Subject Area: *Science* **Grade Level:** *7th & 8th*

Project Title: *Earth Watch*

Unit Title: *Earth Science Concepts*

Teacher: *Tracy Tomm*

Purpose

To investigate and monitor significant events on Earth that impacts the Earth's systems as well as use the information to predict future events and/or areas of greatest risk.

Project Information

Focus Questions:

- What significant events have happened since the first of the year?
- What events do you predict will happen? Where?

Project Objectives: As a result of this project, students will be able to:

- Identify online resources that provide real-time, accurate, and reliable data.
- Describe how scientists use a variety of tools collect their data
- Describe the type of data collected from various tools and how it can be used to make a decision or explain an event.
- Evaluate measurement scales that are used to determine the severity of seismic, volcanic, meteorological, and geologic events.
- Explain how the data gathered and our interpretations of it connects with the concepts presented in classroom lessons and activities
- Use data-based examples to explain how the various systems on Earth are interconnected.
- Locate events on Earth through the use of GPS coordinates, such as those provided by USGS and other reporting agencies.
- Use technology tools to communicate their findings with classmates and the teacher through Google Docs, online mapping software, and other tools they choose to use.

NOTE: A listing of NGSS and other learning standards are listed on the last two pages of this document.

Lesson Materials/Resources Needed:

- Student laptops with Internet access for researching events and documenting their data on Google docs
- Listing of online resources (student generated), apps for Smart Phones, and access to the project's PinMap (mapping software)
- Presentation tools (PowerPoint to use for the introduction and classroom computer/project for the team reporting) and/or report form (see page 5)

Background Information: This unit is used after students have completed the Chapter 1 lessons and activities in our textbook. During this chapter, students learn about the different "spheres" of Earth and how they interact. Students may have past knowledge of different types of Earth Science careers, such as geologist, seismologist, volcanologist, meteorologist. The first slide in the project presentation asks students the two focus questions (listed above) and then has them relate the different spheres with the different careers in Earth Science. (See page 4 for the project intro presentation.)

Introduction

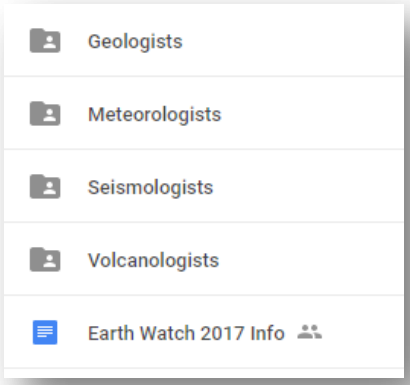
Day 1

- Introduce the project by asking the focus questions and leading a classroom discussion to develop a process/procedure to use to answer them.
- Lead the students in identifying the various parts of the project that will need to be established, such as:
  - How to utilize for research teams to divide the workload by creating teams of scientists (seismologists, geologists, meteorologists, volcanologists, etc.),
  - The "jobs" for each team member (researcher, reporter, leader, etc.) and his/her responsibilities
  - The need for real-time, accurate and reliable data from reliable resources,
  - An organized method for documenting the research, such as a Google document, and
  - How often to communicate the findings of each team along with the best methods for doing so.

  NOTE: The idea is to find ways for the students to provide input on the procedure they will use to research, document, and report data. Each team may have their own ideas, but try to summarize all the main points for a class procedure.

Day 2

- Review the class notes from the previous day and work with the class to establish the process/procedures for the project.
- Establish the scientist teams as well as the roles for each member (reporter, speaker, etc.)
- Set up a shared folder on Drive (see image at right) that includes areas for each team as well as a document you can use to list useful websites and other resources.
- Direct students to help you find at least three resources of real-time, accurate, and reliable data. These resources can be websites or Smart Phone apps. List the URLs on a Google doc in the shared folder.
- Allow time for teams to research data and use Google tools to document their data.
- Work with each team to identify measurement scales that are used by their scientists and develop criteria for "significant" events.



Day 3

- Allow time for teams to share their first reports with the class and highlight major events.
- Work together to document the locations on the PinMap.
- Discuss connections between the team reports and the concepts we have discussed in class.

Research Phase (Ongoing process; 5-10 minutes several times a week)

- Allow time throughout the next two weeks for teams to research and document significant events that have happened. Students may use the reporting form or set up their own report using Google tools (docs, sheets, etc.).
- I meet with each team to monitor their progress and answer any questions they have.
- I take notes of my observations and their efforts, level of discussion, and other points of interest that can be used to determine each team member's progress.

Reporting Phase (Every other Friday)

- Allow time for teams to share their Google docs with the class and highlight major events from the past two weeks. Use the evaluation tool to assess the team reports based on the criteria given.
- Work together to document the locations on the PinMap (and eventually have the students take over this task.)
- Lead the class in a discussion to identify those events that affect more than one of Earth's systems and how they are connected. Also generate discussion to help students build connections to concepts presented in recent classroom lessons and activities.
- Use the report evaluation tool to assess the team reports based on the criteria given. Also use the tool to help identify misconceptions or misinterpretations of the data, concepts that need to be included in future instruction and students who may need additional instruction to understand and utilize the collected data and/or connect it with classroom learning.

Informal Assessment

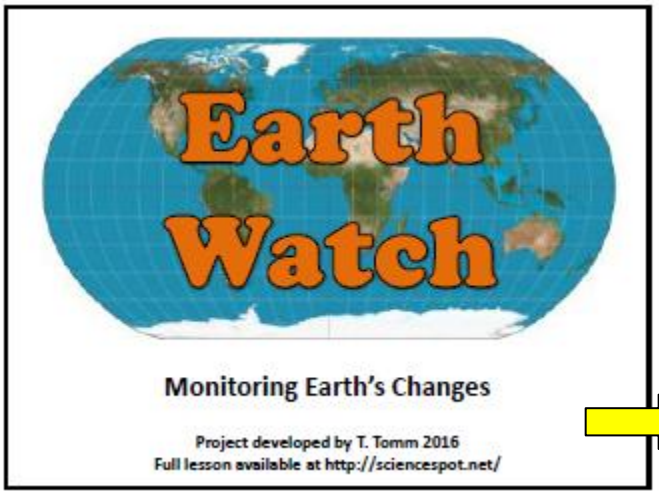
Class & Team Discussions - Whole class discussions as well as those held with each team helps me monitor each student's understanding of the project goals and focus questions. Responses also help me gauge their abilities to connect the data to classroom concepts as well as see the "big" picture of how the various systems of Earth are connected on so many levels.

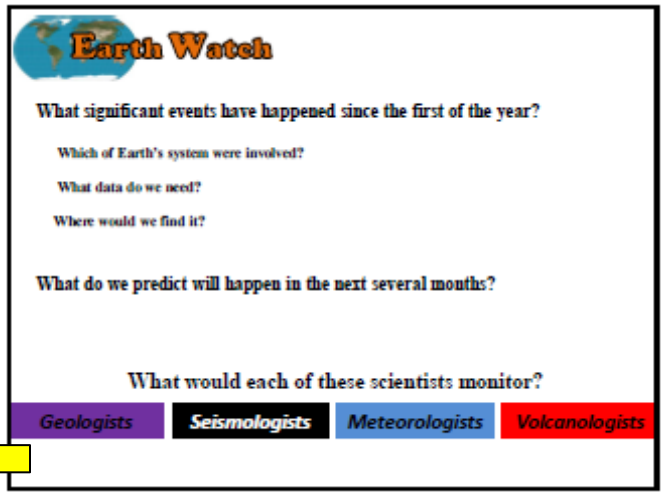
Team Notes & Reports I monitor each team's efforts through the project and record notes using Google docs. From the first day to the last, I take notes that assist me in determining the team's effort and progress towards answering the focus questions. I also take notes to document each team member's progress towards the learning objectives for the project. Throughout the unit, I meet with each team and review my notes with them. We discuss the team's strengths and weaknesses as well as determine a project grade. The first grade we determine is usually not an A or B, but the grade improves as the teams learn to work together and improve their research methods/efforts to provide good reports.

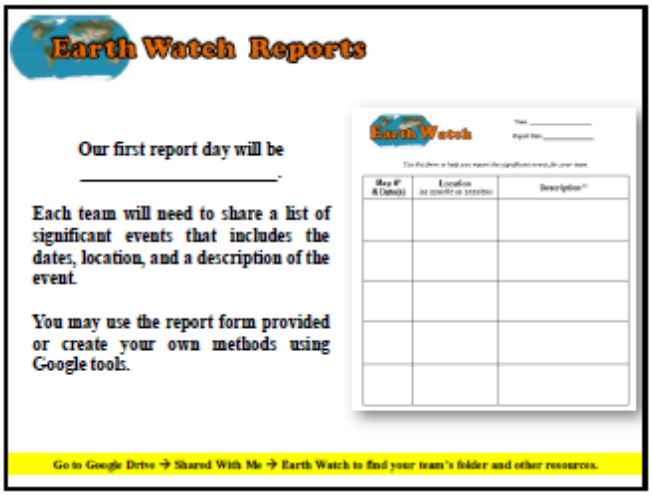
Formal Assessment

Unit Tests - Since this project spans an entire semester, unit tests include questions (multiple-choice, short answer, and essay) to measure student knowledge and understanding of the project as a whole as well as the unit concepts that were discussed at each point of the project. Parts of each unit assessment will include questions for students to interpret data presented in tables or graphs and explain how it relates to current natural disasters and events that were shared during the team reports.

Project Introduction PowerPoint







PowerPoint available at
http://sciencespot.net/Media/EarthWatch_Intro.pdf.

Team _____

Report Date _____

Use this form to help your team report the significant events for branch of Earth Science.

Map #* & Date(s)	**Location** (as specific as possible)	**Description****

* Map #s should be labeled with your team's letter and a number, such as G1 for Geology team's 1st event.
** The description should include all relevant details as to why the event meets your team's significant event requirements, i.e. earthquakes with a magnitude over 5. Other questions to answer include: Did it affect humans? How long did it last? How much damage did it do?

Next Generation Science Standards

MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process

MS-ESS2-4. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

MS-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

MS-ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects

MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Disciplinary Core Ideas

ESS2.A: Earth's Materials and Systems - All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles to produce chemical and physical changes in Earth's materials and living organisms. (MS-ESS2-1)

ESS2.C: The Roles of Water in Earth's Surface Processes - Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (MS-ESS2-4) Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4)

ESS3.A: Natural Resources - Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)

Crosscutting Concepts

Cause and Effect - Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS3-1)

Energy and Matter - Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. (MS-ESS2-4)

Stability and Change - Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale. (MS-ESS2-1)

Connections to Engineering & Technology - All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (MS-ESS3-1)

Common Core State Standards Connections

ELA/Literacy

RST.6-8.1 - Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS3-1)
WHST.6-8.2 - Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-ESS3-1)
WHST.6-8.9 - Draw evidence from informational texts to support analysis, reflection, and research. (MS-ESS3-1)
SL.8.5- Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. (MS-ESS2-1)

Mathematics

6.EE.B.6 - Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-ESS3-1)
7.EE.B.4 - Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (MS-ESS3-1)