Science communication, informal & formal learning, and atmospheric rivers

AR for AR: Augmented Reality for Atmospheric Rivers

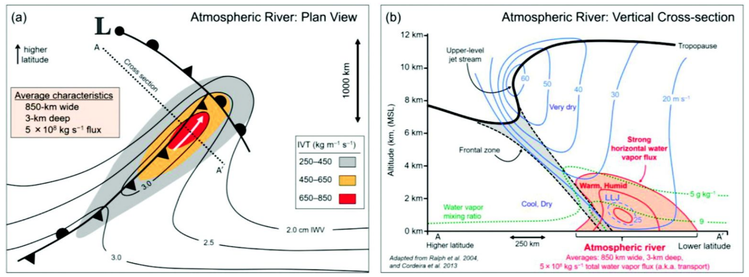
“Teaching moment’ opportunity

- Atmospheric rivers provide a wonderful ‘teaching moment’ for the general public.
  - These ‘rivers in the sky’ are a combination of systems of systems that drive weather and climate. The ocean system provides the moisture. The atmosphere system provides the wind. And the topography provides the uplift, as well as the resulting runoff. The human system (infrastructure expansion) increases the risks to life and property.

The challenge is how to share with the public the “ah ha” of these interactions of ocean, atmosphere and topography as well as the risks.

Are there different visual ways to convey to the public Atmospheric Rivers?

AMS Glossary: Atmospheric river



Schematic prepared by F. M. Ralph, J. M. Cordeira, and P. J. Neiman and adapted from Ralph et al. (2004), Cordeira et al. (2013), and others.]

- A long, narrow, and transient corridor of strong horizontal water vapor transport that is typically associated with a low-level jet stream ahead of a cold front of an extratropical cyclone.
- The water vapor in atmospheric rivers is supplied by tropical and/or extratropical moisture sources.

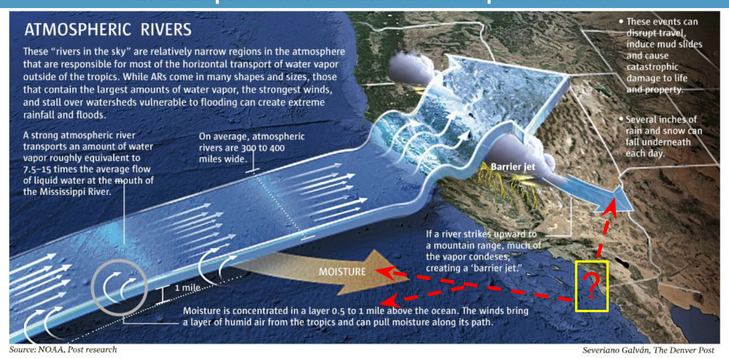
- AR frequently lead to heavy precipitation where they are forced upward– for example, by mountains or by ascent in the warm conveyor belt.
- Horizontal water vapor transport in the midlatitudes occurs primarily in atmospheric rivers and is focused in the lower troposphere.
- ARs are the largest ‘rivers’ of fresh water on Earth, transporting on average more than double the flow of the Amazon River

Glossary vocabulary for ‘experts’ vs. text for lay publics

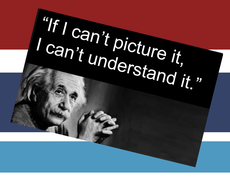
The first two sentences in the above definition of AR have numerous words that easily make sense to practicing meteorologists, but are not quickly understood by the general public. Plain English Summary

1. long and narrow — alternative _____
2. transient corridor — alternative _____
3. water vapor _____
4. water vapor transport _____
5. low-level jet stream _____
6. cold front _____
7. extratropical _____
8. moisture sources _____

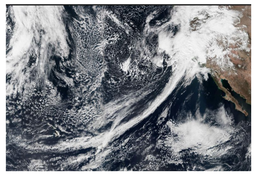
An example of how media can ‘interpret’ science

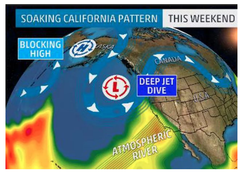


Visual learning

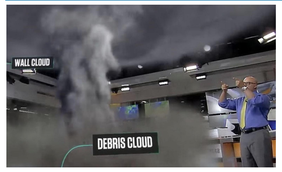


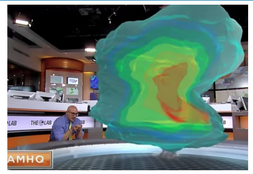
Standard images are only 2-D



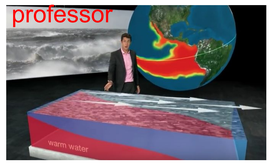


What if we could utilize Augmented Reality on iPhones and iPads?





What if we could bring an AR into any classroom, K-16, & museum?



Even in your own living room

Multimedia learning theories

Best practices: Learning science in informal environments. What works at zoos, aquaria, museums. Nat’l Acad. Sciences

STRANDS OF INFORMAL SCIENCE LEARNING

#1. Experience excitement, interest, and motivation to learn about phenomena in natural and physical world.

#2. Come to generate, understand and remember concepts, explanation, models & facts related to science.

#6. Think of themselves of science learners (& sharing and explaining to their peers).

Crosscutting concepts: tools for making sense of phenomena. Scaffolds to build understanding in formal settings: K-12, Nat’l Acad. Sciences

1. Patterns. Guide organization of relationships and the factors that influence them.
2. Cause and Effect: Mechanism and explanation.
3. Scale, proportion, and quantity. Measures of size, time and energy that affect system.
4. Systems and systems models. Making explicit a model of the system.
5. Energy and matter: flows, cycles, and conservation. Tracking fluxes of energy and matter.
6. Structure and function. How is it shaped?
7. Stability and change. Evolution of system, and life cycle.

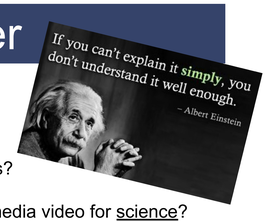
Thinking, Fast and Slow, Daniel Kahneman

Man is cognitively lazy; thinking takes mental energy and time. People make judgments of what they see and the knowledge they have: WYSIATI: What you see is all there is. The science of availability: if examples (extreme weather) come to mind we are more inclined to believe a statistic.

How to make stories memorable: Made to Stick, Heath brothers

SUCCES stories: Simple, Unexpected, Concrete, Credible, Emotional, Story line

Questions to ponder



What visuals would you want designed to explain AR to a 10 year old?

What animations would you like see on the Weather Channel?

What are the advantages of Augmented Reality for Atmospheric Rivers?

Nat’ Geographic Facebook has 44M viewers: How important is social media video for science?

What would be your elevator pitch for additional funding?

Visualizations for ARs: Possible future collaborations

Informal Learning experts

Conceptual Visualizations: Computer animation designers with artists, scientists, cartographers, geographers, big-data programmers

Augmented Reality Designers. The Weather Channel, GOOGLE, Disney, Lynx,

University Big Data Visualization departments / NASA Science Visualization Studio

NSF: Data Visualization Literacy grants: Advancing Public Understanding of Science

NSF: grants for NOVA, KCET and National Geographic TV programming.

Show & Tell with augmented reality:

Television Weather Programs
Classrooms, Aquaria, Museums, SOS

Presenter: Joe Witte
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