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ON THE CUTTING EDGE PROGRAM

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Improving Earth education one hour at a time

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NAGT WEBINARS
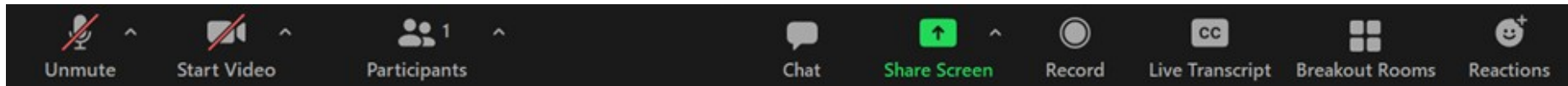## ON THE CUTTING EDGE PROGRAM

Welcome to the NAGT webinar series
### Improving Earth education one hour at a time

Inclusion through STEM Experiences: Approaches to Increase Access and Accommodations

As you enter, please review the Zoom controls below. Leave your audio and video off, unless prompted by a host. You can post any questions in the chat box. Thank you!

| Unmute | Start Video | Participants 1 | Chat | Share Screen | Record | Live Transcript | Breakout Rooms | Reactions |

Please leave your **mic muted** and **video off** (indicated by a red slash).

Click to open the **Participants** box. This will allow you to give nonverbal feedback.

raise hand | yes | no | go slower | go faster
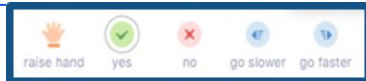
Click to open the **Chat** box. This will allow you to chat with Hosts and Participants.

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Type message here...

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2

Inclusion through STEM Experiences:
Approaches to Increase Access and Accommodations
Dr. Wendi J. W. Williams and Sean Thatcher, Facilitators
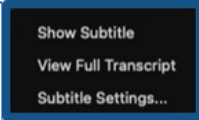
This NAGT webinar 28 April 2021 will provide strategies and resources for designing or modifying pedagogical "ways of doing" to reinforce increasing the diversity of students benefiting from various learning space experiences. Considering inclusive strategies in STEM environments, participants will:

- **learn about common barriers to access and inclusion within STEM education;**
- **be introduced to the principles of Universal / Inclusive Design for Learning (UDL/IDL); and**
- **explore embedded or specific accommodations for both physical and non-apparent disabilities.**

Further, additional resources outside the geosciences will be shared for catalyzing our community efforts.

Who am I? Sean Thatcher, M.S.

- **GIS Analyst and Geoscience Educator**

  - **Focus in remote sensing and climate resiliency.**

  - **Adjunct at the City University of New York and Rutgers University (Fall 2021).**

- **Student Community Chairman for the International Association for Geoscience Diversity.**

- **IAGD Co-Liaison to AGI Inter-society Diversity, Equity and Inclusion Committee.**

- **Quadripelgic (Spinal Cord Injury 2009) and wheelchair user.**

Wendi J. W. Williams, Ph.D.

- **Geosciences Faculty with South Texas College, Lower Rio Grande Valley, TX, U.S.**

- **Practitioner and Facilitator of Universal Design in STEM / Geosciences since 2003**

- **25+ Years Experience in Academia (2YCs and 4YCUs), Nature Center Education Director, Pre- / Inservice Teacher Trainer, Math Science Partnership Center Co-Director, and Geologist for Geotechnical Engineering Firm as well as Government Agency Dealing with Planning, Environmental Issues and Public Safety.**

- **IAGD Co-Liaison to AGI Inter-society Diversity, Equity and Inclusion Committee**

The International Association for Geoscience Diversity

- **The IAGD is a 501c3 organization promoting equal access in the geosciences for all persons.**
- **Provides resources on a variety of different disabilities in classrooms and in the field.**
- **Opportunities for students to become more engaged.**

We are the IAGD

Approximately 1 minute streaming video with music / non narrated.

Common Barriers to Access and Inclusion in STEM

Ways of "doing" are particularly important when designing to diminish barriers to learning and to support successful access to technical career fields.

As you are aware, there are many kinds of diversity represented in our formal and informal educational settings.

Let's take a few moments so you can <u>contribute one or two kinds of diversity that comes to mind</u>… please <u>enter into your Zoom chat area</u>.

There is more often than not intersectionality:

  Learning Preferences

  Level of College "Readiness"

  First Generation College-Bound

  Age

  Persons with Varying Abilities / Disabilities (Self-Advocated or Not)

  English Language Learners

  Military (Active Duty, Reservist or Veteran Status)

  Move Frequently (e.g. Migrant Worker)

  Gender Identity

  Ethnic/Racial Demographics

- *Physical* barriers that promote unequal access, such as only stairs / no ramps or lifts, rugged terrain, and lack of accessible vehicle.
- *Sensory* barriers that promote unequal access, such as media lacking captioning / alt tags, need ASL interpreters, quiet spaces, etc.
- *Technical* barriers to include those due to limited technical literacy, challenge of STEM language, limited exposure to technical training and educational opportunities, inaccessible labs, and technology costs
- *Social* barriers to experiential learning and networking that often relate to field courses, conferences, and trips.

How do we Address These Barriers?
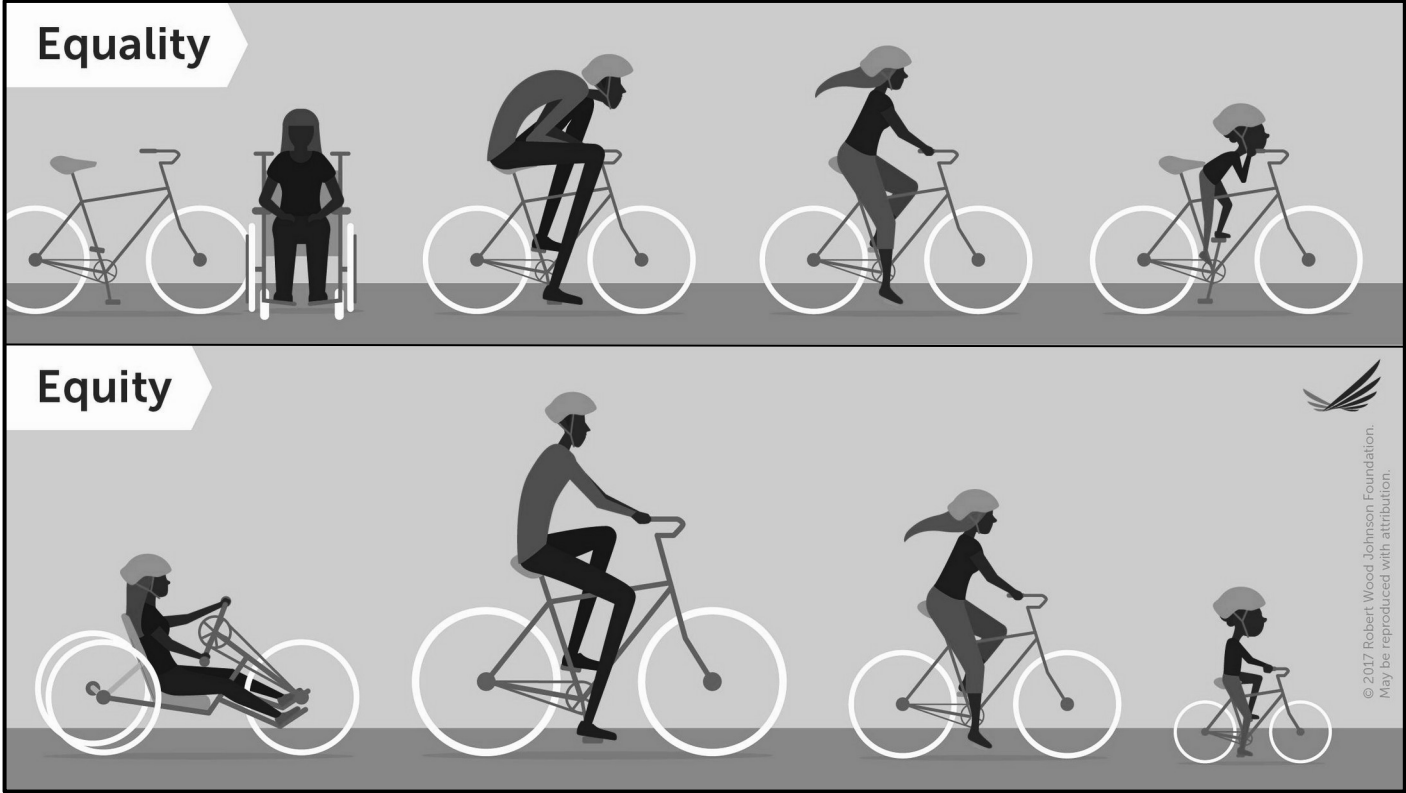
Equality

Equality implies that each individual should receive the same.

Equity

Equity focuses on eliminating differences between groups, when those differences can be addressed.

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(Image from Robert Wood Johnson Foundation (2017))

Ways to Diminish Barriers: Apply Principles of Universal Design for Learning (UDL)

Ways to Diminish Barriers: Apply Principles of Universal Design for Learning (UDL) 1

UDL Can Change the World

One minute captioned streaming video from CAST.org

Universal Design guidelines naturally include many of the suggested "best practices" for learner-centered instructions, such as use of *appropriate** :

- **Visual and Auditory Media**

- **Tactile Representations**

- **Interpersonal Strategies and/or Learning Space Management**

- **Routines and Predictable Structure or Patterns to "Doing"**

- **Blended Instructional Techniques**

    *Remembering that what is one person's "appropriate" may be another person's barrier...

*"**While physical spaces, courses, technology, and student services are often designed for the average student, the practice of universal design in education (UDE) considers people diverse characteristics in the design of all formal and informal educational products and environments. UDE goes beyond accessible design for people with disabilities to make all aspects of the educational experience more inclusive for students, staff, instructors, administrators, and visitors with a great variety of characteristics, including those related to gender, race and ethnicity, age, stature, disability, and learning preference.**"*

Sheryl E. Burgstahler, Ph.D.
DO-IT Universal Design in Education

Ways to Diminish Barriers: Apply Principles of Universal Design for Learning (UDL) 4

CAST   [Universal Design for Learning Guidelines](#)

DO-IT   [DO-IT Disabilities, Opportunities, Internetworking, and Technology](#)

DO-IT   **AccessSTEM** Community of Practice

Explore Embedded or Specific Accommodations for Physical and Non-apparent Disabilities

Explore Embedded or Specific Accommodations for Physical and Non-apparent Disabilities 1

SERC

PLAN, PLAN, PLAN!

Be *PROACTIVE* not *REACTIVE* when designing ways of "doing".

- Use appropriate headers, numbering, and bullets
- Create/utilize multimedia content
- Remember closed / open captioning audio content and possibly scene narration
- Alt text tagging on visual content
- Keep accessibility in mind when creating field trips
  - **Access to Accessible Bathrooms**
  - Curb Cuts
  - Ramps
  - Distance between Locations
  - Weather
  - Activity Descriptions and Evaluation
  - Trial Desired Technology

Proactivity will save you valuable time and will become habitual!

Some Examples of Making Learning Spaces and Professional Conferences More Accessible

From the organization *respect ability*: Ensuring Virtual Events are Accessible to All

And from Hospitality & Disability: Accessible Meetings - Events -Conference Guide

Also consider a physical learning space configuration:

Optimal classroom arrangement

Arranging student desks in a U shape allows deaf students to have continuous visual contact with the teacher, and to see how other (hearing) students are responding.

Screen

Teacher's desk
(Space in front and behind for instruction and/or dialogue)

Projector
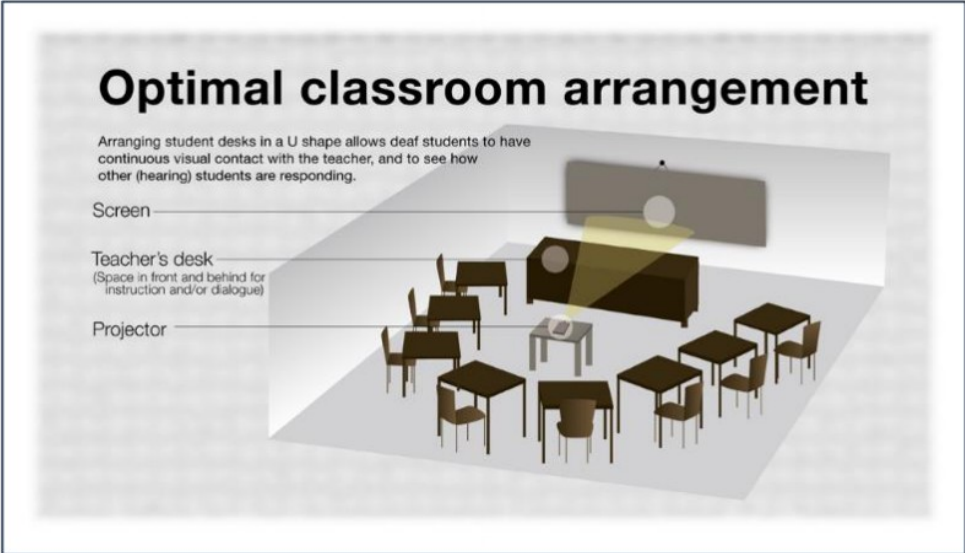
Image mined Optimal Inclusive Classroom
Creative Commons BY-NC-SA

20

Deaf and hard-of-hearing education tools for STEM and other disciplines are available from Rochester Institute of Technology.

Such as Science Signs Lexicon using American Sign Language (ASL) (hyperlinked screen captured image at upper right) and RIT Library Interpreter Resources ASLCORE Project celebrating Deaf Culture and ASL (hyperlinked screen capture at lower right).

Also read about Advances in Deaf Education from Inside Higher Ed 15 April 2021 .

Color Vision Deficiency (CVD)

Colblindor
**Basic background on color vision deficiency and
Coblis color blindness simulator**

Drag and drop or paste your file in the area below or: [Choose File] visiblelights…ikipedia.png
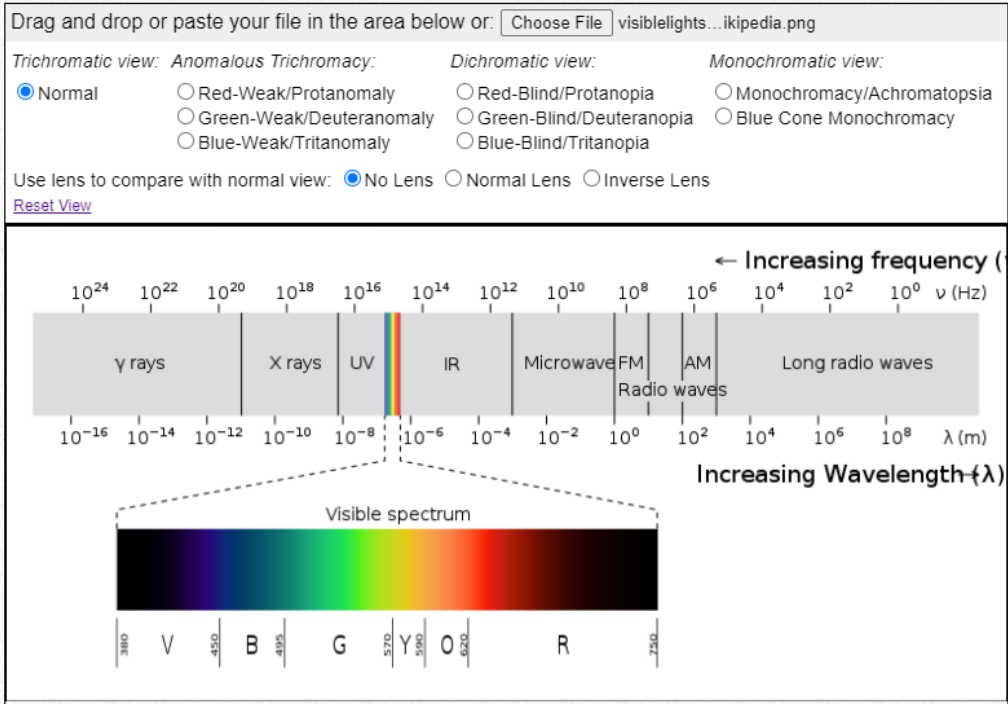
Trichromatic view: Anomalous Trichromacy: Dichromatic view: Monochromatic view:
◉ Normal   ○ Red-Weak/Protanomaly   ○ Red-Blind/Protanopia   ○ Monochromacy/Achromatopsia
                  ○ Green-Weak/Deuteranomaly   ○ Green-Blind/Deuteranopia   ○ Blue Cone Monochromacy
                  ○ Blue-Weak/Tritanomaly   ○ Blue-Blind/Tritanopia

Use lens to compare with normal view: ◉ No Lens ○ Normal Lens ○ Inverse Lens
Reset View

← Increasing frequency (

10^{24} 10^{22} 10^{20} 10^{18} 10^{16} 10^{14} 10^{12} 10^{10} 10^{8} 10^{6} 10^{4} 10^{2} 10^{0} ν (Hz)

γ rays   X rays   UV   IR   Microwave FM   AM   Long radio waves
                                                         Radio waves

10^{-16} 10^{-14} 10^{-12} 10^{-10} 10^{-8} 10^{-6} 10^{-4} 10^{-2} 10^{0} 10^{2} 10^{4} 10^{6} 10^{8} λ (m)

Increasing Wavelength (λ)

Visible spectrum

380   V   450   B   495   G   570 Y 590 O   620   R   750

Anomalous Trichromacy

Visible spectrum

Dichromatic

Monochromatic

22

Familiar?

R. Weller/ Cochise College
K. Panchuk
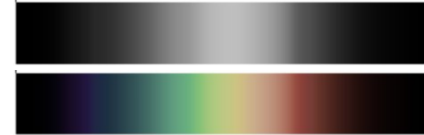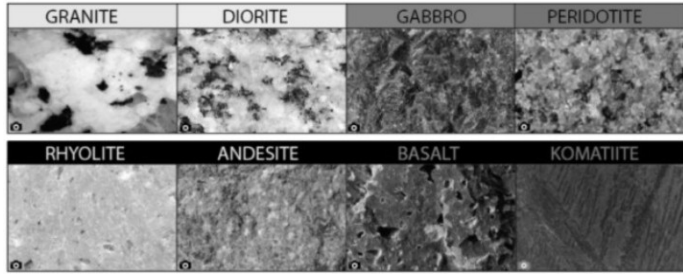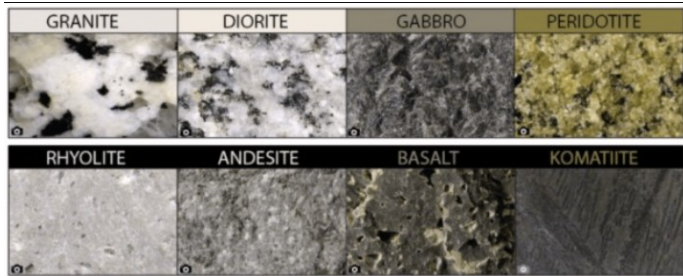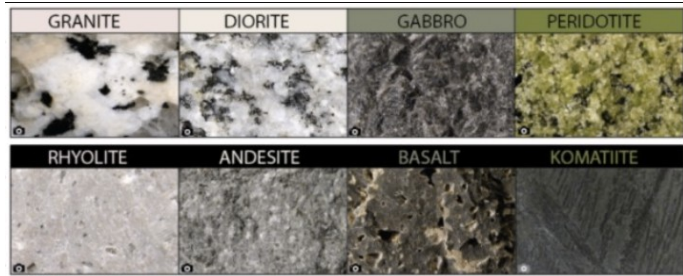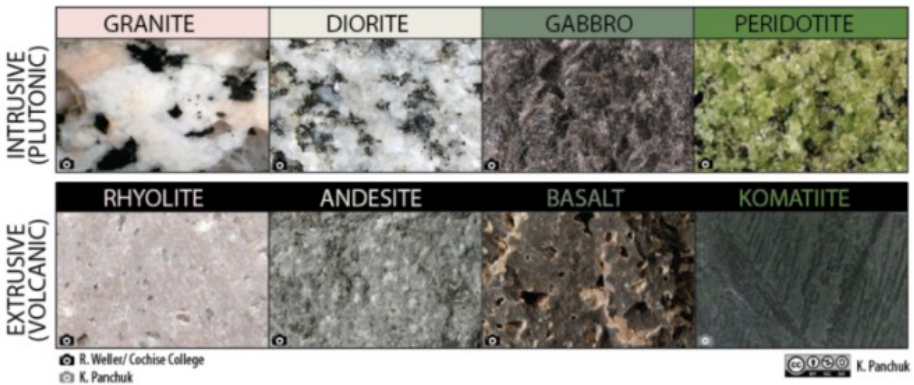
Please consider how color is used in our interactions.

What strategies can you use to teach materials in a more Universal Design way?

If you work with web and application coding projects or consider adopting products to use in your learning and work environment, <u>please</u> follow these protocols or preferentially acquire only ADA compliant moving forward...

W3C®

World Wide Web Consortium

Making the Web Accessible

Web Accessibility Tutorials

Web Content Accessibility Guidelines 2.1 (WCAG2.1 / Technical)

Also seek out mobile app accessibility.
A primer to consider is a free eBook found at UsableNet

CMS and LMS starting to automate alternative formats:

Minerals Content Presentation and Study Tool
Enabled: Statistics Tracking
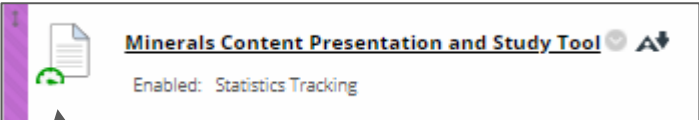
And probe for best practices in accessibility when upload items into system.

Albeit color indicator only, I met the excellent goal (green for "go", I suggest different symbols to replace red - yellow - green).

Introduction to Blackboard Ally

Download alternative formats ⌄   ✕

Selected file:

StudyGuide_MineralsCh2&PartialCh22(2).docx

○ Tagged PDF
Structured PDF for improved use with assistive technology

○ HTML
For viewing in the browser and on mobile devices

● ePub
For reading as an e-book on an iPad and other e-book readers

○ Electronic braille
BRF version for consumption on electronic braille displays

○ Audio
MP3 version for listening

○ BeeLine Reader
Enhanced version for easier and faster on-screen reading

○ Translated version
A machine translated version of the original document

? Help

By downloading an alternative format, you agree with the Terms of Use

Cancel   A↓ Download

Synchronous and Asynchronous Learning Opportunities

With the onset of the pandemic new strategies have been implemented using UDL to promote inclusivity in remote learning and virtual experiences.

- Synchronous
    - Provides the social interaction to encourage peer learning
    - Encourages networking between peers and faculty
- Asynchronous
    - Allows students to learn in ways that promote independence
    - Information easily shared using a variety of media options

Remote learning has leveled the playing field, forcing students and faculty with and without disabilities to rethink traditional barriers to access:

- Field trips
- Field camps
- Lab work

Remote Collaboration Strategies

**Let's take a moment
with this streaming content.**

**Then in the chat, please
enter one strategy that you
thought most
intriguing/possible for your
setting and briefly why.**

Note: Approximately 3 minute captioned streaming video with narration.

Slippery Slope: The Virtual Experience and the New Museum Option

- **As the world reopens the virtual options made this past year should not be the default "accessible" option for students.**
    - **Promotes feelings of otherness**
    - **Encourages the perpetuation of ableist/racist stereotypes**
    - **Limits networking opportunities**
    - **Encourages students to leave STEM programs**
- ***Think of your past year and consider how things could have been better if we were all together, that's exactly what the virtual only or the "museum option" is.***
    - **We need to plan all activities for all student not just for students we're used to.**
    - ***Some accommodations are another person's barrier.***

Example Streaming Video with CC and Scene Narration / Audio Description:

Equal Access: Universal Design of Instruction
from TheDOITCenter
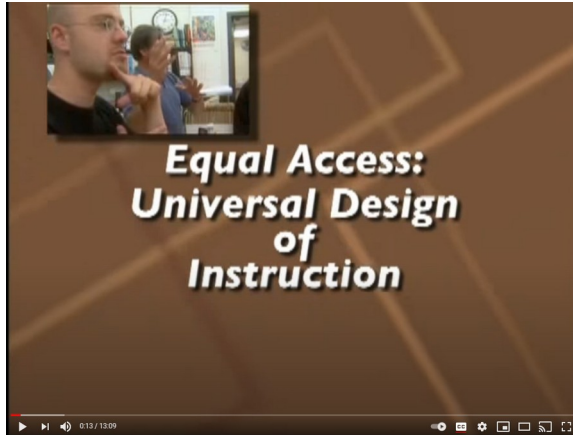
If time permits, watch a little to experience scene narration.

Invisible Disabilities and Postsecondary Education
from TheDOITCenter

Scene Narration (also referred to as Audio Description)...consider the Library of Congress National Library Service for the Blind and Print Disabled Audio Description Resource Guide

GIS Opportunities for Access

- **GIS is a tool that allows users to study locations they may not be able to physically access.**
- **Allows users with limitations to:**
  - **Pursue research interests near and far**
  - **Provides a sense of ownership**
  - **Plays to intellectual strengths**
  - **Builds desirable technical expertise**
  - **Encourages inter/transdisciplinary work**
- **Limitations:**
  - **Visual in nature**
  - **Cost/expertise**
  - **Lack of access**

Low Tech vs High Tech GIS Options

- **Low Tech:**
  - **An open source platform that allows users to interpret land surface imagery worldwide such as Google Earth.**
    - **No advanced technical skills required**
    - **Allows for image interpretation, basic digitization/mapping, and anotiations.**
    - **Easily created story maps and exploratory field trip creation via Google Tours.**
- **High Tech:**
  - **Advanced geospatial platforms that allows for advanced analyses at a variety of scales including non-commercial Google Earth Engine/QGIS and commercial ArcGIS options.**
    - **Moderate understanding of mathematics or programming**
    - **Advanced image analysis, editing, and interpretation.**
    - **Practical laboratory analysis similar to professional geoscientists.**

# GIS with UDL Principles: Drought Analysis and Color Vision Deficiency

- **Drought analysis is a common introductory exercise using GIS with applications in agriculture, forestry, water security, fire management, etc.**
- **NOAA PERSIANN moderate resolution dataset measures global precipitation.**
- **Sentinel-2 provides high resolution hyperspectral land surface data.**
  - **Can be used in creating a Normalized Difference Vegetation Index (NDVI).**
- **Commonly uses a red to green color scale - terrible for CVD.**
- **Using the open source Google Earth Engine platform these datasets can be analyzed in effective, complementary, and inclusively.**
  - **Conducted on external servers**
  - **Easily shareable**
  - **Numerous resources in a variety of formats**
    - **Documentation**
    - **Tutorials**
    - **Videos**

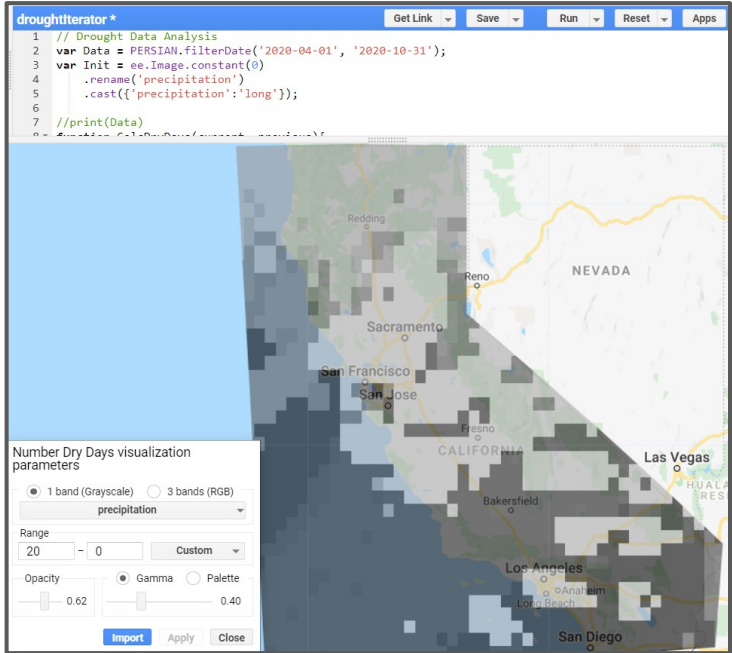# Drought Analysis CA Summer 2020 Red-Green
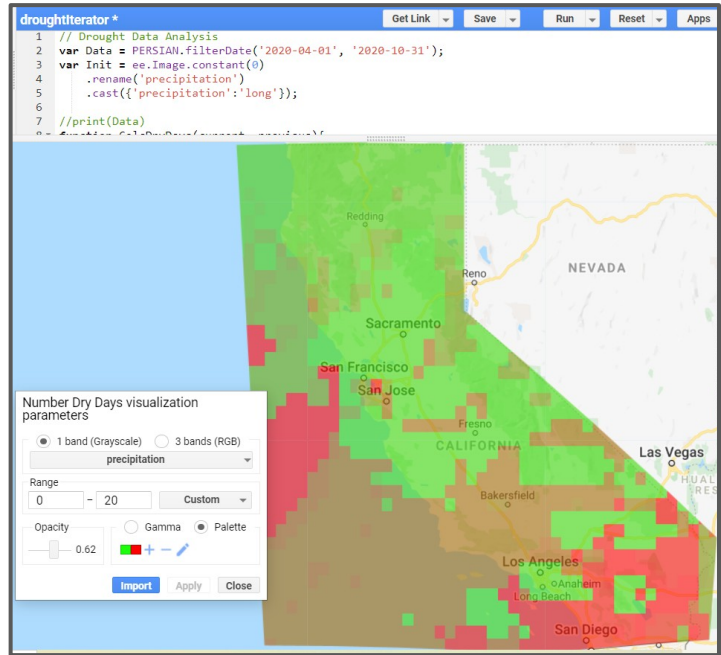
Redder areas experience less frequent precipitation. 10 km resolution.
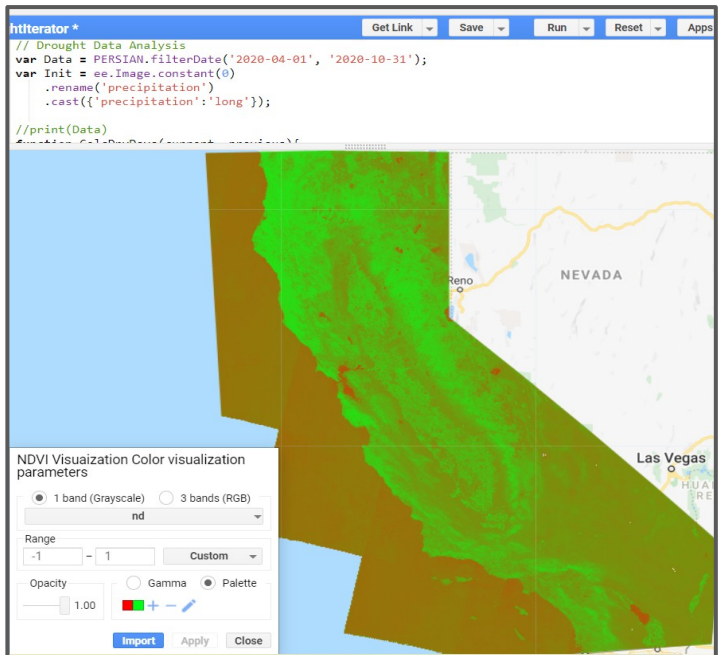
Redder areas have less healthy vegetation. 10 m resolution.

Drought Analysis CA Summer 2020 Greyscale

Darker areas experience less frequent precipitation. 10 km resolution.
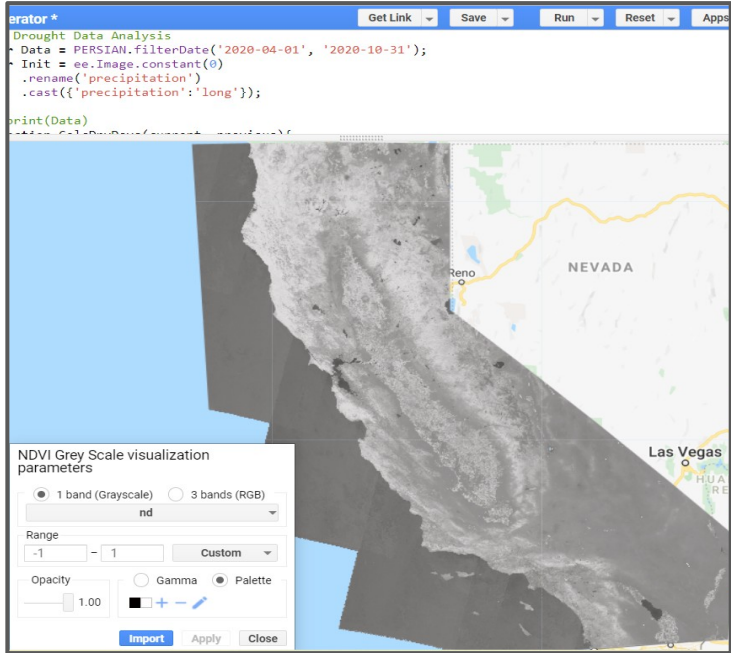
Darker areas have less healthy vegetation. 10 m resolution.

Additional Resources Outside Geosciences to Consider

Resources Outside Geosciences to Consider

Following are just a few items to get us thinking about our interdisciplinary geosciences more broadly across STEM:

ADA at 30: Scientists Urge Efforts Beyond Compliance

Astronomy Accessibility Guidelines

Teaching Chemistry to Students with Disabilities

The Sonification Handbook (especially Ch 17)

Thoughts about Data Visualization and Accessibility (via Sonification)
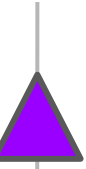
Quick Recap on UDL Principles

- Creates an accessible and inclusive learning environment for all students.
- Be PROACTIVE not REACTIVE when creating course content.
- UDL is multimodal and provides options in learning environment.
  - Some accommodations can create barriers, encourage an open dialog.
- Technologies can help dismantle many barriers:
  - Physical
  - Sensory
  - Technical
  - Social
- If unsure of best practices, please reach out for help.

Literature Resources

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Additional Resources

Course Design

- **Blackboard**
  - **Blackboard Ally**
- **Canvas**
  - **Accessibility Design Guidelines**
  - **Accessibility Within Canvas**
  - **Canvas Voluntary Accessibility Template**

Color Vision Deficiency

- **Colblinder**
- **5 easy online color blindness simulators**
- **Color Blindness Simulator**
- **Color blindness how to design an accessible user interface**

GIS Open Source Resources

- **Google Earth**
- **Google Tours**
- **Google Earth Engine**
  - **Documentation**
  - **Tutorials**
  - **Videos**

Organizations

- **International Association for Geoscience Diversity**
- **SciAccess**

Thank you for joining us!

Thank you to NAGT for asking us to join the webinar series!

Our Contact Information:

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Upcoming webinar:

Improving Earth education one hour at a time

Recent and Ongoing Efforts of the NAGT Diversity, Equity, and Inclusion Committee

Laura Rademacher, *NAGT DEI Committee Chair, University of the Pacific*
Leah Courtland, *University of Indianapolis*
Amy Weislogel, *NAGT DEI Committee Secretary, West Virginia University*
Steve Mattox, *Grand Valley State University*
Mimi Fuhrman, *Consulting Geologist*
Danielle Sumy, *The IRIS Consortium*
Yadira Ibarra, *San Francisco State University*
Samuel Nyarko, *Western Michigan University*

Wednesday, May 19, 2021

Time: 1:00 PM PT | 2:00 PM MT | 3:00 PM CT | 4:00 PM ET

Webinar Page - http://nagt.org/243022

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http://nagt.org/243130

Resources and Opportunities:

•Consider your department or course for **NAGT's Traveling Workshops Program**

•**Teaching Geoscience Online:** https://serc.carleton.edu/236246

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