist John Tyndall is often credited with this discovery, he actually expanded on Foote's research.

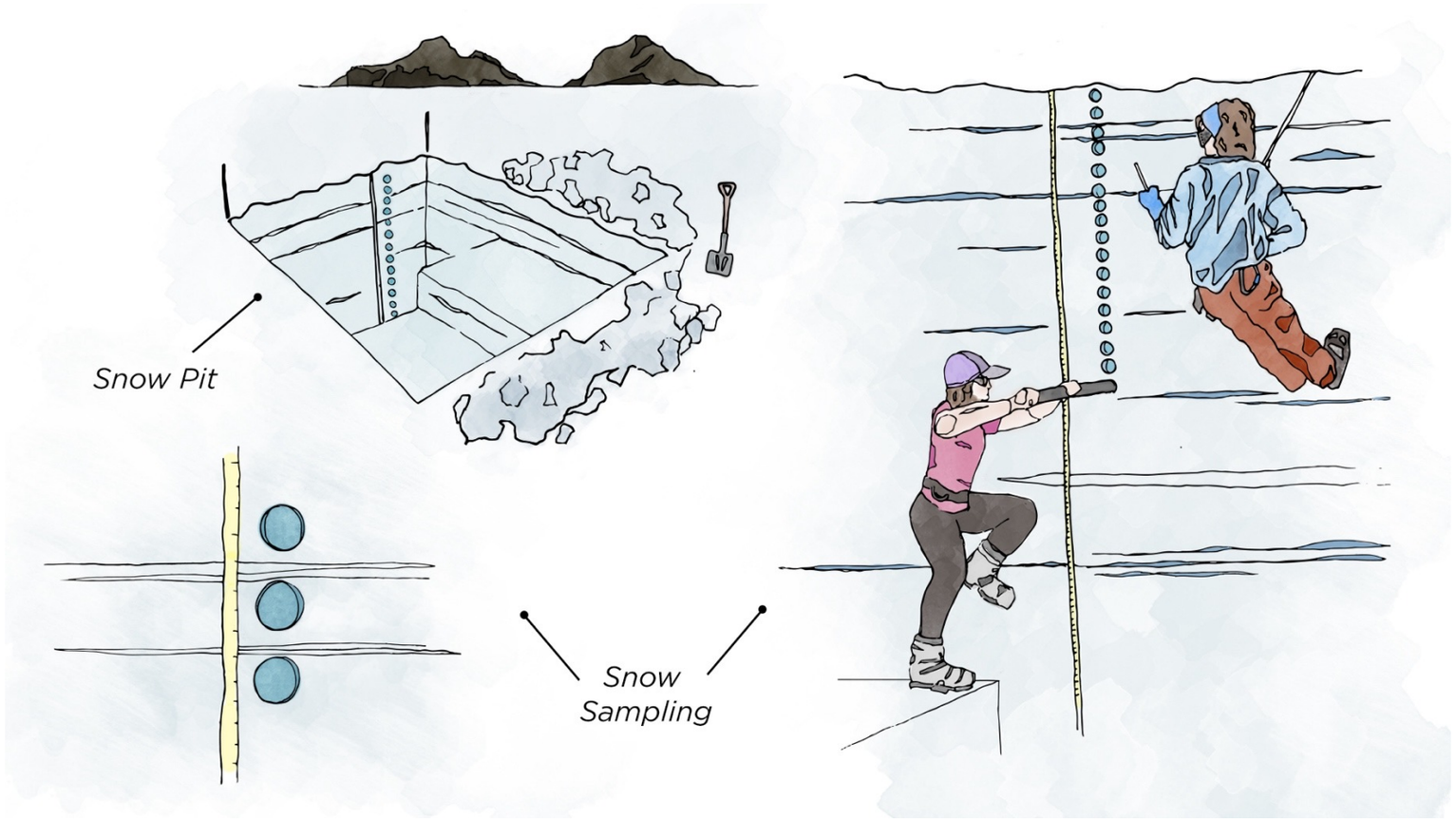
HANNAH'S WORK: women in STEM mural

Grace Juneau

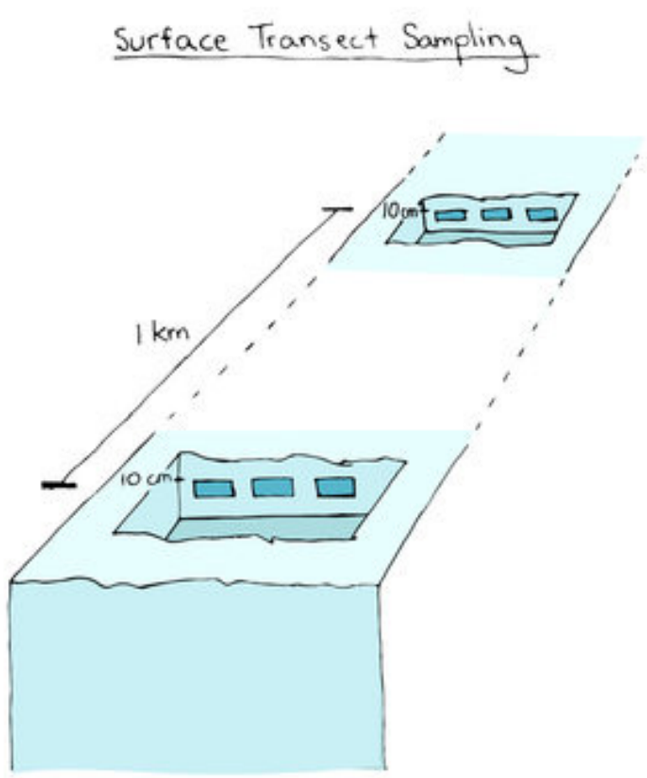
SCIENCE ILLUSTRATION + VISUALS

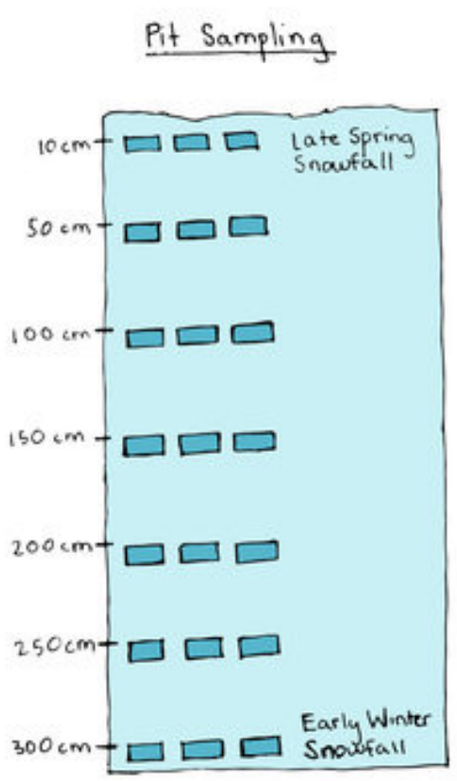
Help reach a wider audience with diagrams + figures

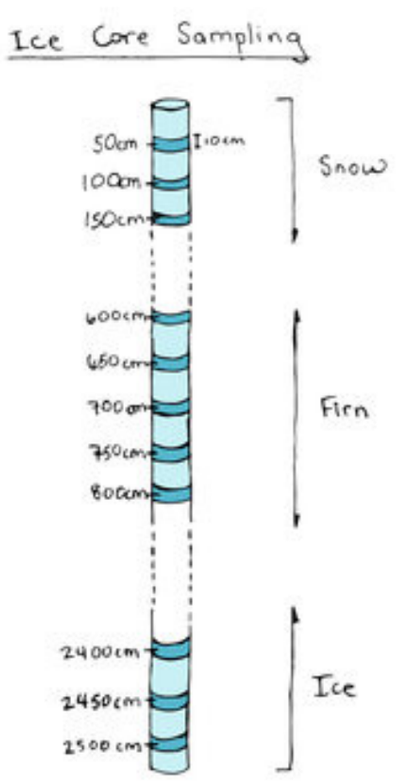
Clearly communicate findings and complex concepts



Jaclyn Schmidt

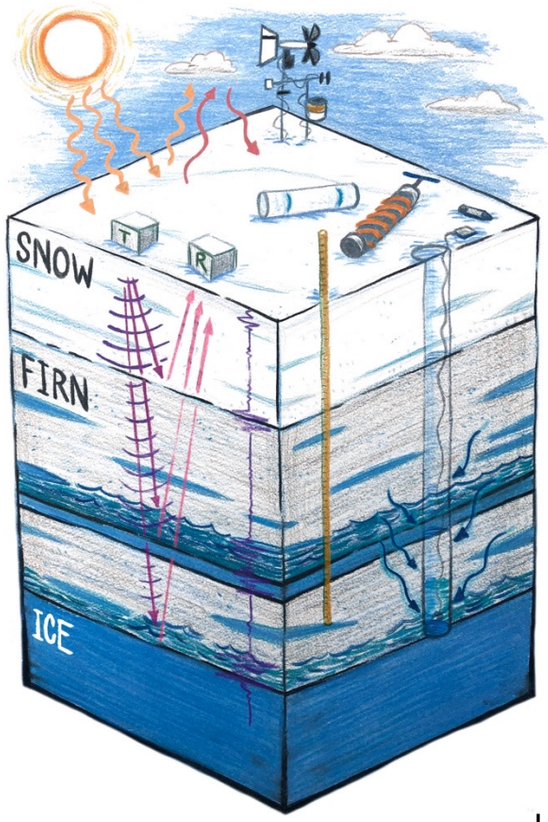




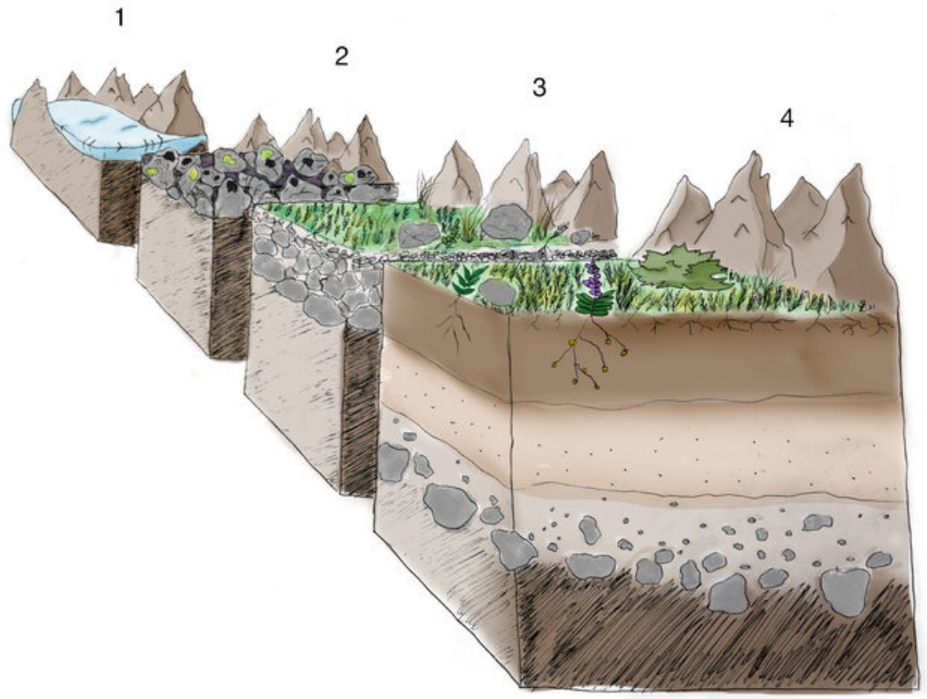


Nadia Grisaru

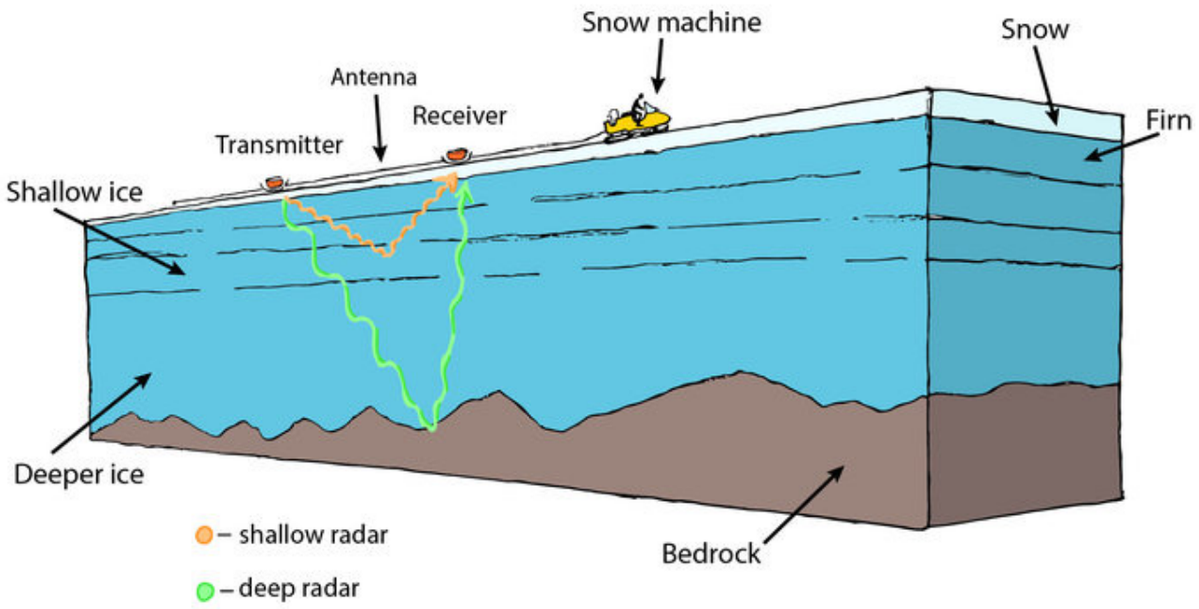
STUDENT WORK: science illustration



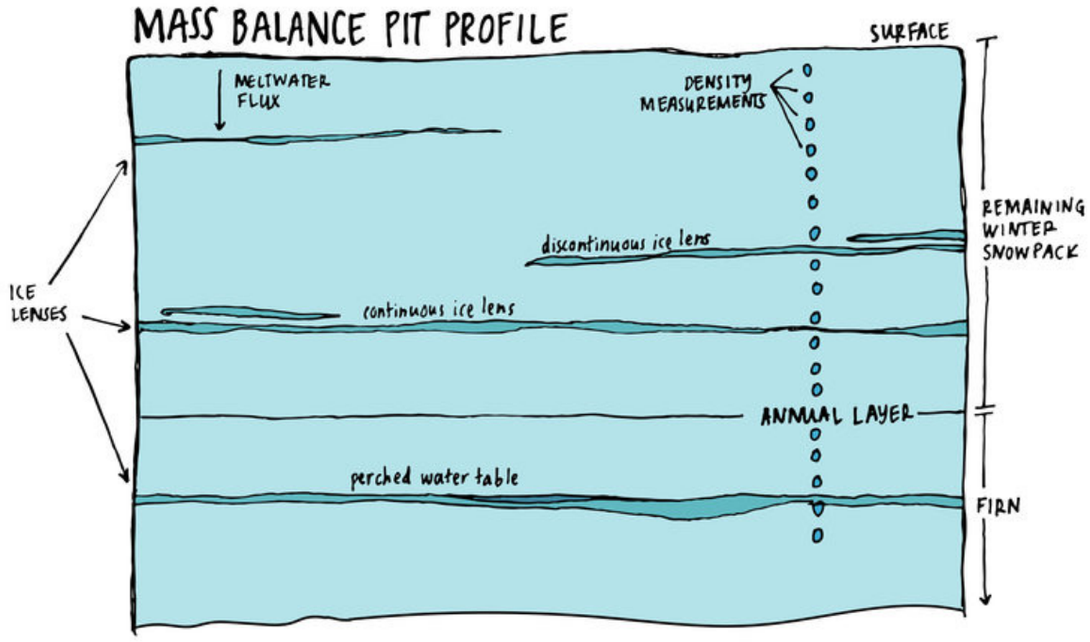
Jeremy Stock



Abby Case



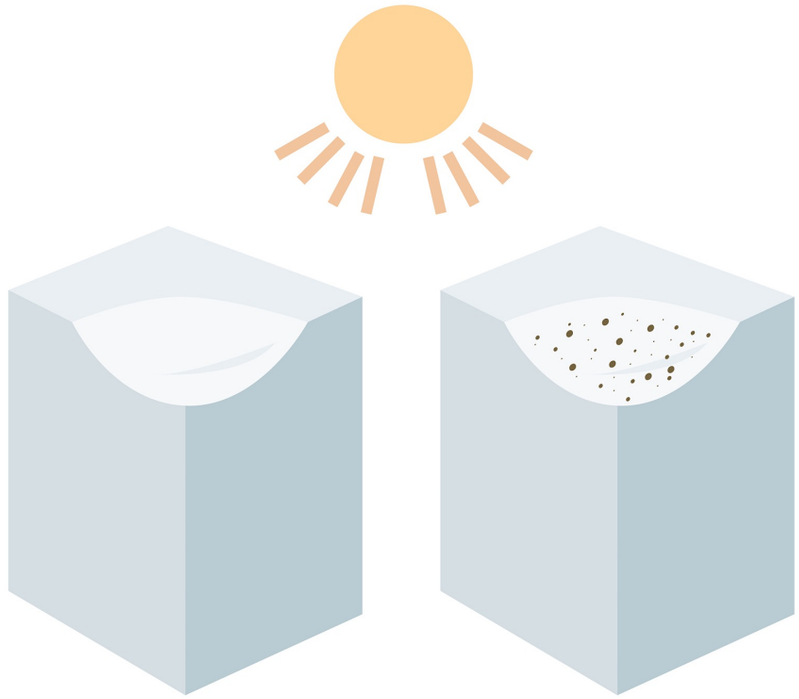
Bertie Miller



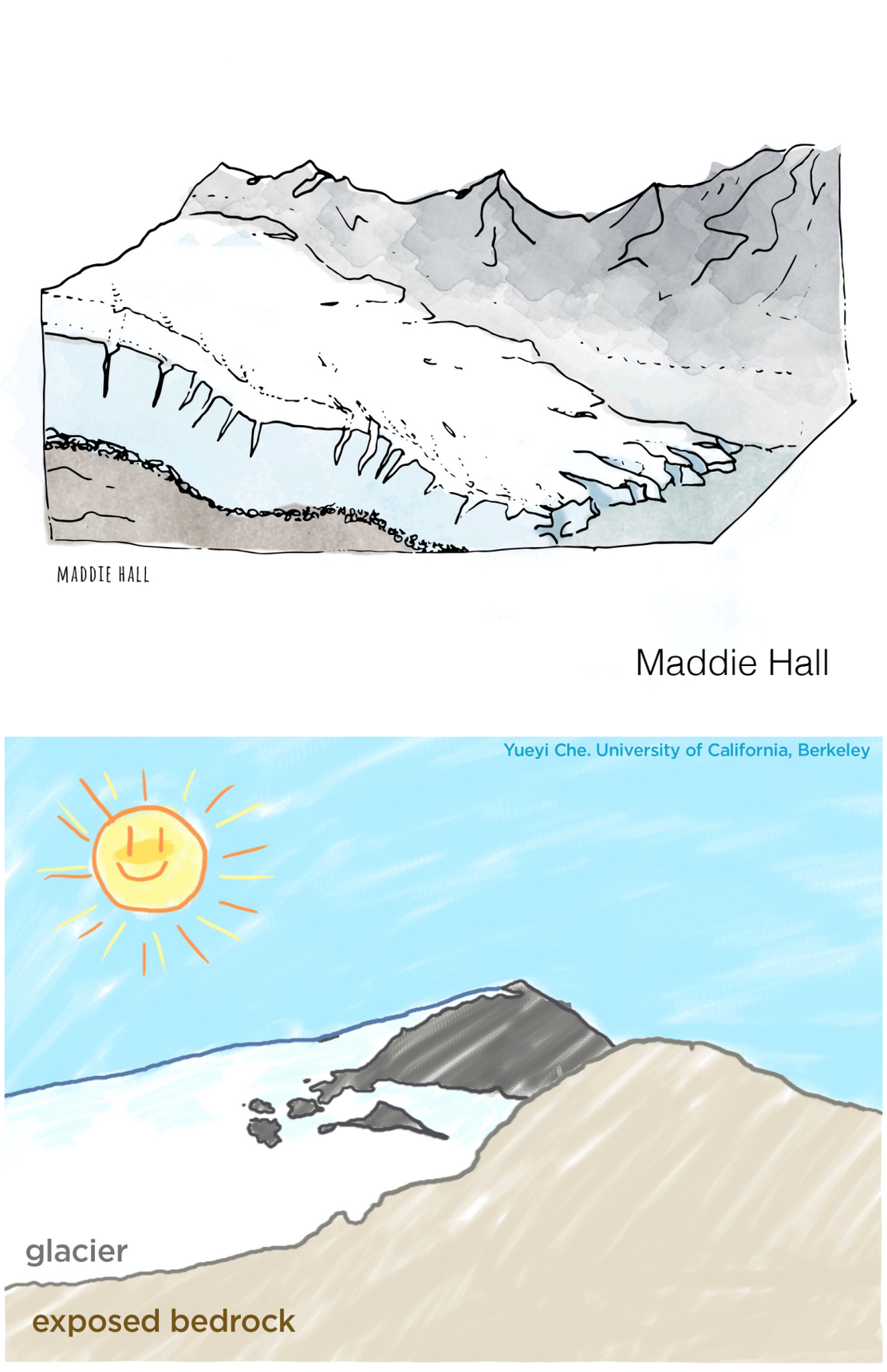
Mia Vanderwilt

STUDENT WORK: science illustration

Maddie Hall



Alexia Fabiani



Yueyi Che

Yueyi Che

STUDENT WORK: science illustration

PARTICIPATORY PROJECTS

Collective creative engagement deepens connections to each other, to field science, and to quantitative info

Amplifies diverse forms of knowledge production and ways of relating to place

STUDENT WORK: collaborative cyanotype prints + memory exchange

THANK YOU! FEEL FREE TO REACH OUT:

hannahpmode@gmail.com

MORE ABOUT ME:

www.hannahpmode.com

instagram.com/hannahpmode