Exploring Global Warming Using TI calculator, Agent Sheets and GIS

Caroline Rodriguez  
The College at Brockport

Maria Huot  
The College at Brockport

Sarah Heigl  
The College at Brockport

Patrick Chierichella  
The College at Brockport

Reggie Sherrill  
The College at Brockport

Follow this and additional works at: http://digitalcommons.brockport.edu/cmst_lessonplans

Part of the Physical Sciences and Mathematics Commons, and the Science and Mathematics Education Commons

Repository Citation
Rodriguez, Caroline; Huot, Maria; Heigl, Sarah; Chierichella, Patrick; and Sherrill, Reggie, "Exploring Global Warming Using TI calculator, Agent Sheets and GIS" (2006). Lesson Plans. 123.
http://digitalcommons.brockport.edu/cmst_lessonplans/123

This Lesson Plan is brought to you for free and open access by the CMST Institute at Digital Commons @Brockport. It has been accepted for inclusion in Lesson Plans by an authorized administrator of Digital Commons @Brockport. For more information, please contact kmyers@brockport.edu.
Goal
- **Science**
  - Students will interpret data to understand global warming and the green house effect. (Atmospheric Science, Ecology)
- **Mathematics**
  - How to enter information into the calculator and graph data to interpret and communicate mathematically.
- **Technology**
  - To use modeling tools to gather, interpret, and simulate real world issues.

Performance Objectives
- Students will manipulate the Agent Sheets model in order to see the direct correlation between CO₂, temperature, polar ice caps and the rising seas (sea level)
- Students will hypothesize and develop conclusions
- Students will answer questions based on the data graphed on the TI calculator
- Students will learn how to enter data to calculate and plot a graph
- Students will review how to label a graph
- Students will produce a graph and find correlation between the temperature and CO₂

NYS Standards
- **Science**
  - S-3 Earth and Space Science concepts
  - S-4 Scientific Connections and Applications
  - S-5 Scientific Thinking
  - S-6 Scientific Tools and Technologies
- **Mathematics**
  - S-1 Mathematical reasoning
  - S-4 Modeling/Multiple representations
  - S-5 Measurement
- **Technology**
  - Information technology is used to retrieve, process, and communicate information and as a tool to enhance learning.

**TI - Graphing Calculator**
**Smart View**
**TI Calculator and Smart View**
TI Graph
Graph Questionnaire
- What is represented on the y-axis? (The title of the y-axis and include the units)
- What is represented on the x-axis? (The title of the x-axis and include the units)
- Where on the globe was the data taken from?
- What trends or conclusions can you draw from the graph? (increasing/decreasing? What does it mean?)

Excel-Data Analysis

Temp. and CO₂ Data and Graph Analysis
- During what time was the observed temperature increase the greatest?
- What time period shows the greatest increase in CO₂ concentrations?
- Examine the date carefully. Does the data support the conclusion that increasing greenhouse emissions are responsible for the 0.5 degree Centigrade increase in observed temperature during the past 110 years? Explain your reasoning.
- What are some other natural phenomena that possible could explain increases in temperature.

Agent Sheets – The Model
- The model was generated from trends noticed in the data
- Agents were created representing CO₂, global temperature, and polar-ice caps

The Worksheet
Changes...
Increased Temperature
Increase of Melted Polar-Ice Caps
Differentiated Instruction
Beyond the expectations
Recognize

- Students varying background knowledge
- Readiness
- Language
- Preferences in learning
- Interests
- How to react responsively

Differentiated instruction is a process to approach teaching and learning for students of differing abilities in the same class.

http://www.cast.org/publications/ncac/ncac_diffinstruc.html

Increasing Complexity
The Differentiated Classroom
Agent Sheets
◆ Create new agents
★ Methane, Sulfuric oxide, Nitrous oxide, water vapor, carbon monoxide, etc
★ Design a new model representing opposing theories
GIS – Geographic Information Systems
◆ Comparing metadata about the different agents affecting the global temperature