Can clouds help me predict weather?

Second graders form Rochester School
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Abstract

Second graders want to know if clouds and temperature data are related to each other and help them predict weather, to know how to protect from rainy or dry seasons. Students practice their observation skills by observing clouds cover to comprehend how the local weather can change. By recording daily observations, students were able to begin to identify patterns and predict the weather in order to communicate the results to the community, and help them achieve health competence by knowing when rainy and dry seasons are more often to happen. Students answer their research question and prove how to predict weather. They also propose a new experiment to find out if the behavior of clouds and temperature is the same at night.

Introduction

Clouds are groups of condensed water vapor and water drops or ice crystals that are so light they can float in the sky. For understanding clouds, it’s important to understand the water cycle and physical changes of matter. Water in the atmosphere can be found as liquid, solid or gas. Water gas is not visible to the human eye, but when water droplets or ice crystals are present, they scatter enough light for the human eye to see them as “clouds”.

Clouds act as gatekeepers between Earth and space, by regulating the amount of sun rays that are reflected or absorbed as infrared radiation. Clouds can help us understand air temperature and predict weather, by analyzing how much sunlight reaches the ground or scapes back to space; or when droplets join with other droplets to cause rain. Depending on their shape and height in the sky, clouds receive different names that help classification and forecasting.
Studying clouds is very important for understanding weather in Earth and also in other planets, by comparing the ones in our planet with the ones on other planets, plus watching clouds could be a relaxing activity.

**Research question**

Is it possible to predict weather with temperature and cloud cover data?

a. With this research question students develop skills such as asking questions; plan and carry out research by deciding the variables they need to use; analyze and interpret data; manipulate instruments such as the thermometer, hygrometer, cloud chart and table to record data. Students also learned how to use Globe’s app in a tablet. Finally, students practice how to communicate relevant information so that others can understand them.

b. In our community, one of the quality conditions is health competence. By getting to predict the weather, students can alert the community about rain and dry seasons in order for them to prepare with the proper clothes or drink enough water. The school has a climatized swimming pool, so it’s also important for the students to prevent sudden temperature changes.

c. As a sustainable LEED Gold school, to have the information about the incoming rainy days give us the chance to manage our water consumption in activities such as watering the farm and gardens, or washing the hallways.

**Methods and Materials**

Second graders studied the clouds in class to understand the different shapes and the implications of those clouds into the predictions that we can make about the local weather. After practicing and learning the clouds’ names, they were ready to record data.

They used GLOBE’s cloud chart and GLOBE’s observer app to record their observations following the instructions given in the GLOBE Cloud Protocol, working in groups of four to identify the cloudy coverage per quadrant. At the moment to upload
the observations, a general revision has been made in order to standardize the data and provide the most accurate information as possible. All the students had the chance to upload data in the GLOBE Observer app at some point, by assigning turns in between the groups. An alcohol thermometer was also used to record air temperature, following the GLOBE Temperature Protocol. They created a binnacle in their notebooks to record the observations, in order to have standardized data to perform the research. Students had roles that involved all of them, to be able to practice and learn how to use a thermometer, how to read the cloud’s chart and how to submit the information in the app. During each class, students compared their data with their perception of the weather to realize if their predictions were correct.

Students recorded, with the help of their Science teacher, 6 observations in the period of January 17 to March 10.

Results

<table>
<thead>
<tr>
<th>Date and hour</th>
<th>Temperature</th>
<th>Clouds observed</th>
<th>Cloud cover</th>
<th>Prediction</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>03/10/2020 18:33 UTC</td>
<td>15.2°C</td>
<td>Nimbostratus, Stratocumulus, Cumulonimbus, Altostratus.</td>
<td>Overcast (90-100%)</td>
<td>Rain</td>
<td>Correct</td>
</tr>
<tr>
<td>03/09/2020 16:21 UTC</td>
<td>25°C</td>
<td>Cirrus, Altocumulus, Cumulus, Nimbostratus.</td>
<td>Broken (50-90%)</td>
<td>No rain</td>
<td>Correct</td>
</tr>
<tr>
<td>03/06/2020 18:33 UTC</td>
<td>23°C</td>
<td>Cirrus, Cirrurus and Cumulus.</td>
<td>Isolated (10-25%)</td>
<td>No rain</td>
<td>Correct</td>
</tr>
<tr>
<td>02/28/2020 18:08 UTC</td>
<td>24.2°C</td>
<td>Cumulus, Stratocumulus and cumulonimbus.</td>
<td>Broken (50-90%)</td>
<td>No rain</td>
<td>Incorrect</td>
</tr>
<tr>
<td>02/09/2020 23:09 UTC</td>
<td>18.8°C</td>
<td>Altostratus, Nimbostratus, Stratus, Stratocumulus.</td>
<td>Overcast (90-100%)</td>
<td>Rain</td>
<td>Correct</td>
</tr>
</tbody>
</table>
Video link: https://youtu.be/-lwnYMfGeN0

Discussion

We found a relation between low temperatures and cloudy days, as you can see in the 01/17 and 02/09. Those months were rainy and cold, and the students were able to identify characteristic rain clouds as Nimbus, Cumulonimbus or Nimbostratus. Along we changed to a dryer season we started to gaze new clouds that represented less rain and different impacts from the air temperature into the cloud formation. You can see those results in the dates from 02/28/2020 to 03/09/2020. The students confirmed that their predictions could be precise enough to share the information with the community, providing important warnings for a specially rainy or sunny day, that could be shared with their classmates to take care of themselves in terms of temperature changes.

Conclusions

We concluded as a group in brain storm analyzing our results and these are the ideas that the kids gave:

- There is a clear relation between the clouds observed in the sky and the atmospheric temperature registered during the day.

- It is possible to help people at Rochester School to prepare for dry or rainy seasons by advising them about the appropriate clothes to wear, and the amount of water to drink.
• Health competence is easier to achieve by using scientific data as backup.

• Having a specific role in the group helped us understand the importance of individual accountability in order to achieve a group goal.

• It is necessary to take the same data from this study at night in order to find out if the behavior of temperature and cloud cover draws the same results as daytime.

Citations


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