Project SPECTRA!

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What is it?

- Inquiry based lessons and activities
- Students use actual mission data
- Students create their own spectrographs
- Designed for the middle school classroom (most can be modified for high school)
Structure of SPECTRA

SOLAR SYSTEM DATA STORIES

- Modular
- Data-rich

Paper and pencil + Computer interactives

Graphing the Rainbow

Building a Spectrograph

Patterns in Nature

FOUNDATION
What is Spectroscopy (Spek*tras*k*pE) anyway?

- One way to study light
- Using tools like spectrometers and spectrographs, incoming light is broken down into its component wavelengths
- Example: light from stars and planets can be studied to determine what gases make up their atmospheres
How do we address this in Middle School?

- Traditionally, because spectroscopy relies on understanding atomic transition states…. Well, it’s hard

- Project SPECTRA! doesn’t introduce atoms, photons, electrons, electron transitions, wavelength etc.
YIKES!
Much Better!
Data Stories: Classrooms Using Mission Data

→ Real-world contextual basis for the physics of light
→ Application of knowledge from foundational lessons
→ Using actual scientific data to meet a goal
→ A means for constructing knowledge using data
→ A basis for asking better questions using data
Using Spectral Data to Explore Saturn and Titan

Students view real spectra from the Cassini UVIS instrument to compare Saturn’s and Titan’s spectra with standard spectra of four different elements and identify which elements are present in Saturn’s rings and Titan’s atmosphere

**Students consider:**

- Why hydrogen is so abundant
- Why nitrogen exists in Titan’s atmosphere but not Saturn’s rings
- Differences between Titan’s atmosphere and Earth’s with a focus on planetary habitability
**Goldilocks and the Three Planets**

Students use historic data on the atmospheres of Venus, Earth and Mars to compare and contrast levels of CO2.

**Students consider:**

- How greenhouse gases contribute to planetary temperature
- How atmosphere and distance from the Sun effect planetary temperature and habitability
Data Story Computer Modules
The Engineering Connection

- Promotes engineering and engineering concepts
- Creates enthusiasm about space, planetary science, the Sun and stars, and atmospheres
Questions?