GEOSTAC Teaching Guide

Lesson Developer: Jane Benjamin and Lynn Songer
Title: Blown Away: US Tornado Patterns and Occurrences
Grade Level: High School AP Geography – College Level Intro Physical Geography

Lesson Description: In this lesson students will use Boolean login queries to explore tornado patterns and association to the Jet Streams annual movement. The will look for correlations between intensity of events and impact to human life and property. *This lesson was adapted from an ARCLESSON by Tom Baker and Drew Keller*

Education Standards:

Common Core Standard English Language Arts Standards: English language Arts Standards ».History / Social Studies » Grade 12

CCSS.ELA-Literacy.RH.11-12.7: Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

Common Core Standard English Language Arts Standards: English Language Arts Standards » Science & Technical Subjects » Grade 11-12

CCSS.ELA-Literacy.RST.11-12.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

ITSE National Technology:

3. Research and Information Fluency
   a. Plan strategies to guide inquiry
   b..Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media
   c. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks
   d. Process data and report results

4. Critical Thinking, Problem Solving, and Decision Making
   c. Collect and analyze data to identify solutions and/or make informed decisions

5. Digital Citizenship
   b. Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity

6. Technology Operations and Concepts
   a.. Understand and use technology systems
   b. Select and use applications effectively and productively

National Geography Standards

1) How to use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information
2) How to analyze the spatial organization of people, places, and environments on Earth's surface
3) How to apply geography to interpret the present and plan for the future

Geospatial Skills: The students will be able to:

1) Describe the spatial patterns, associations, with tornadoes
2) Identify spatial distribution
3) Design Boolean Logic queries
4) Evaluate correlations as positive, negative or non-existent
5) Discuss spatial connections

Materials: Computer access with high-speed internet, student activity sheets.

Pre-Teaching:

1) Students should have completed the GIS Tutorial activity and be familiar with geospatial skills such as viewing data layers, performing a Boolean logic queries and analyzing spatial patterns
2) Students should be introduced to basic principles of the Jet stream movement and the criteria necessary for tornado development

Lesson Procedure: After introducing tectonic processes students are given the tornado activity to complete outside of class. Following the completion of the assignment, in class students will discuss the overall

Time to Teach:

The home assignment takes about 45 minutes to complete. The in class discussions takes about 20 minutes

Answer Key:

1) Data Collection

1950	**Selected**	**# F5**	**# F4**	**Location with respect to the jet streams**
Jan	86/ 4777	0	1	The majority are north of the winter Jet and south of the equinox jet.
April	742/4777	1	22	They move west and cover a wider are across the equinox jet but below the summer jet.
July	528/4777	0	6	Generally more scattered across the US. They are occurring above the summer jet a little.
Oct	126/4777	0	1	Scattered but more along the equinox jet and all below the summer jet.

	Selected	**# F5**	**# F4**	**Location with respect to the jet streams**
Jan	83	0	1	Mostly Equinox scattered and between Midwest and Southeast
April	742	1	22	Clustered in the Midwest. More at the west end of lines.
July	528	0	6	Similar lines as above, clustered in the middle of the U.S.
Oct	126	0	1	
2000	**Selected**	**# F5**	**# F4**	**Location with respect to the jet streams**
Jan	215/11645	0	0	Mostly in the south east of the US. Along the winter jet and below the equinox jet. A few are above the equinox jet. A few are in west coast.
April	1000/11645	0	3	They are more scattered in general across the US. Many more seen above the equinox jet and moving up to summer jet.
July	1000/ 11645	0	4	Scattered across the US. But moving north. The center of the county (Oklahoma) seems to have a very few. Still along the Gulf, but now along the northern border.
Oct	540/11645	0	0	Moving south still east to west below the summer jet.

2) Data Summary

When you have finished, summarize your data. In general, where are the majority of the tornadoes for each of the four months? Does one decade layer have a different t pattern than the others? Are their exceptions to the patterns you are describing? What do you know about the Jet stream and tornado occurrence?

Answers will vary.

3) Finally, choose one of the states in the contiguous US (not Hawaii or Alaska).

Develop a series of complex queries (at least 4) to summarize the tornados for one of the decade data layers and for one state. **Record your queries** and the **results**, then write a paragraph or two describing your data search results. Discuss the jet stream, the number of tornadoes, Intensity (F scale) damage, and death.

Answers will vary.