TASK OVERVIEW

MIDDLE SCHOOL EARTH AND SPACE SCIENCE: SNOW DAY

Three-Dimensional Claim

In this task, students apply their understanding of atmospheric conditions and weather patterns to predict future weather conditions by using models to explain the pattern of snowfall in the more northern city of Knoxville and to develop a model to explain an atypical event of how Chattanooga received snow while Knoxville (which has a similar longitude) did not, by showing a cause and effect relationship can be used to predict phenomena in a natural system.

Disciplinary Core Ideas Crosscutting Concepts Science and Engineering Practices

Tennessee Academic Standards for Science

This task is intended to elicit student learning of the following Tennessee Science Standard:

6.ESS2.6: Explain how relationships between the movement and interactions of air masses, high and low pressure systems, and frontal boundaries result in weather conditions and severe storms.

6.ESS2.5: Analyze and interpret data from weather conditions, weather maps, ~~satellites, and radar~~ to predict probable local weather patterns and conditions.

Next Generation Science Standards

This task is intended to elicit student learning of the following NGSS elements for each of the three dimensions:

Science and Engineering Practices

Developing and Using Models

- *Middle School Element*: Develop and /or use a model to predict and/or describe phenomena.
- *Middle School Element*: Develop or modify a model — based on evidence — to match what happens if a variable or component of a system is changed.

Analyzing and Interpreting Data

- *Middle School Element*: Analyze and interpret data to provide evidence for phenomena.

Disciplinary Core Ideas

ESS2.D Weather and Climate

- *Middle School Element*: Because these patterns are so complex, weather can only be predicted probabilistically.

Crosscutting Concepts

Cause and Effect: Mechanism and Prediction

- *Middle School Element*: Cause and effect relationships may be used to predict phenomena in natural or designed systems.

System and System Models

- *Middle School Element*: Models are limited in that they only represent certain aspects of the system under study.

Note: The strikeout language is not targeted in this assessment.

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	STRENGTHS	OPPORTUNITIES FOR IMPROVEMENT
SCENARIO	The scenario provides a local and interesting phenomenon that can allow students to meaningfully connect to the task and uses a specific and local weather event. The scenario is also presented in a variety of ways to increase accessibility — through text, data tables, maps, and pictures.	It may be unclear to students exactly how Tasks 1–3 relate back to helping them make sense of the phenomenon. No direct connection or explanation is provided for them, and as it is currently written, it is not necessary to complete these parts for them to explain why Chattanooga received more snow than Knoxville.
SENSE-MAKING	In Task 4, students are applying their understanding of weather patterns and conditions to explain the phenomenon — why Chattanooga, a more southern city, received more snow than Knoxville.	Multiple questions require rote knowledge (e.g., Task 2A) but these seem to serve as scaffolds for the students to eventually explain the phenomenon.
INTEGRATED DIMENSIONS	Students are given well-crafted opportunities to show their understanding of developing and using models at a grade-appropriate level. Students use multiple dimensions together to make sense of the phenomenon.	In Parts 2–4, students use weather maps to explain (though not predict) weather conditions, addressing only part of the targeted Tennessee standard. The task may not provide enough scaffolding to students to elicit the **Systems and System Models** crosscutting concept element.
EQUITY	Students are able to make their thinking visible in this prompt through both modeling and writing.	To increase coherence, the task could directly explain to students that they need to first understand the normal weather patterns of the cities (by completing Tasks 1–-3) in order to understand and make sense of why what happened in these two cities is so different from usual.
FEEDBACK SUPPORT	The task prompts include sufficient directions for students to complete the task while maintaining high levels of analytical thinking.	Consider breaking down the scoring guidance in the Teacher Guide for the “description of performance” into individual components. The individual components could still identify the dimension connection (SEP, CCC, or DCI) for each scoring component through the color-coding that currently exists.

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Suggestions for Use

This task should be used as a summative assessment to check for student understanding of Tennessee Standard ESS2.6, the targeted Science and Engineering Practice element of **Developing and Using Models**, and the targeted Crosscutting Concept element of **Cause and Effect**.

What Are The Major Takeaways?

SUMMARY POINTS

The scenario presented to students in the task is relevant and compelling. There is usually a general interest in weather and most people assume that the more south you go the warmer it gets, which means less snow. The specific example provided in the scenario is different from this idea and can be engaging for students. The task includes multiple modes (modeling and writing) for students to respond and students are given well-crafted opportunities to show their understanding of developing and using models at a grade-appropriate level along with the target-ed Crosscutting Concept and Disciplinary Core Idea elements to make sense of the phenomenon.

SUGGESTIONS FOR IMPROVEMENT

To strengthen coherence from the student perspective, the task could directly explain to students that they need to first understand the normal weather patterns of the cities (by completing Tasks 1–3) in order to understand and make sense of why what happened in these two cities is so different from usual. Some targeted elements, such as the **Systems and System Models** Crosscutting Concept, may not be fully elicited again as written.

What Should I Do Before Using This Task?

Users should review the provided guidance to familiarize themselves with instructions and disclosures before using these tasks.

How Were These Tasks Developed?

The tasks were developed and revised by teacher work groups from participating districts in the Tennessee District Science Network (TDSciN), which was launched in early 2019 and managed by NextGenScience. Tasks were evaluated using an adapted version of the Science Task Screener. Teachers worked collaboratively across districts to develop and revise these tasks after attending multiple professional learning sessions. Find out more about the development process here.

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