Promoting learning:
the fine line between choosing materials that **challenge the user to think critically** versus those that are too complicated to interpret to provide meaningful usage.

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CONTEXT

Many GOALS:
- Educate Students
- Train entry level professionals
- Promote continuing professional development
- Enhance trainer knowledge
- Promote mentoring
- Build Capacity in organizations, countries, regions, and globally

Our 'Informal' Training

Monthly Regional Focus Group Sessions   **Reinforce**

Special Topic Sessions (2-4 hours) }

Workshops (~40 hours)   **Present concept and content**

Our Mixed Audiences:

 Students >

 Early career (operational/researchers/educators/trainers) >

 Mid career (listed above + managers) >

 Senior level (listed above)

Poll 1

1. What category best describes you? / ¿Qué categoría lo describe mejor?
__a) Student / estudiante
__b) Early Career / principios de carrera
__c) Middle Career / carrera media
__d) Senior Career / carrera de mayores

2. What category describes your experience? / ¿Qué categoría describe su experiencia?
__a) Forecaster or Hydrologist / Pronosticador o hidrólogo
__b) Researcher / Investigador
__c) Educator or Trainer / Profesor o Entrenador
__d) Manager / Gerente
__e) other / otros

Poll 2

1. How often do you look at satellite imagery? / ¿Con qué frecuencia mira imágenes de satélite? (single choice)
__a) 3 or more days per week / 3 o más días a la semana
__b) once per week / una vez por semana
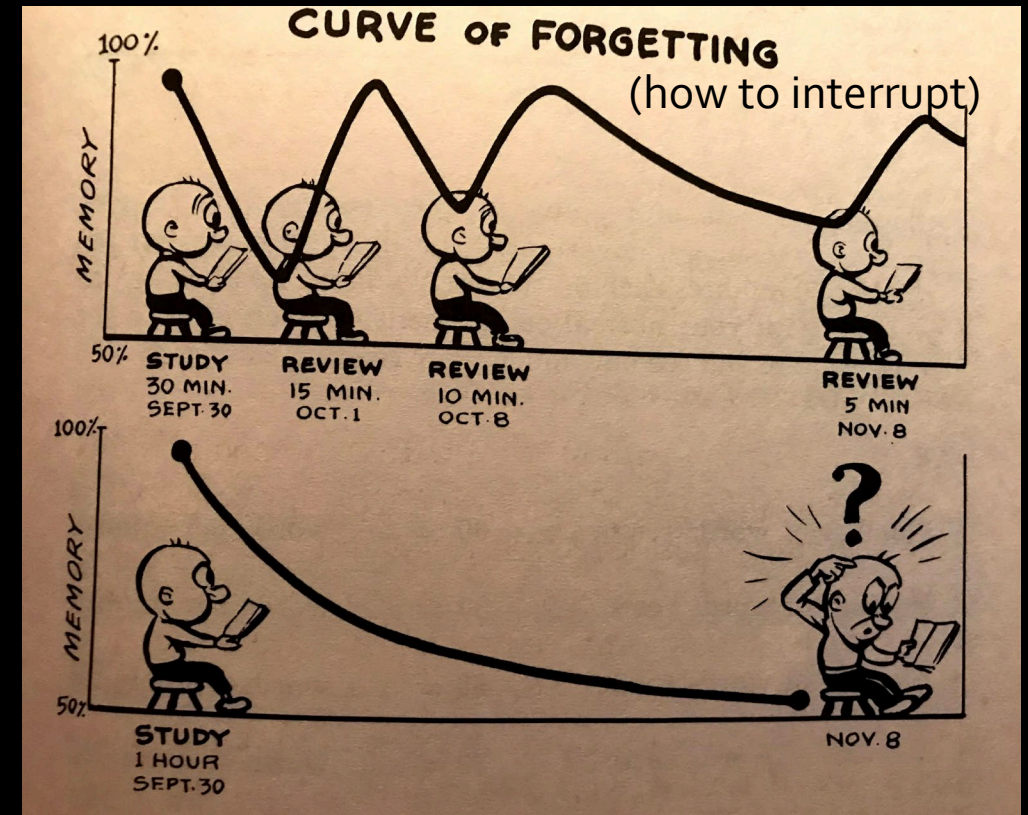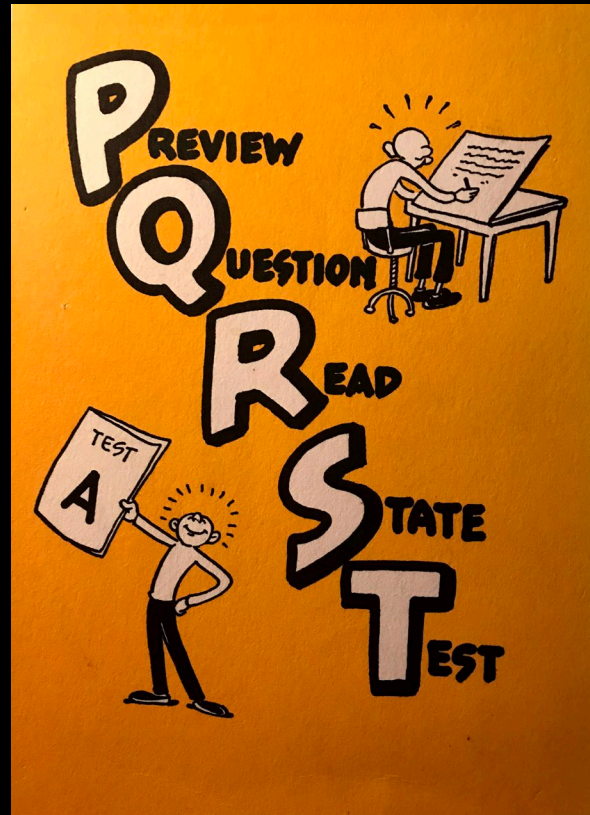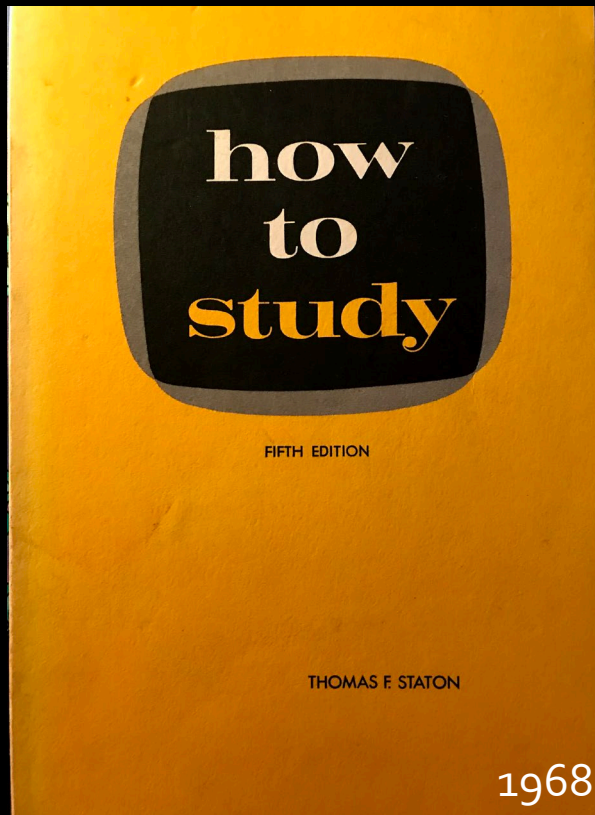__c) once per month / una vez al mes
__d) once every 3 months / una vez cada 3 meses
__e) for special events / para eventos especiales
__f) never / nunca

Approaches for the back-door Meteorologist/Remote Sensing Specialist/Educator

Early Life Exposure

1968

Approaches for the back-door Meteorologist/Remote Sensing Specialist/Educator

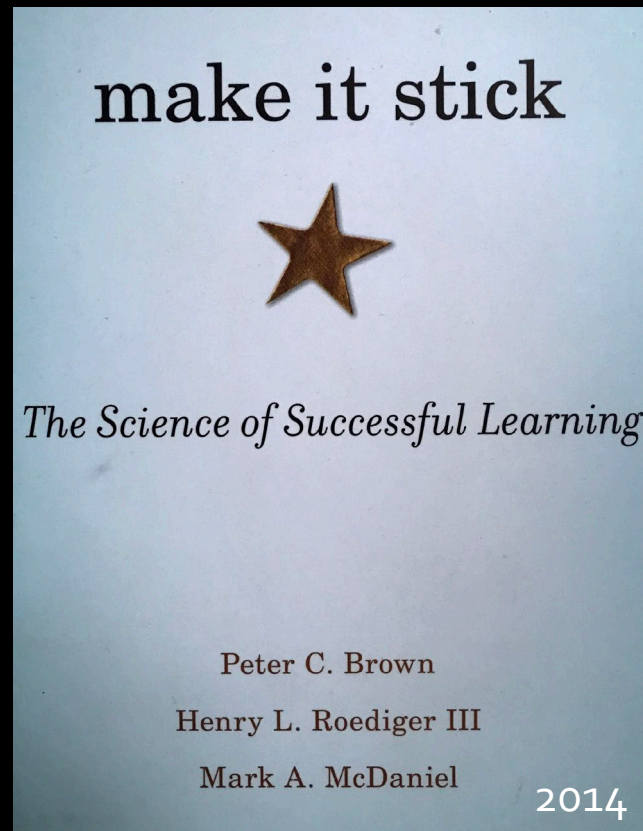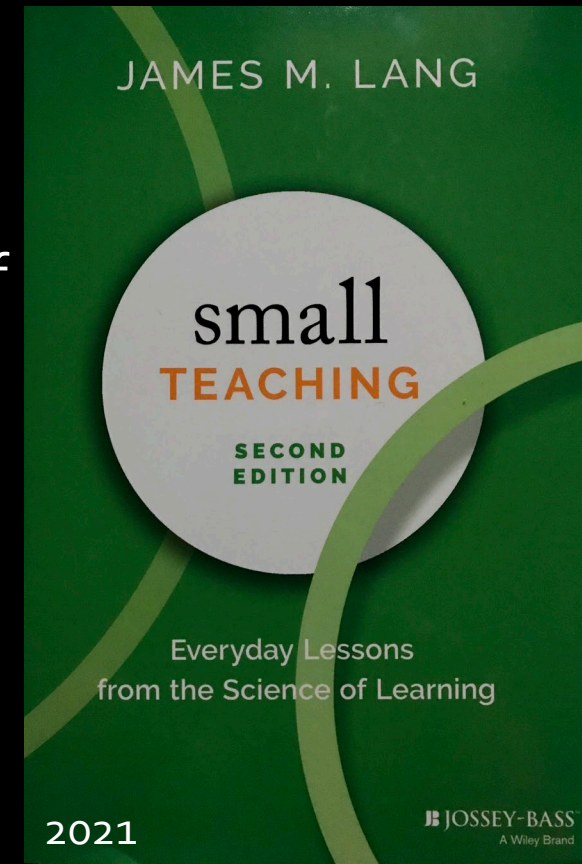Early Life Exposure   Colleagues & Workshops   +   Books***

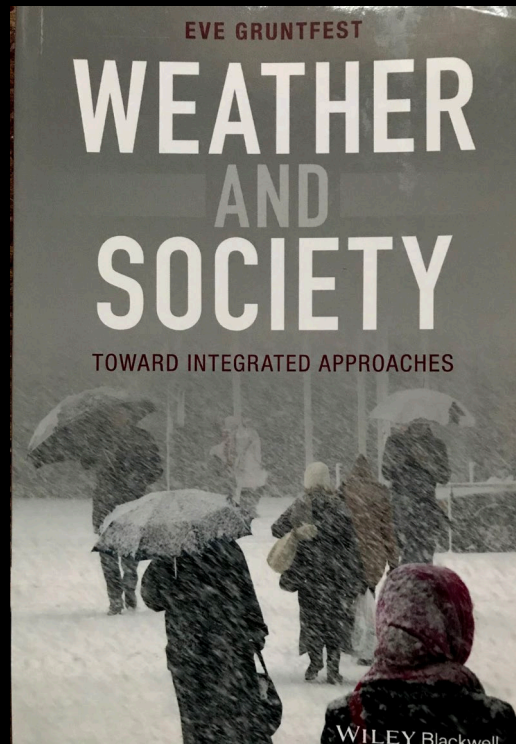To Learn, Retrieve
Mix Up Your Practice
Embrace Difficulties

make it stick

The Science of Successful Learning

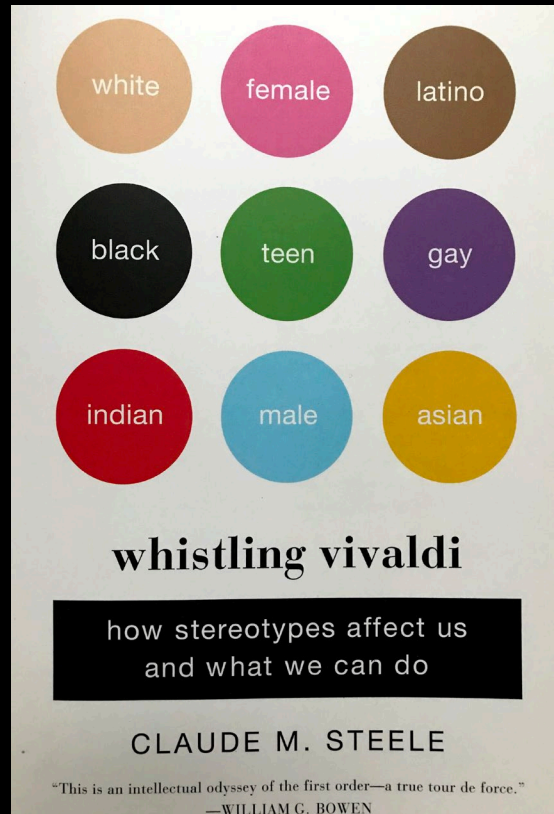Peter C. Brown

Henry L. Roediger III

Mark A. McDaniel

2014

Small teaching activities of prediction, retrieval, and interleaving can provide significant boosts to mastery of foundational knowledge and skills.

JAMES M. LANG

small
TEACHING

SECOND
EDITION

Everyday Lessons
from the Science of Learning

JOSSEY-BASS
A Wiley Brand

2021

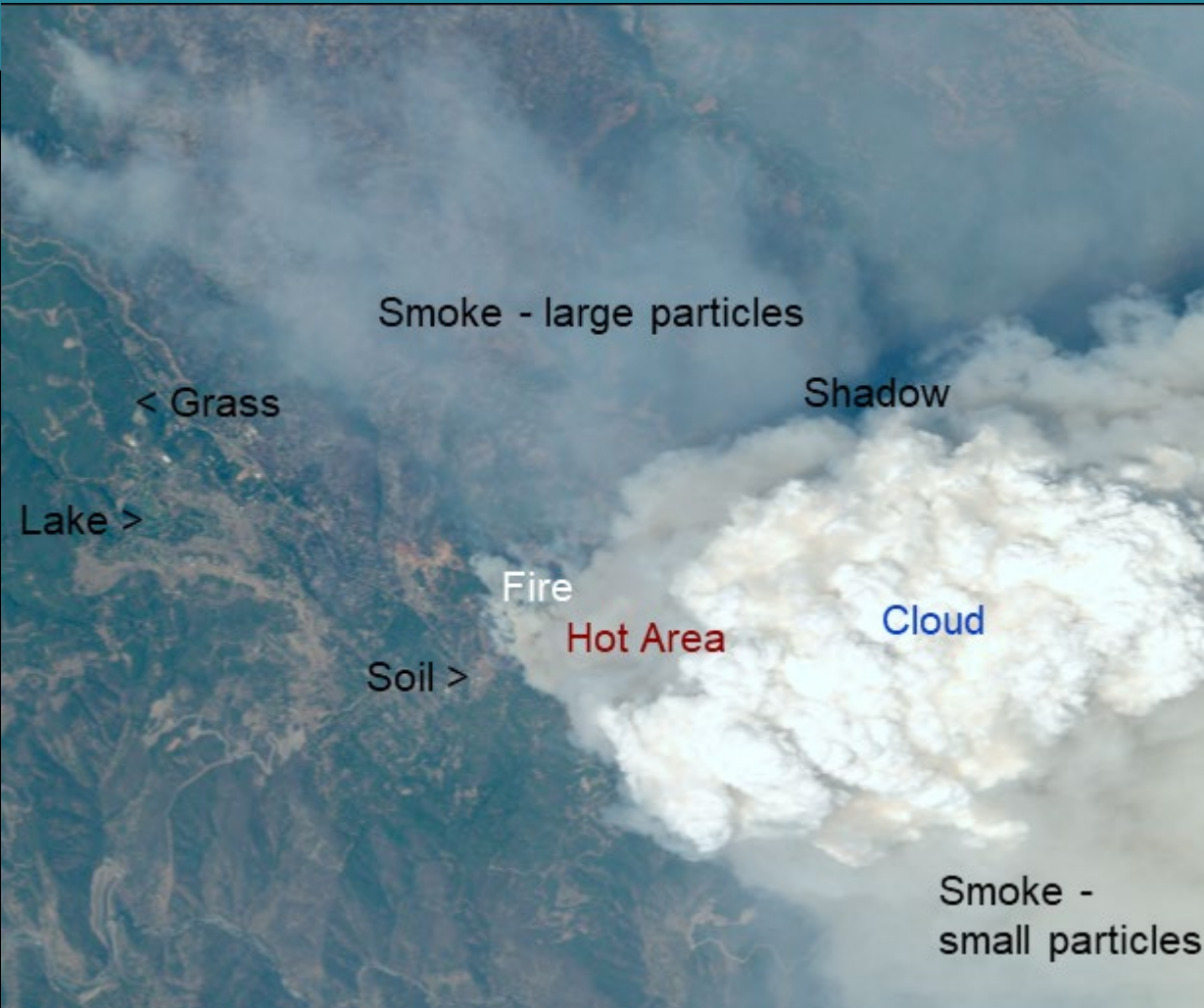# How can we incorporate Diversity, Inclusiveness , and Community?
How can we incorporate Social Sciences?

Challenging!
Can we do it with small steps?

Do you check the weather forecast every day? If not, how often do you check the forecast? (Replace forecast with satellite imagery!)

How can we seed and encourage conversations of exploration in subtle ways that enhance the abilities of the learner?

Smoke - large particles

Shadow

< Grass

Lake >

Fire

Cloud

Hot Area

Soil >

Smoke - small particles

AVIRIS Image. Linden, California, USA 20 August 1992.
Number of spectral bands: 224
Wavelength range: 0.4 to 2.5 um.
Pixel size: 20m x 20m   Scene: 10km x 10km
Loop courtesy of Mike Griffin, MIT Lincoln Laboratory

Why do we assign this homework before we review radiation topics?
- Precondition
- Review answers before lesson
- Explain further during lecture and build on concepts throughout the workshop (interleave).

Why do we ask the questions (listed)?
- We will review a few of them next.
What other questions would you ask?

Poll 3

1. In what channel does the northern smoke disappear?
¿En qué canal desaparece el humo del norte?

__<40
__41-60
__61-80
__81-100
__>100

What does the range of answers tell us?

- People perceive the contrast in the scene differently.
- Does the background affect detection of smoke?
- The contrast differences can be due to their unique visual perception or be a result of the electronic device they are viewing it on.
- The change from smoke to no smoke is subtle with the narrow hyperspectral wavelength bands. It would be interesting to compare the same scene with broader multispectral bands.
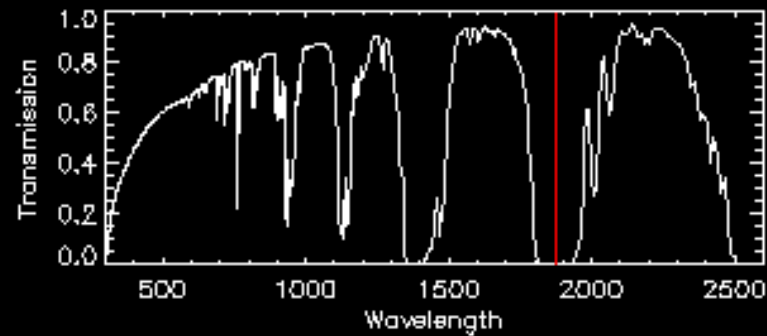
AVIRIS Image. Linden, California, USA 20 August 1992.
Number of spectral bands: 224
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Loop courtesy of Mike Griffin, MIT Lincoln Laboratory

Depending on the knowledge level of the audience, the instructor can expand on question 3:
In which channel does the fire and hot area begin to glow white?
- *Wein's displacement law*
- *Use of this information in RGBs to detect fires. This is where a link between hyperspectral and multispectral can be made.*

Channel 161   1873 nm

AVIRIS Image. Linden, California, USA 20 August 1992.
Pixel size: 20m x 20m   Scene: 10km x 10km
MIT Lincoln Laboratory

Question 4:
How many times does the earth's surface disappear (everything that is outside the cloud)?

- *A student listed ch 161 (in viewing the loop, this goes by quickly and I did not notice it before. I wonder if it is real as the wavelengths get out of order here…)*

- *We then adapted the question to specify the part of the image that does not include the cloud.*
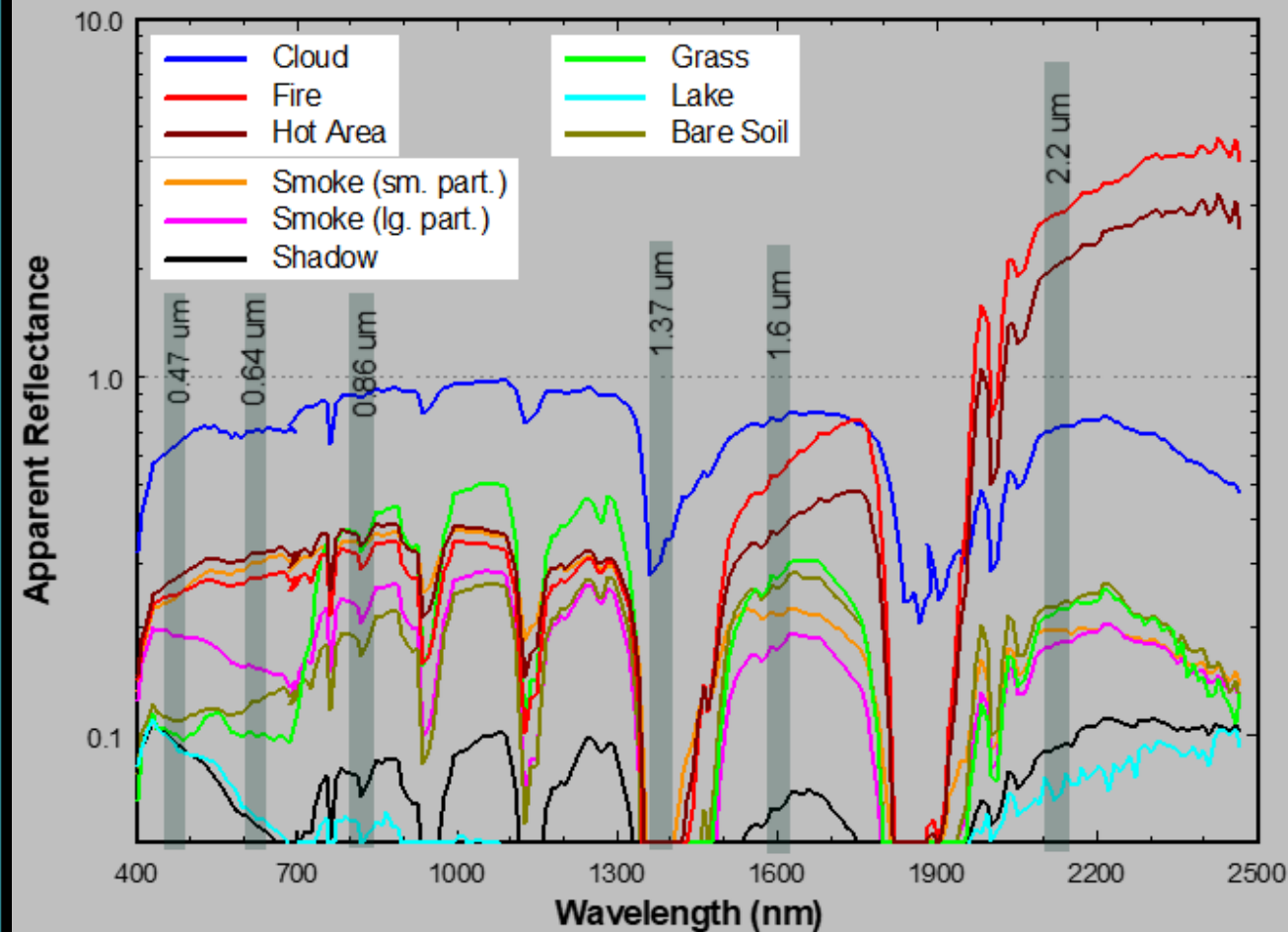
AVIRIS Image. Linden, California, USA 20 August 1992.
Pixel size: 20m x 20m   Scene: 10km x 10km
MIT Lincoln Laboratory

Question 7 is new in response to a comment by a student in the workshop.
Which direction is the wind from?
What assumption(s) did you make?

What other questions would you ask about the homework animation?
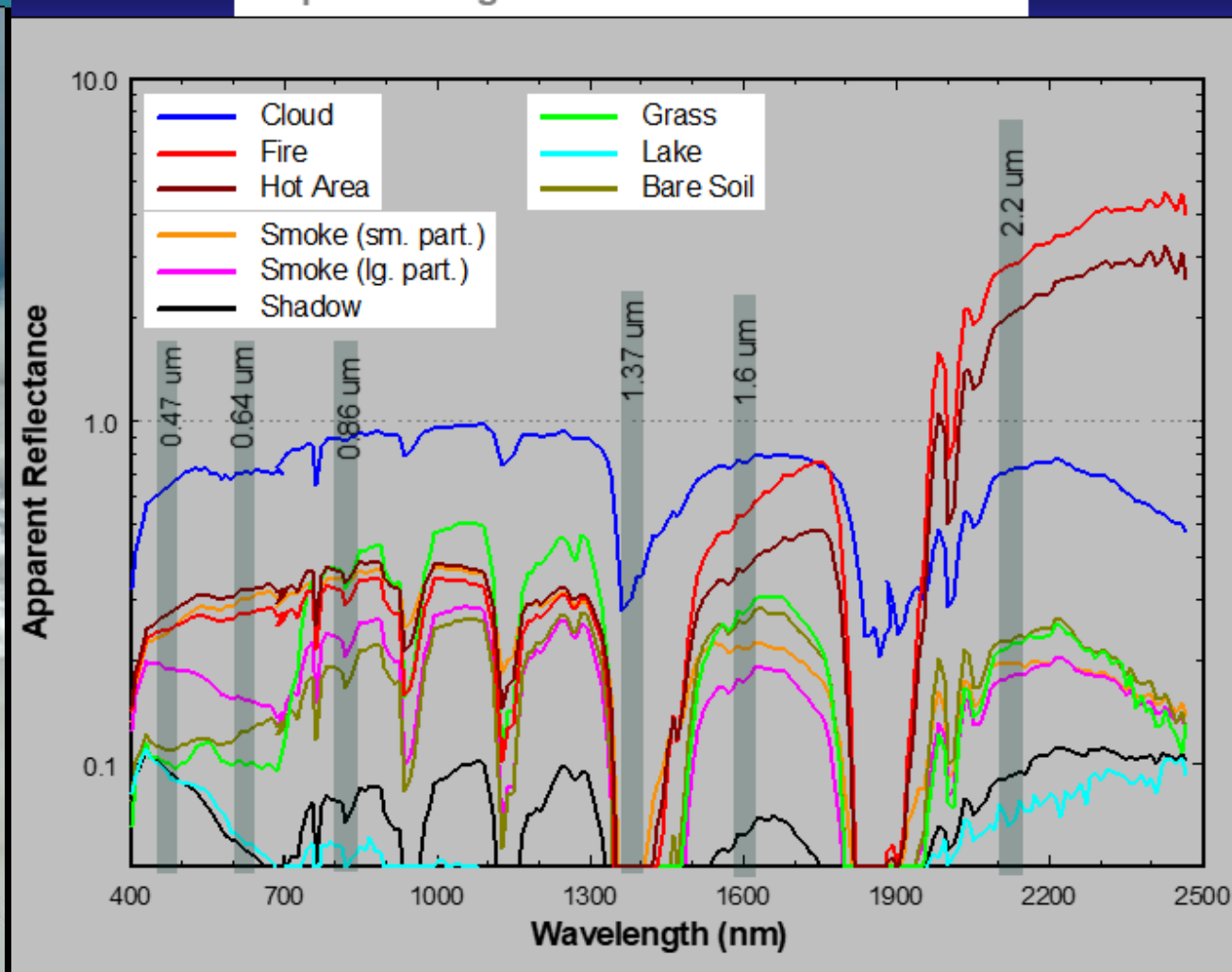
Spectral Signatures of Selected Pixels

Graph derived from AVIRIS data. Linden, California, USA
20 August 1992. Pixel size: 20m x 20m   Scene: 10km x 10km
MIT Lincoln Laboratory

During the third workshop, we added this graph during lecture to present the information in a different format. It also prepares the participants for the way information is presented for the upcoming section on the Infrared portion of the spectrum.

- Shows linkages to hyperspectral and multispectral coverage.
- Shows changes for different features across the spectrum
- Introduces linkages to RGB creation.

Which approach catches your attention? Why?

We hope this has stimulated your curiosity. Thank you for participating!