GRADES 6 AND UP

Argonne NATIONAL LABORATORY

PREDICTING THE WEATHER
BE AN ATMOSPHERIC SCIENTIST!
Instruction Sheet

Weather forecasts from weather apps and the news are important for us to make decisions like what to wear or how to plan for travel. Similarly, understanding climate patterns and change is important in our efforts to plan for our future. But have you ever wondered HOW scientists are able to predict weather and climate? Do they use a magic crystal ball, or is the “magic” applying math, science and computer science?

MATERIALS

- https://www.ventusky.com/
- Data table (included)
- Excel/Google Spreadsheets (optional)

INTRODUCTION

Atmospheric science is the study of Earth’s atmosphere such as clouds, weather and climate. Atmospheric scientists incorporate a lot of STEM in their field of study. For

example, they use special instruments to collect data to then develop and program computer models. Models simulate real life conditions and outcomes. These models are the key—or “magic”—to making weather and climate forecasts and predictions. The ability to measure, model, and analyze atmospheric processes is essential to understanding our ever-changing, dynamic planet.

At Argonne National Laboratory, climate science is one area of research within the Environmental Science Division (EVS). Atmospheric scientists at Argonne are known for their expertise and state-of-the-art models that offer better accuracy for climate predictions. Using models to identify patterns and trends and to make predictions is something that atmospheric scientists practice in their line of research and work.

Today, we have a lot of technology and resources at our fingertips, including access to meteorological (weather) software applications such as VENTUSKY. VENTUSKY is a weathering model that can be used to make weather predictions. In this activity, you will use VENTUSKY as a tool to make weather predictions and then analyze how accurate the predictions are.

Argonne researchers Rao Kotamarthi (left) and Yan Feng (right) take climate data gathered from instruments like this one on Argonne's campus and combine it with millions of other data points taken from around the world to create models of how the climate might change in the next decades. (Image from Argonne National Laboratory)

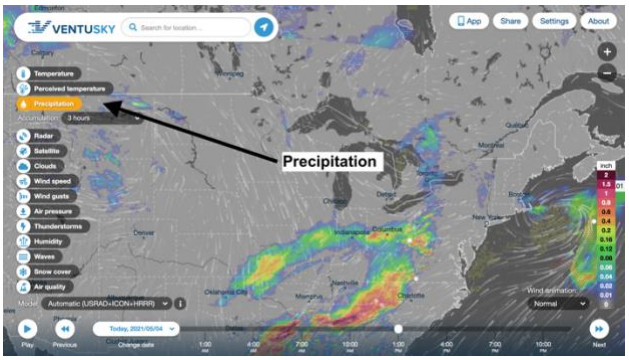
ACTIVITY HIGHLIGHTS

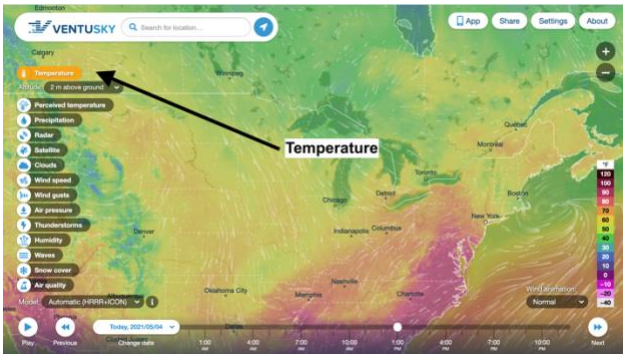
- **Monitor and track weather conditions using a special visual weather interactive application**
- **Test how well you can predict the weather**
- **Identify weather trends & patterns**
- **Share your project with Argonne Education**

U.S. DEPARTMENT OF ENERGY Argonne National Laboratory is a U.S. Department of Energy laboratory managed by UChicago Argonne, LLC.

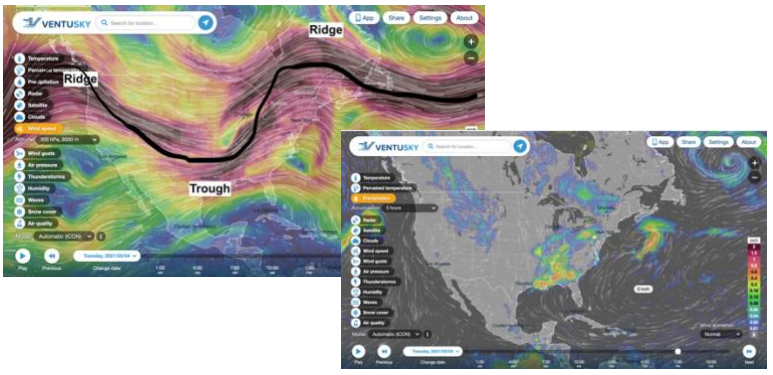
Explore

1. Go to https://www.ventusky.com/.
2. Find Chicago or your city/town. You can do this manually by zooming in and scrolling on the map or searching for a location using the search bar.
3. Spend some time exploring the modeling application.
4. **Note:** Pay attention to which weather condition you are looking at in the model. Also note that the colors mean different things depending on which weather condition you are on (red doesn't always mean there's a storm!).
5. **Note:** At the bottom, you can change the date and time. You can go to a previous date & time or see what the model predicts for a future date & time.





Note: Bobby Jackson, Assistant Atmospheric Scientist, recommends collecting data from a wind speed altitude of 300hPa, 9000m. This is the altitude where the jet stream can be seen. Typically, troughs (low pressure) in the jet stream indicate rainy or snowy weather, while locations in the ridges (high pressure) usually get fair weather.

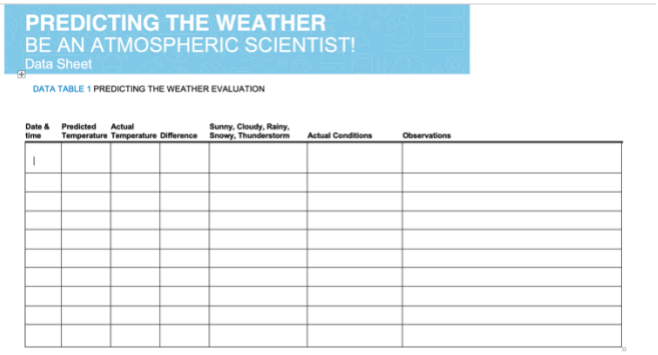


Make Predictions

Using the VENTUSKY model, you will make a 10-day forecast (prediction).

6. Select Chicago or a location of your choice on VENTUSKY.
7. Select 10 days and a set time for each day that you will create a forecast for. Write down the dates and time on the provided data table.

   Optional: Do daily an hourly forecast for a part of the day. For example, make an hourly forecast from 1pm-4pm on Day 1.
8. For each day, select the day and time on the VENTUSKY model and log the predicted temperature and weather conditions (ie. sunny, cloudy, snowy, thunderstorm etc.) on your data table.
9. **Note:** The VENTUSKY only showes up to 9 days ahead. For the 10th date, you will need to wait the following day to log the prediction.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DATA TABLE 1 PREDICTING THE WEATHER EVALUATION

Date & time	Predicted Temperature	Actual Temperature	Difference	Sunny, Cloudy, Rainy, Snowy, Thunderstorm	Actual Conditions	Observations

Collect and Analyze Data

10. Check the weather on the news or weather app for each day you made a forecast for and document it on your data table. You may also include your own observations.
11. **Optional:** Calculate how accurate your predictions were by taking the difference in temperature. See (hypothetical) example →
12. **Optional:** Make a graph(s) or chart(s) to better visualize your data.
13. Ask yourself the following:

    "How accurate are the predictions? How do they compare to the actual weather?"

    "Does accuracy increase, decrease or stay the same the further out the prediction is made?"

    “Are there any trends or patterns?”

Date & time	Predicted Temperature	Actual Temperature	Difference	S
5/1, 10am	67°	67°	0°	
5/2, 10am	58°	57°	3°	
5/3, 10am	42°	44°	2°	

Share Your Project!

14. Take a screenshot of your project and send it to Argonne Education at learninglabs@anl.gov, or have an adult tweet it out to @Argonne and #ArgonneAtHome.

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