MULTI Summer 2018 Water, Weather, & Climate

6/7/18

JANELLE JOHNSON MAY 23, 2018 02:05PM

What's the problem?

ANONYMOUS MAY 30, 2018 11:55AM

PBL: Can we predict a changing climate will affect our weather and water availability?

JANELLE JOHNSON JUN 01, 2018 02:20PM

Puzzler Image of Ice

EO's Satellite Puzzler : Earth Matters : Blogs

Answer: The image above shows curious holes in Arctic sea ice, located about 50 miles northwest of Canada's Mackenzie River Delta. Guesses from readers included everything from ice broken by marine animals to breathe, to ice that had been thawed by methane hydrates.

NASA

JANELLE JOHNSON JUN 03, 2018 03:46PM

CAS & NGSS

Grade 3:
Std.1.PS.1: Matter exists in different states such as solids, liquids, and gases and can change from one state to another by heating and cooling

Grade 4:
Std.2.LS.3:There is interaction and interdependence between and among living and nonliving components of systems
Std.3.ESS.1:Earth is part of the solar system, which includes the Sun, Moon, and other bodies that orbit the Sun in predictable patterns that lead to observable paths of objects in the sky as seen from Earth
Connection: “orbits in predictable pattern in space influence seasons- connect seasons with discussion of weather changes/patterns

Grade 5:
Std.3.ESS.3:Weather conditions change because of the uneven heating of Earth’s surface by the Sun’s energy. Weather changes are measured by differences in temperature, air pressure, wind and water in the atmosphere and type of precipitation

Grade 6:
Std.1.PS.4.:Distinguish among, explain, and apply the relationships among mass, weight, volume, and density
Std.2.LS.1:Changes in environmental conditions can affect the survival of individual organisms, populations, and entire species

Grade 7:
Std.1.PS.1:Mixtures of substances can be separated based on their properties such as solubility, boiling points, magnetic properties, and densities
-could connect to talking about greenhouse gases
Std.2.LS.4: Photosynthesis and cellular respiration are important processes by which energy is acquired and utilized by organisms

Grade 8:
Std.1.PS.4: Recognize that waves such as electromagnetic, sound, seismic, and water have common characteristics and unique properties
Std.2.LS.1:Human activities can deliberately or inadvertently alter ecosystems and their resiliency
Std.3.ESS.1:Weather is a result of complex interactions of Earth's atmosphere, land and water, that are driven by energy from the sun, and can be predicted and described through complex models
Std.3.ESS.2:Earth has a variety of climates defined by average temperature, precipitation, humidity, air pressure, and wind that have changed over time in a particular location
Std.3.ESS.4: The relative positions and motions of Earth, Moon, and Sun can be used to explain observable effects such as seasons, eclipses, and Moon phases

High School:
Std.1.PS.2.Matter has definite structure that determines characteristic physical and chemical properties

Std.1.PS.5. Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined
Std.2.LS.2: The size and persistence of populations depend on their interactions with each other and on the abiotic factors in an ecosystem
Std.2.LS.9: Evolution occurs as the heritable characteristics of populations change across generations and can lead populations to become better adapted to their environment
Std.3.ESS.4: Climate is the result of energy transfer among interactions of the atmosphere, hydrosphere, geosphere, and biosphere
Std.3.ESS.6:The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes
Std.3.ESS.7: Natural hazards have local, national and global impacts such as volcanoes, earthquakes, tsunamis, hurricanes, and thunderstorms

NGSS Performance Expectations:

3-ESS2-1 Earth's Systems

Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
Grade: 3

3-ESS2-2 Earth's Systems

Obtain and combine information to describe climates in different regions of the world.
Grade: 3

3-ESS3-1 Earth and Human Activity

Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.*
Grade 3

4-PS3-2 Energy

Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
Grade: 4

4-ESS2-2 Earth's Systems

Analyze and interpret data from maps to describe patterns of Earth's features.
Grade 4

5-LS1-1 From Molecules to Organisms: Structures and Processes

Support an argument that plants get the materials they need for growth chiefly from air and water.
Grade: 5

5-ESS1-2 Earth's Place in the Universe

Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.
Performance Expectation
Grade: 5

5-ESS2-1 Earth's Systems

Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
Grade:5

5-ESS2-2 Earth's Systems

Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
Grade:5

MS-PS1-4 Matter and its Interactions

Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
Middle School (6-8)

MS-PS4-2 Waves and their Applications in Technologies for Information Transfer

Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
Middle School (6-8

MS-ESS2-5 Earth's Systems

Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.
Middle School (6-8)

MS-ESS2-6 Earth's Systems

Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

Middle School (6-8)

MS-ESS3-2 Earth and Human Activity

Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
Middle School (6-8)

MS-ESS3-5 Earth and Human Activity

Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
Middle School (6-8)

HS-LS2-6 Ecosystems: Interactions, Energy, and Dynamics

Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
High School (9-12)

HS-ESS2-3 Earth's Systems

Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection:
High School (9-12)

HS-ESS2-4 Earth's Systems

Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
High School (9-12)

HS-ESS2-5 Earth's Systems

Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
High School (9-12)

JANELLE JOHNSON JUN 03, 2018 05:27PM

Possible PBLs

PBL: Climate change and its local impacts (fire season, water shortage and drought, tourism, beetles, 100 year events)

JANELLE JOHNSON JUN 03, 2018 05:28PM

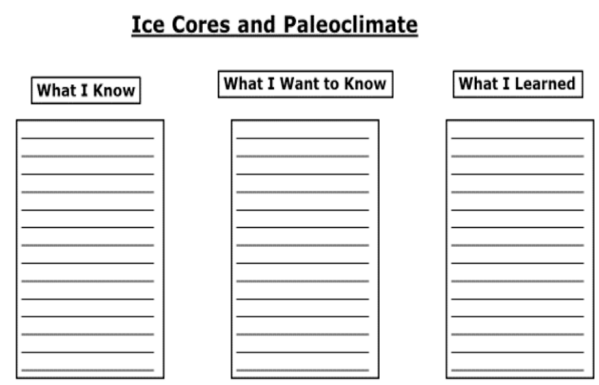
Possible PBL on Human Impact

Video weather v climate
https://www.natureworkseverywhere.org/resources/understanding-climate-change/ (6:55, The relationship between weather and climate and the resilience of nature. Also includes lesson plans and student handouts. *How does human activity impact weather events? What natural things can be utilized to mitigate climate change? What careers are possible in this field?*)

Ice Core Lab Field Trip

DAWN_CUMMINGS MAY 31, 2018 02:59PM

graphic organizer on Ice Cores



Ice_cores_graphic_organizer.docx
Word document
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AMALIA_SOLLARS JUN 07, 2018 03:34PM

https://www.youtube.com/watch?v=50WphCvOubE

I guess our understanding is now updated :)

Clouds

JANELLE JOHNSON JUN 01, 2018 08:44AM

GLOBE Observer Clouds App Tutorial

GLOBE_Observer_Clouds_App_Tutorial.pdf
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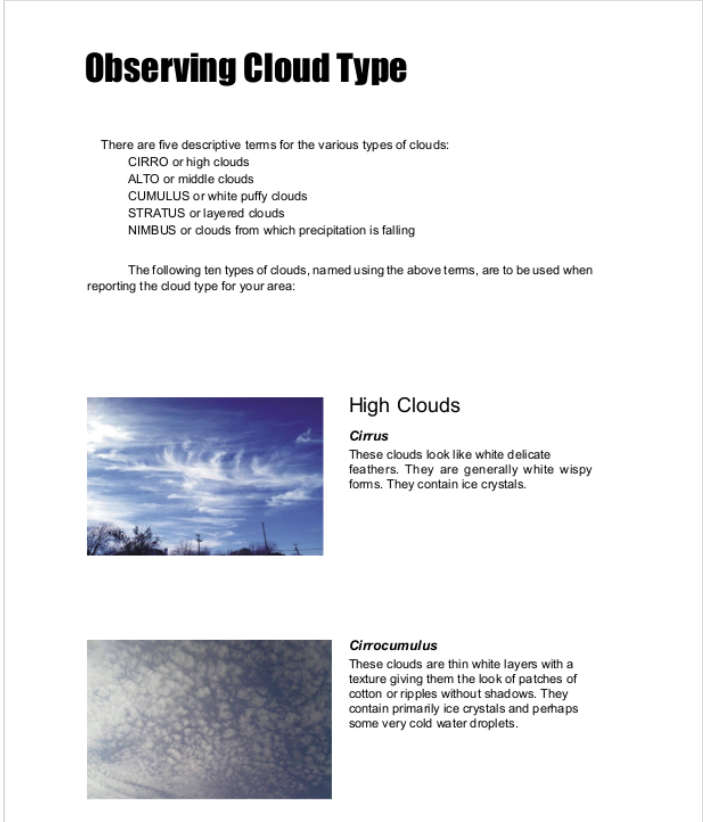

Observing Cloud Type

There are five descriptive terms for the various types of clouds:
CIRRO or high clouds
ALTO or middle clouds
CUMULUS or white puffy clouds
STRATUS or layered clouds
NIMBUS or clouds from which precipitation is falling

The following ten types of clouds, named using the above terms, are to be used when reporting the cloud type for your area:

High Clouds

Cirrus
These clouds look like white delicate feathers. They are generally white wispy forms. They contain ice crystals.

Cirrocumulus
These clouds are thin white layers with a texture giving them the look of patches of cotton or ripples without shadows. They contain primarily ice crystals and perhaps some very cold water droplets.

Observing_Cloud_Type.pdf
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GLOBE Cloud Chart

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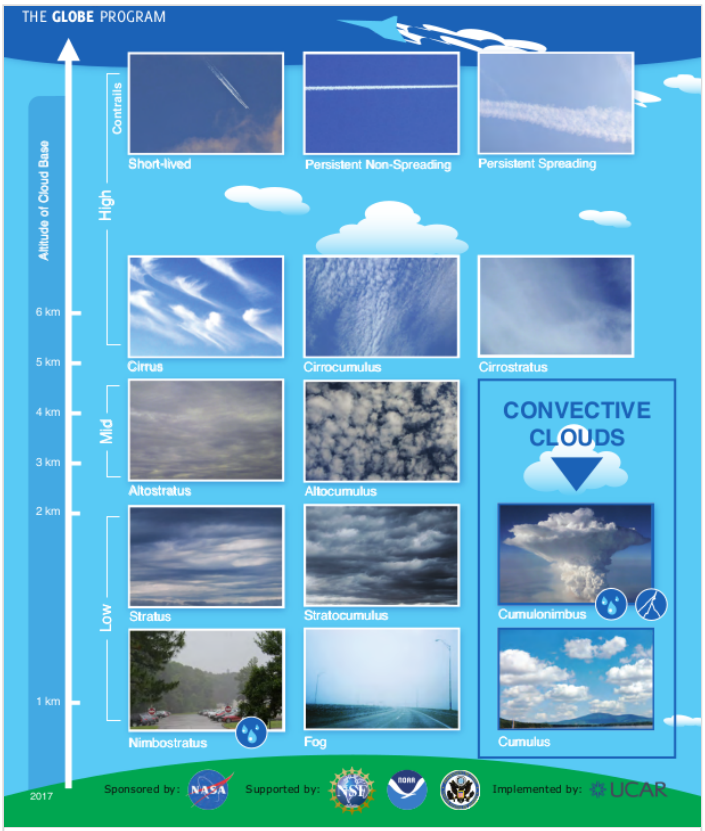
Observing Cloud Type



GLOBE_Cloud_Chart.pdf

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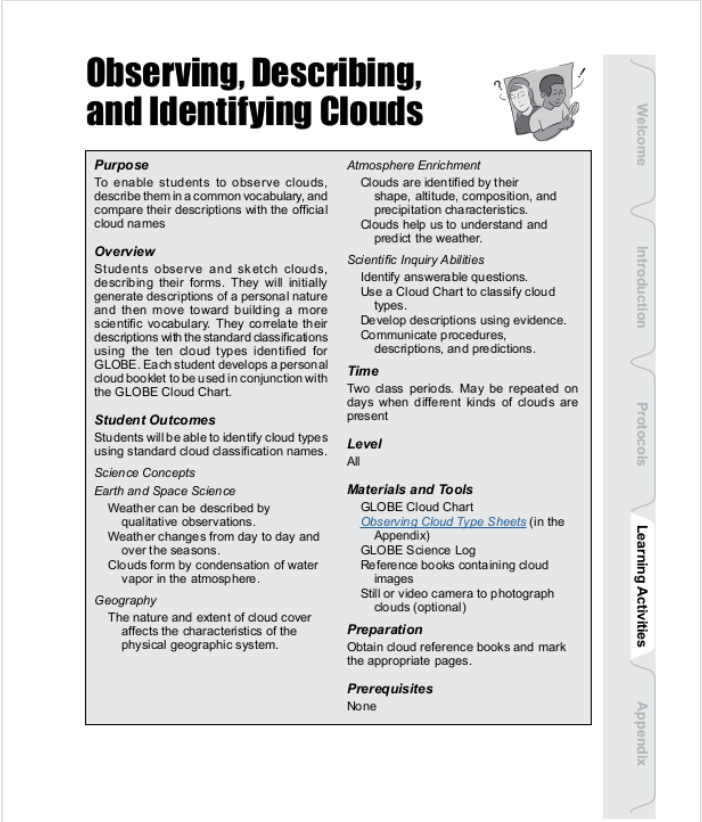

Observing, Describing, and Identifying Clouds

Purpose

To enable students to observe clouds, describe them in a common vocabulary, and compare their descriptions with the official cloud names

Overview

Students observe and sketch clouds, describing their forms. They will initially generate descriptions of a personal nature and then move toward building a more scientific vocabulary. They correlate their descriptions with the standard classifications using the ten cloud types identified for GLOBE. Each student develops a personal cloud booklet to be used in conjunction with the GLOBE Cloud Chart.

Student Outcomes

Students will be able to identify cloud types using standard cloud classification names.

Science Concepts

Earth and Space Science

- Weather can be described by qualitative observations.
- Weather changes from day to day and over the seasons.
- Clouds form by condensation of water vapor in the atmosphere.

Geography

- The nature and extent of cloud cover affects the characteristics of the physical geographic system.

Atmosphere Enrichment

- Clouds are identified by their shape, altitude, composition, and precipitation characteristics.
- Clouds help us to understand and predict the weather.

Scientific Inquiry Abilities

- Identify answerable questions.
- Use a Cloud Chart to classify cloud types.
- Develop descriptions using evidence.
- Communicate procedures, descriptions, and predictions.

Time

Two class periods. May be repeated on days when different kinds of clouds are present

Level

All

Materials and Tools

- GLOBE Cloud Chart
- Observing Cloud Type Sheets (in the Appendix)
- GLOBE Science Log
- Reference books containing cloud images
- Still or video camera to photograph clouds (optional)

Preparation

Obtain cloud reference books and mark the appropriate pages.

Prerequisites

None

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Observing__Describing__and_Identifying_Clouds.pdf

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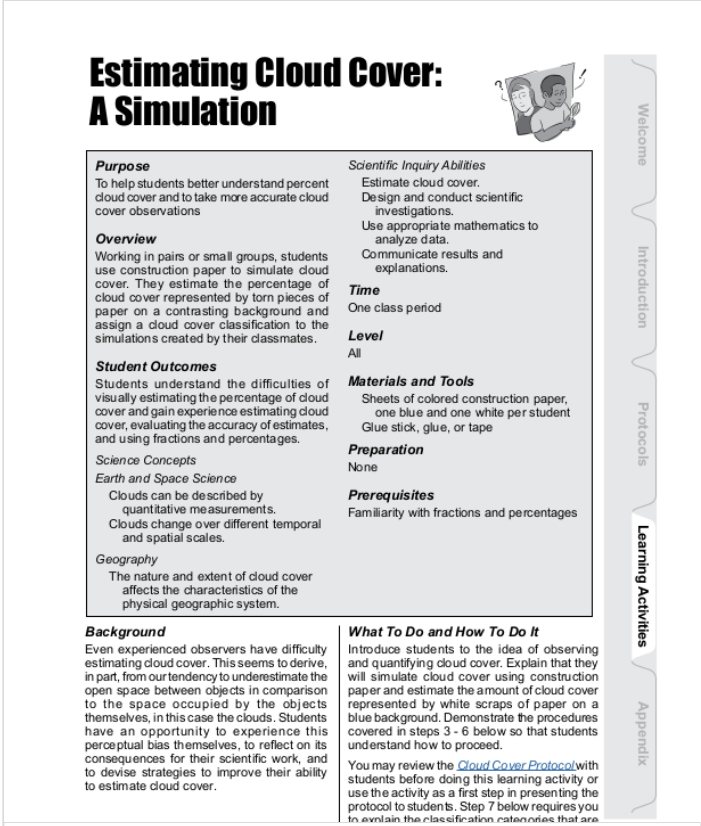
Observing & Identifying Clouds

JANELLE JOHNSON JUN 01, 2018 08:46AM

Estimating Cloud Cover



Estimating Cloud Cover: A Simulation

Purpose
To help students better understand percent cloud cover and to take more accurate cloud cover observations

Overview
Working in pairs or small groups, students use construction paper to simulate cloud cover. They estimate the percentage of cloud cover represented by torn pieces of paper on a contrasting background and assign a cloud cover classification to the simulations created by their classmates.

Student Outcomes
Students understand the difficulties of visually estimating the percentage of cloud cover and gain experience estimating cloud cover, evaluating the accuracy of estimates, and using fractions and percentages.

Science Concepts

Earth and Space Science
- Clouds can be described by quantitative measurements.
- Clouds change over different temporal and spatial scales.

Geography
- The nature and extent of cloud cover affects the characteristics of the physical geographic system.

Scientific Inquiry Abilities
- Estimate cloud cover.
- Design and conduct scientific investigations.
- Use appropriate mathematics to analyze data.
- Communicate results and explanations.

Time
One class period

Level
All

Materials and Tools
- Sheets of colored construction paper, one blue and one white per student
- Glue stick, glue, or tape

Preparation
None

Prerequisites
Familiarity with fractions and percentages

Background
Even experienced observers have difficulty estimating cloud cover. This seems to derive, in part, from our tendency to underestimate the open space between objects in comparison to the space occupied by the objects themselves, in this case the clouds. Students have an opportunity to experience this perceptual bias themselves, to reflect on its consequences for their scientific work, and to devise strategies to improve their ability to estimate cloud cover.

What To Do and How To Do It
Introduce students to the idea of observing and quantifying cloud cover. Explain that they will simulate cloud cover using construction paper and estimate the amount of cloud cover represented by white scraps of paper on a blue background. Demonstrate the procedures covered in steps 3 - 6 below so that students understand how to proceed.

You may review the *Cloud Cover Protocol* with students before doing this learning activity or use the activity as a first step in presenting the protocol to students. Step 7 below requires you to explain the classification categories that are

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Estimating_Cloud_Cover__A_Simulation.pdf

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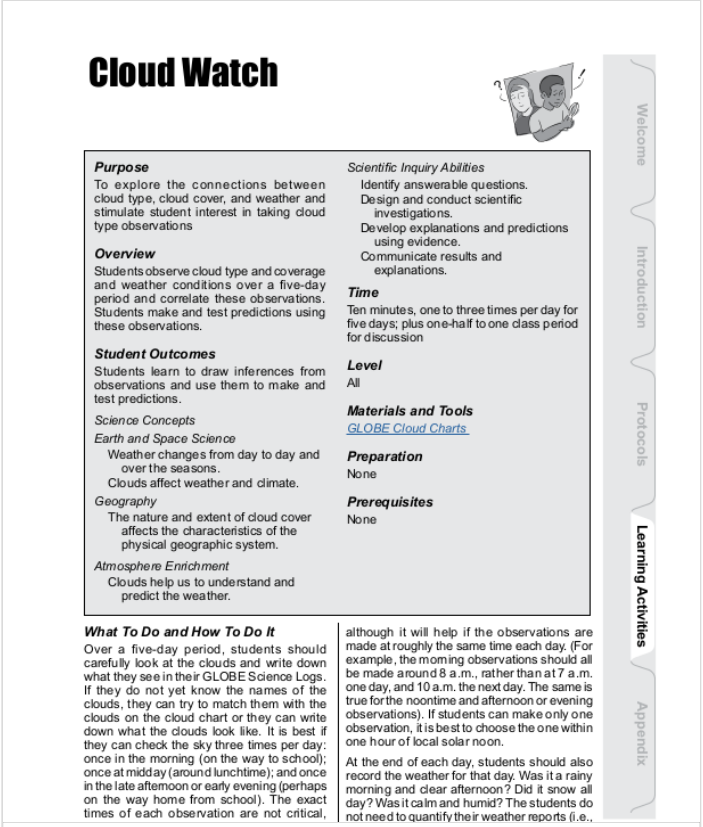

Cloud Watch

Purpose
To explore the connections between cloud type, cloud cover, and weather and stimulate student interest in taking cloud type observations

Overview
Students observe cloud type and coverage and weather conditions over a five-day period and correlate these observations. Students make and test predictions using these observations.

Student Outcomes
Students learn to draw inferences from observations and use them to make and test predictions.

Science Concepts

Earth and Space Science
- Weather changes from day to day and over the seasons.
- Clouds affect weather and climate.

Geography
- The nature and extent of cloud cover affects the characteristics of the physical geographic system.

Atmosphere Enrichment
- Clouds help us to understand and predict the weather.

Scientific Inquiry Abilities
- Identify answerable questions.
- Design and conduct scientific investigations.
- Develop explanations and predictions using evidence.
- Communicate results and explanations.

Time
Ten minutes, one to three times per day for five days; plus one-half to one class period for discussion

Level
All

Materials and Tools
GLOBE Cloud Charts

Preparation
None

Prerequisites
None

What To Do and How To Do It
Over a five-day period, students should carefully look at the clouds and write down what they see in their GLOBE Science Logs. If they do not yet know the names of the clouds, they can try to match them with the clouds on the cloud chart or they can write down what the clouds look like. It is best if they can check the sky three times per day: once in the morning (on the way to school); once at midday (around lunchtime); and once in the late afternoon or early evening (perhaps on the way home from school). The exact times of each observation are not critical, although it will help if the observations are made at roughly the same time each day. (For example, the morning observations should all be made around 8 a.m., rather than at 7 a.m. one day, and 10 a.m. the next day. The same is true for the noontime and afternoon or evening observations). If students can make only one observation, it is best to choose the one within one hour of local solar noon.

At the end of each day, students should also record the weather for that day. Was it a rainy morning and clear afternoon? Did it snow all day? Was it calm and humid? The students do not need to quantify their weather reports (i.e.,

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Extension_Activity_Cloud_Watch.pdf

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Extension Activity: Cloud Watch

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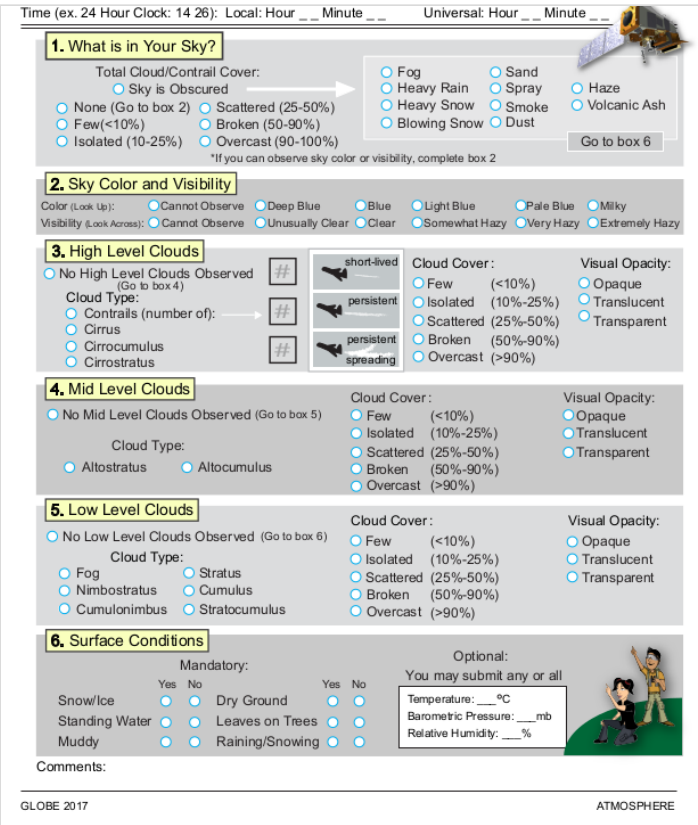
Clouds 1 Day Data Sheet



Time (ex. 24 Hour Clock: 14 26): Local: Hour _ _ Minute _ _ Universal: Hour _ _ Minute _ _

1. What is in Your Sky?

Total Cloud/Contrail Cover:
- Sky is Obscured
- None (Go to box 2)
- Scattered (25-50%)
- Few(<10%)
- Broken (50-90%)
- Isolated (10-25%)
- Overcast (90-100%)

*If you can observe sky color or visibility, complete box 2

- Fog
- Heavy Rain
- Heavy Snow
- Blowing Snow
- Sand
- Spray
- Smoke
- Dust
- Haze
- Volcanic Ash

Go to box 6

2. Sky Color and Visibility

Color (Look Up): Cannot Observe, Deep Blue, Blue, Light Blue, Pale Blue, Milky

Visibility (Look Across): Cannot Observe, Unusually Clear, Clear, Somewhat Hazy, Very Hazy, Extremely Hazy

3. High Level Clouds

No High Level Clouds Observed (Go to box 4)

Cloud Type:
- Contrails (number of):
- Cirrus
- Cirrocumulus
- Cirrostratus

short-lived / persistent / persistent spreading

Cloud Cover:
- Few (<10%)
- Isolated (10%-25%)
- Scattered (25%-50%)
- Broken (50%-90%)
- Overcast (>90%)

Visual Opacity:
- Opaque
- Translucent
- Transparent

4. Mid Level Clouds

No Mid Level Clouds Observed (Go to box 5)

Cloud Type:
- Altostratus
- Altocumulus

Cloud Cover:
- Few (<10%)
- Isolated (10%-25%)
- Scattered (25%-50%)
- Broken (50%-90%)
- Overcast (>90%)

Visual Opacity:
- Opaque
- Translucent
- Transparent

5. Low Level Clouds

No Low Level Clouds Observed (Go to box 6)

Cloud Type:
- Fog
- Nimbostratus
- Cumulonimbus
- Stratus
- Cumulus
- Stratocumulus

Cloud Cover:
- Few (<10%)
- Isolated (10%-25%)
- Scattered (25%-50%)
- Broken (50%-90%)
- Overcast (>90%)

Visual Opacity:
- Opaque
- Translucent
- Transparent

6. Surface Conditions

Mandatory:

	Yes	No		Yes	No
Snow/Ice			Dry Ground		
Standing Water			Leaves on Trees		
Muddy			Raining/Snowing		

Optional:
You may submit any or all

Temperature: ___°C
Barometric Pressure: ___mb
Relative Humidity: ___%

Comments:

GLOBE 2017 ATMOSPHERE

Clouds_1_Day_Data_Sheet.pdf

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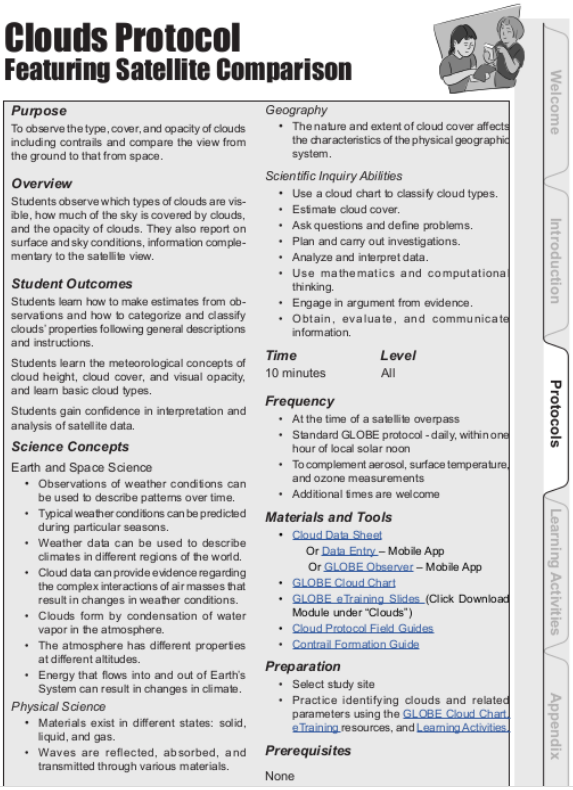

Clouds Protocol
Featuring Satellite Comparison

Purpose

To observe the type, cover, and opacity of clouds including contrails and compare the view from the ground to that from space.

Overview

Students observe which types of clouds are visible, how much of the sky is covered by clouds, and the opacity of clouds. They also report on surface and sky conditions, information complementary to the satellite view.

Student Outcomes

Students learn how to make estimates from observations and how to categorize and classify clouds' properties following general descriptions and instructions.

Students learn the meteorological concepts of cloud height, cloud cover, and visual opacity, and learn basic cloud types.

Students gain confidence in interpretation and analysis of satellite data.

Science Concepts

Earth and Space Science
- Observations of weather conditions can be used to describe patterns over time.
- Typical weather conditions can be predicted during particular seasons.
- Weather data can be used to describe climates in different regions of the world.
- Cloud data can provide evidence regarding the complex interactions of air masses that result in changes in weather conditions.
- Clouds form by condensation of water vapor in the atmosphere.
- The atmosphere has different properties at different altitudes.
- Energy that flows into and out of Earth's System can result in changes in climate.

Physical Science
- Materials exist in different states: solid, liquid, and gas.
- Waves are reflected, absorbed, and transmitted through various materials.

Geography
- The nature and extent of cloud cover affects the characteristics of the physical geographic system.

Scientific Inquiry Abilities
- Use a cloud chart to classify cloud types.
- Estimate cloud cover.
- Ask questions and define problems.
- Plan and carry out investigations.
- Analyze and interpret data.
- Use mathematics and computational thinking.
- Engage in argument from evidence.
- Obtain, evaluate, and communicate information.

Time 10 minutes

Level All

Frequency
- At the time of a satellite overpass
- Standard GLOBE protocol - daily, within one hour of local solar noon
- To complement aerosol, surface temperature, and ozone measurements
- Additional times are welcome

Materials and Tools
- Cloud Data Sheet
  Or Data Entry – Mobile App
  Or GLOBE Observer – Mobile App
- GLOBE Cloud Chart
- GLOBE eTraining Slides (Click Download Module under "Clouds")
- Cloud Protocol Field Guides
- Contrail Formation Guide

Preparation
- Select study site
- Practice identifying clouds and related parameters using the GLOBE Cloud Chart, eTraining resources, and Learning Activities.

Prerequisites

None

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Clouds_Protocol.pdf

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Clouds Protocol

JENNIFER BOURGEAULT JUN 07, 2018 03:33PM

Elementary GLOBE - Clouds

Clouds - GLOBE.gov

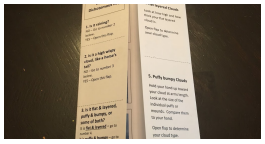
In this book, descriptions of cloud types are combined with analogies related to cloud shapes and are acted out by the GLOBE Kids. Activities give students the opportunity to describe the shape and appearance of cumulus clouds and learn the types of weather that are associated with cumulus clouds.

GLOBE

JENNIFER BOURGEAULT JUN 07, 2018 03:38PM

Cloud Classification Key - Blog & Foldable

Cloudy with Cloud Identification Confusion? - Community Blogs - GLOBE.gov



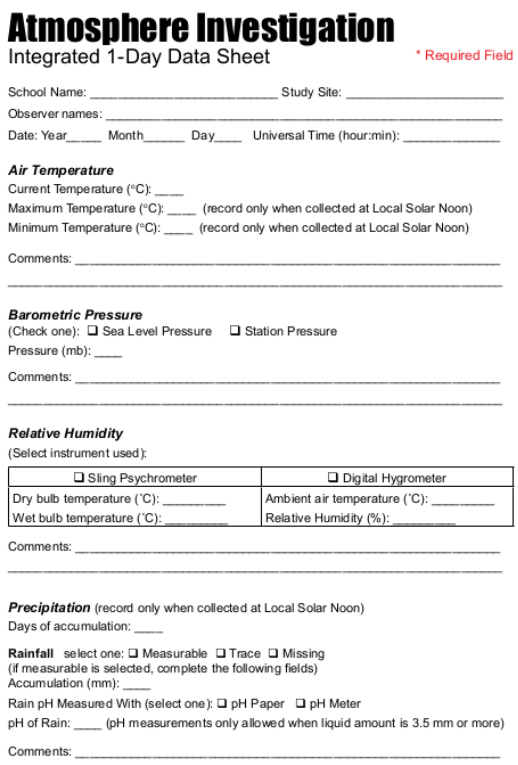
Hello, GLOBE Universe, No need to be cloudy and confused with identifying clouds! There are easy questions that you can ask yourself to help identify what beautiful clouds you are seeing floating high above you. I created a Cloud Identification Guide to step you and your students through identifying clouds.

GLOBE

Weather Station

JANELLE JOHNSON JUN 01, 2018 08:51AM

Atmosphere Investigation 1 Day Data Sheet



Atmosphere Investigation
Integrated 1-Day Data Sheet

* Required Field

School Name: _____ Study Site: _____
Observer names: _____
Date: Year____ Month_____ Day____ Universal Time (hour:min): _____

Air Temperature
Current Temperature (°C): ____
Maximum Temperature (°C): ____ (record only when collected at Local Solar Noon)
Minimum Temperature (°C): ____ (record only when collected at Local Solar Noon)

Comments: _____

Barometric Pressure
(Check one): ❑ Sea Level Pressure ❑ Station Pressure
Pressure (mb): ____

Comments: _____

Relative Humidity
(Select instrument used):

❑ Sling Psychrometer	❑ Digital Hygrometer
Dry bulb temperature (˚C): _____	Ambient air temperature (˚C): _____
Wet bulb temperature (˚C): _____	Relative Humidity (%): _____

Comments: _____

Precipitation (record only when collected at Local Solar Noon)
Days of accumulation: ____

Rainfall select one: ❑ Measurable ❑ Trace ❑ Missing
(if measurable is selected, complete the following fields)
Accumulation (mm): ____
Rain pH Measured With (select one): ❑ pH Paper ❑ pH Meter
pH of Rain: ____ (pH measurements only allowed when liquid amount is 3.5 mm or more)

Comments: _____

Atmosphere_Investigation_Integrated_1_Day_Data_Sheet.pdf
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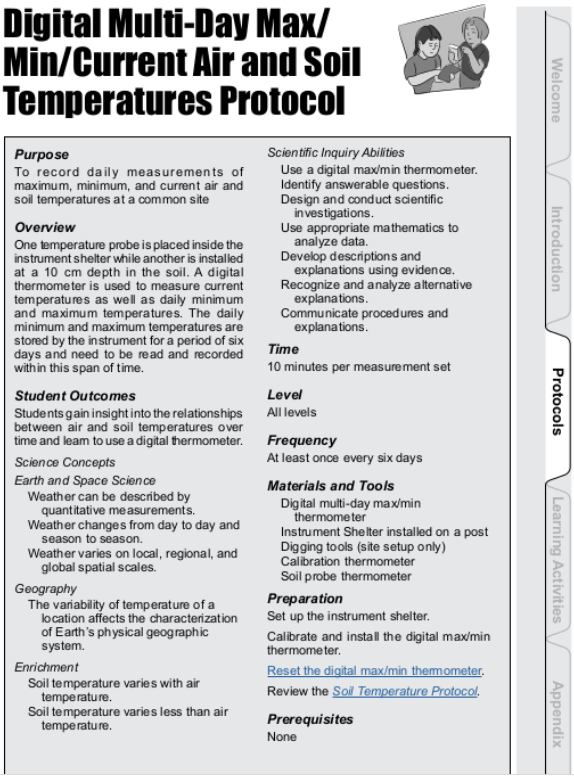
Atmosphere (digital) Protocol



Digital Multi-Day Max/ Min/Current Air and Soil Temperatures Protocol

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Purpose
To record daily measurements of maximum, minimum, and current air and soil temperatures at a common site

Overview
One temperature probe is placed inside the instrument shelter while another is installed at a 10 cm depth in the soil. A digital thermometer is used to measure current temperatures as well as daily minimum and maximum temperatures. The daily minimum and maximum temperatures are stored by the instrument for a period of six days and need to be read and recorded within this span of time.

Student Outcomes
Students gain insight into the relationships between air and soil temperatures over time and learn to use a digital thermometer.

Science Concepts
Earth and Space Science
Weather can be described by quantitative measurements.
Weather changes from day to day and season to season.
Weather varies on local, regional, and global spatial scales.
Geography
The variability of temperature of a location affects the characterization of Earth's physical geographic system.
Enrichment
Soil temperature varies with air temperature.
Soil temperature varies less than air temperature.

Scientific Inquiry Abilities
Use a digital max/min thermometer.
Identify answerable questions.
Design and conduct scientific investigations.
Use appropriate mathematics to analyze data.
Develop descriptions and explanations using evidence.
Recognize and analyze alternative explanations.
Communicate procedures and explanations.

Time
10 minutes per measurement set

Level
All levels

Frequency
At least once every six days

Materials and Tools
Digital multi-day max/min thermometer
Instrument Shelter installed on a post
Digging tools (site setup only)
Calibration thermometer
Soil probe thermometer

Preparation
Set up the instrument shelter.
Calibrate and install the digital max/min thermometer.
Reset the digital max/min thermometer.
Review the *Soil Temperature Protocol*.

Prerequisites
None

Atmosphere_Digital_Multi_Day_Max_Min_Current_Air_and_Soil_T
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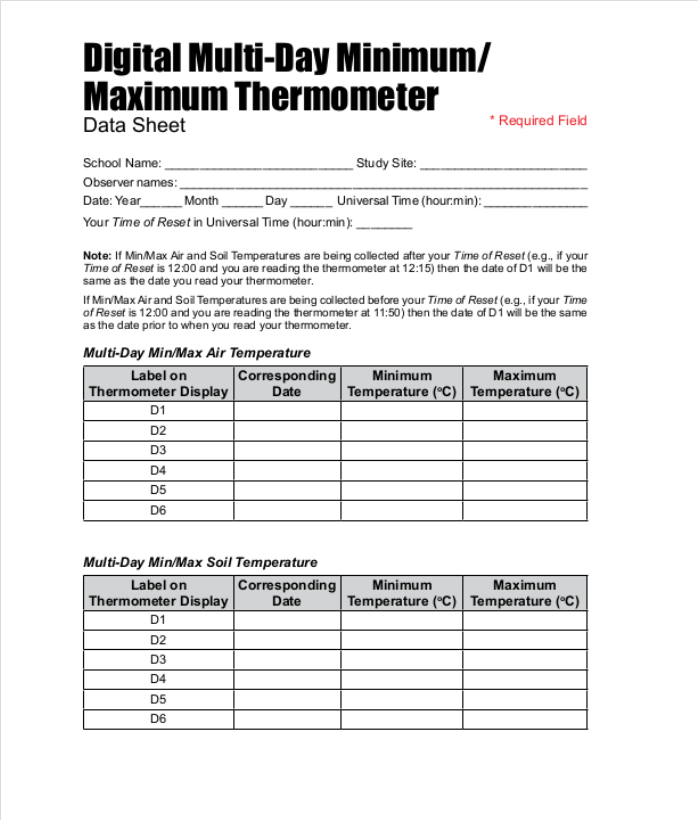
JANELLE JOHNSON JUN 01, 2018 08:53AM

Atmosphere (digital) Data Sheet



Digital Multi-Day Minimum/ Maximum Thermometer

Data Sheet

* Required Field

School Name: _____ Study Site: _____

Observer names: _____

Date: Year_____ Month _____ Day _____ Universal Time (hour:min): _____

Your *Time of Reset* in Universal Time (hour:min): _____

Note: If Min/Max Air and Soil Temperatures are being collected after your *Time of Reset* (e.g., if your *Time of Reset* is 12:00 and you are reading the thermometer at 12:15) then the date of D1 will be the same as the date you read your thermometer.

If Min/Max Air and Soil Temperatures are being collected before your *Time of Reset* (e.g., if your *Time of Reset* is 12:00 and you are reading the thermometer at 11:50) then the date of D1 will be the same as the date prior to when you read your thermometer.

Multi-Day Min/Max Air Temperature

Label on Thermometer Display	Corresponding Date	Minimum Temperature (°C)	Maximum Temperature (°C)
D1			
D2			
D3			
D4			
D5			
D6			

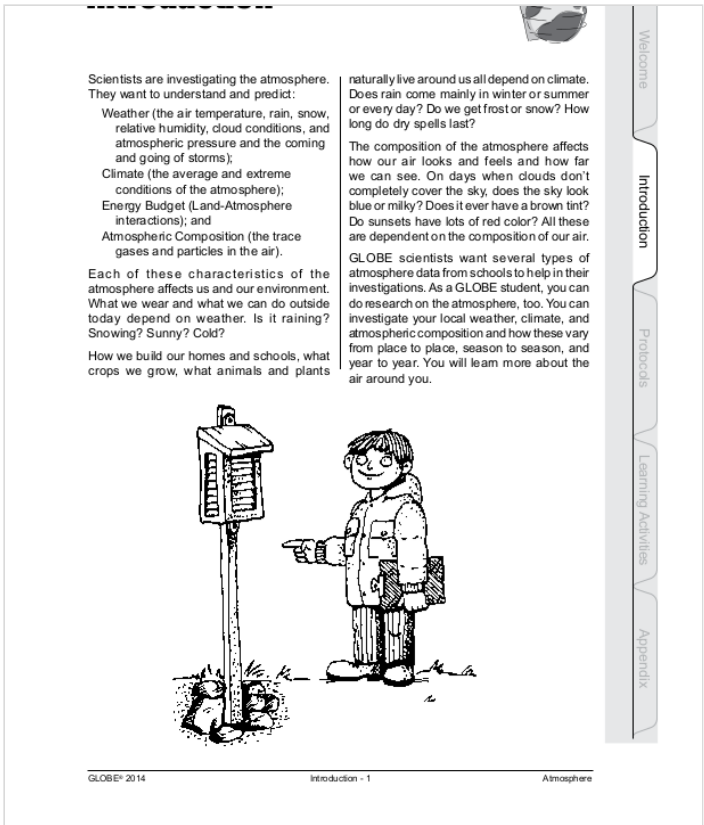
Multi-Day Min/Max Soil Temperature

Label on Thermometer Display	Corresponding Date	Minimum Temperature (°C)	Maximum Temperature (°C)
D1			
D2			
D3			
D4			
D5			
D6			

Atmosphere_Digital_Multi_Day_Maximum_Minimum_Thermometer_Data_Sheet.pdf

PDF document

PADLET DRIVE



Scientists are investigating the atmosphere. They want to understand and predict:

- Weather (the air temperature, rain, snow, relative humidity, cloud conditions, and atmospheric pressure and the coming and going of storms);
- Climate (the average and extreme conditions of the atmosphere);
- Energy Budget (Land-Atmosphere interactions); and
- Atmospheric Composition (the trace gases and particles in the air).

Each of these characteristics of the atmosphere affects us and our environment. What we wear and what we can do outside today depend on weather. Is it raining? Snowing? Sunny? Cold?

How we build our homes and schools, what crops we grow, what animals and plants naturally live around us all depend on climate. Does rain come mainly in winter or summer or every day? Do we get frost or snow? How long do dry spells last?

The composition of the atmosphere affects how our air looks and feels and how far we can see. On days when clouds don't completely cover the sky, does the sky look blue or milky? Does it ever have a brown tint? Do sunsets have lots of red color? All these are dependent on the composition of our air.

GLOBE scientists want several types of atmosphere data from schools to help in their investigations. As a GLOBE student, you can do research on the atmosphere, too. You can investigate your local weather, climate, and atmospheric composition and how these vary from place to place, season to season, and year to year. You will learn more about the air around you.

GLOBE® 2014 Introduction - 1 Atmosphere

Atmosphere_Protocols.pdf

PDF document

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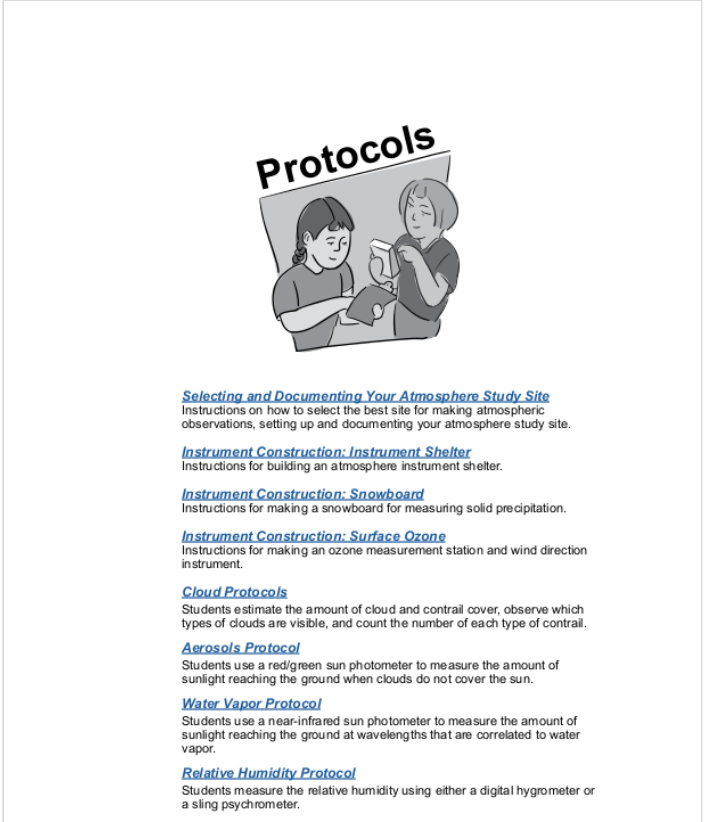
JANELLE JOHNSON JUN 01, 2018 08:53AM

Atmosphere Overview

JANELLE JOHNSON JUN 01, 2018 08:53AM

Atmosphere Protocols



Protocols

Selecting and Documenting Your Atmosphere Study Site
Instructions on how to select the best site for making atmospheric observations, setting up and documenting your atmosphere study site.

Instrument Construction: Instrument Shelter
Instructions for building an atmosphere instrument shelter.

Instrument Construction: Snowboard
Instructions for making a snowboard for measuring solid precipitation.

Instrument Construction: Surface Ozone
Instructions for making an ozone measurement station and wind direction instrument.

Cloud Protocols
Students estimate the amount of cloud and contrail cover, observe which types of clouds are visible, and count the number of each type of contrail.

Aerosols Protocol
Students use a red/green sun photometer to measure the amount of sunlight reaching the ground when clouds do not cover the sun.

Water Vapor Protocol
Students use a near-infrared sun photometer to measure the amount of sunlight reaching the ground at wavelengths that are correlated to water vapor.

Relative Humidity Protocol
Students measure the relative humidity using either a digital hygrometer or a sling psychrometer.

Atmosphere_Protocols.pdf
PDF document
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JANELLE JOHNSON JUN 01, 2018 08:54AM

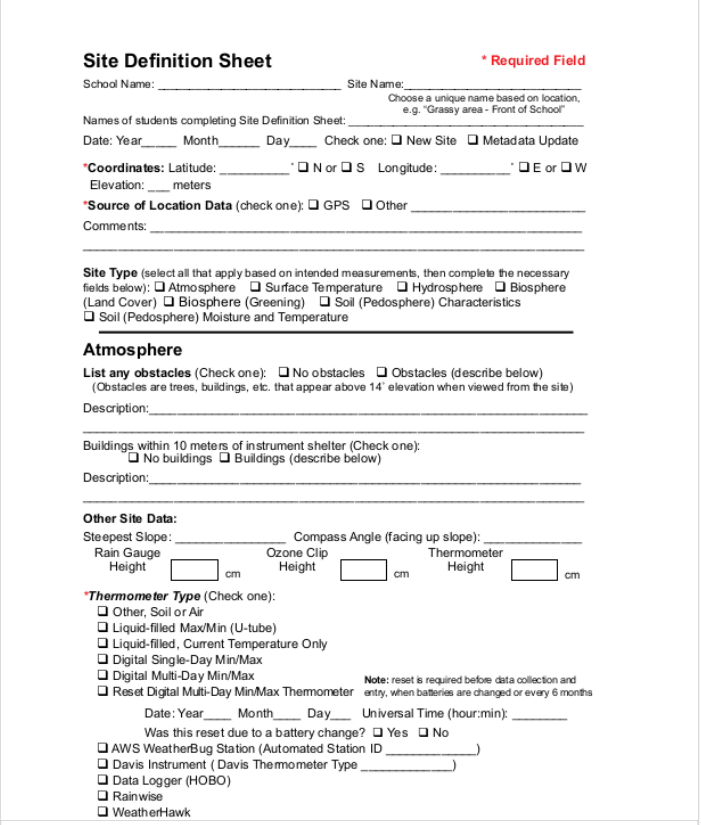
GLOBE Weather Station

JANELLE JOHNSON JUN 01, 2018 08:54AM

GLOBE Weather Station

JANELLE JOHNSON JUN 01, 2018 08:55AM

Atmosphere Investigation Site Definition Sheet



Site Definition Sheet

* Required Field

School Name: _____ Site Name: _____
Choose a unique name based on location, e.g. "Grassy area - Front of School"

Names of students completing Site Definition Sheet: _____

Date: Year_____ Month_____ Day____ Check one: ❑ New Site ❑ Metadata Update

***Coordinates:** Latitude: _____° ❑ N or ❑ S Longitude: _____° ❑ E or ❑ W
Elevation: ___ meters

***Source of Location Data** (check one): ❑ GPS ❑ Other _____

Comments: _____

Site Type (select all that apply based on intended measurements, then complete the necessary fields below): ❑ Atmosphere ❑ Surface Temperature ❑ Hydrosphere ❑ Biosphere (Land Cover) ❑ Biosphere (Greening) ❑ Soil (Pedosphere) Characteristics ❑ Soil (Pedosphere) Moisture and Temperature

Atmosphere

List any obstacles (Check one): ❑ No obstacles ❑ Obstacles (describe below)
(Obstacles are trees, buildings, etc. that appear above 14° elevation when viewed from the site)

Description: _____

Buildings within 10 meters of instrument shelter (Check one):
❑ No buildings ❑ Buildings (describe below)

Description: _____

Other Site Data:

Steepest Slope: _____ Compass Angle (facing up slope): _____

Rain Gauge Height [ ] cm Ozone Clip Height [ ] cm Thermometer Height [ ] cm

****Thermometer Type*** (Check one):
- ❑ Other, Soil or Air
- ❑ Liquid-filled Max/Min (U-tube)
- ❑ Liquid-filled, Current Temperature Only
- ❑ Digital Single-Day Min/Max
- ❑ Digital Multi-Day Min/Max
- ❑ Reset Digital Multi-Day Min/Max Thermometer

Note: reset is required before data collection and entry, when batteries are changed or every 6 months

Date: Year____ Month____ Day___ Universal Time (hour:min): _____

Was this reset due to a battery change? ❑ Yes ❑ No

- ❑ AWS WeatherBug Station (Automated Station ID _____)
- ❑ Davis Instrument (Davis Thermometer Type _____)
- ❑ Data Logger (HOBO)
- ❑ Rainwise
- ❑ WeatherHawk

Atmosphere_Investigation_Site_Definition_Sheet.pdf
PDF document
PADLET DRIVE

JENNIFER BOURGEAULT JUN 07, 2018 04:01PM

Guest Post by GLOBE Teacher Bonnie Banyas: The First Year with our Weather Shelter

Guest Post by GLOBE Teacher Bonnie Banyas: The First Year with our Weather Shelter - Blog - GLOBE.gov

GLOBE

AMALIA_SOLLARS JUN 08, 2018 08:13AM

Weather Station install in San Antonio

Our most recent install and modifications. Full PVC pipe to protect thermometer leads and slit in middle allows removal of station during summer months of campus closure.

AMALIA_SOLLARS JUN 08, 2018 08:16AM

Screen Modificiation

These screens still allow for airflow but protect from wasps forming homes inside the box

Using Data

WRENTWEET MAY 30, 2018 02:15PM

University Corporation Atmospheric Research (UCAR)

The University Corporation for Atmospheric Research serves as a hub for research, education, and public outreach for the atmospheric and related Earth sciences community. We provide

services to and promote partnerships within a collaborative community of researchers and educators who are dedicated to understanding the atmosphere—the air around us—and the complex processes that make up the Earth system, from the ocean floor to the Sun's core.

Check Out Their Website:
https://www.youtube.com/watch?time_continue=76&v=xr5IFc6PnmY

RICHARD WAGNER MAY 31, 2018 01:19PM

Weather Data Visualization Activity

Feb. 15	48	16	70
Feb. 16	42	7	40
Feb. 17	56	24	20
Feb. 18	69	20	50
Feb. 19	20	3	100
Feb. 20	13	-3	80
Feb. 21	22	-7	30
Feb. 22	26	8	90
Feb. 23	35	8	60
Feb. 24	36	15	50
Feb. 25	41	15	20
Feb. 26	57	18	10
Feb. 27	56	21	10
Feb. 28	50	21	40

For the first week (May 15-21) make a row of legos representing the maximum temperature using the following rules.

50-69	Warm	**Red**
31-49	Cool	**Yellow**
10-30	Cold	**Blue**

Next, add rows for minimum temperature and cloud cover using these rules:

18-25	Cool	**Red**		**60-100%**	Cloudy	**White**
6-17	Cold	**Yellow**		**0-50%**	Clear	**Black**
-10 to 5	Frigid	**Blue**				

Repeat with three rows representing the data for the 2nd week

Using_Temperature_and_Cloud_Data_Feb.docx
Word document
PADLET DRIVE

RICHARD WAGNER MAY 31, 2018 01:22PM

Weather Data Graphing as Followup to Data Visualization Activity on Temperature and Clouds

Visualizing, Interpreting, and Using Data:

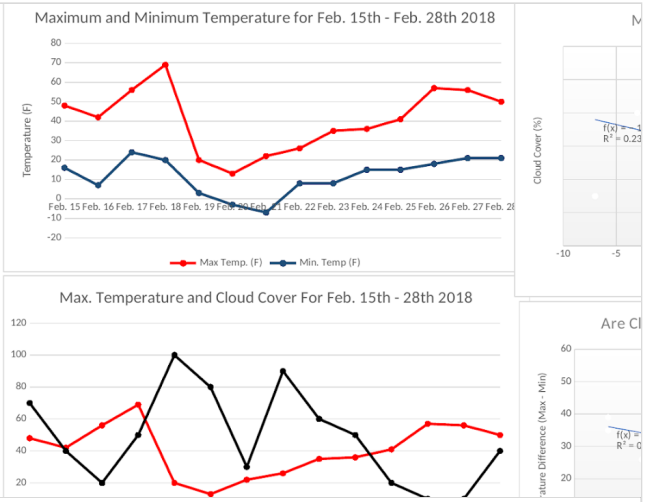
In this document you will find serval examples of different graphs, charts, and visual representations using the data found in both the Lego and Weather Calendar Activities from the **Water, Weather, and Climate Day of the MULTI Summer Institute 2018**. This is not by any means a comprehensive list but a starting place to provide you with examples of different representations of the same data and how they can lead to deep thinking and critical thinking opportunities for your students. The Excel spreadsheet used to manipulate and generate these figures is included on the padlet for your use as well.

Simple Column (Bar) Graph:

MULTI_Water_Weather_Climate_Data_Analysis_Graphs.docx
Word document
PADLET DRIVE

RICHARD WAGNER MAY 31, 2018 01:23PM

Data and Graphs from Data Activity on Temperature and Clouds



MULTI_Water_Weather_climate_Charts.xlsx
Excel spreadsheet
PADLET DRIVE

JENNIFER BOURGEAULT JUN 07, 2018 03:46PM

Elementary GLOBE - Climate Book and Activities

Climate - GLOBE.gov

This storybook follows the GLOBE Kids as they take an adventure and learn that climate change affects the whole world, from the tropics to the poles. Through learning activities, students learn how weather over a long period of time describes climate, explore how sea level rise can affect coastal communities and environments, and describe how humans are contributing to climate change and how we can take action to solve this problem.

GLOBE

Weather adds up to Climate: https://www.globe.gov/documents/348830/21221037/01_EGc_FINAL_29sept2016.pdf/e23a6ca7-cf1d-4ca9-a82e-68c42d408e3f

— JENNIFER BOURGEAULT

JENNIFER BOURGEAULT JUN 07, 2018 03:53PM

GLOBE Exploration & Visualizations

Data Exploration Learning Activities - GLOBE.gov

Investigating an Alaskan Spring Mystery : Students learn about the timing of spring budburst, develop multiple working hypotheses about why timing differs year to year, and test hypotheses using environmental data collected by GLOBE students in Alaska to come to a conclusion about the factors that most impact timing of budburst on paper birch trees.

GLOBE

RICHARD WAGNER JUN 07, 2018 08:45PM

Accessing Monthly Data from National Weather Service

Link for Weather Data for Denver

WeatherDataAccess.pptx

Powerpoint presentation

PADLET DRIVE

Focal Students-Reflection

TERRI_LIRA1 JUN 07, 2018 02:46PM

Weather Activities

Student A I would assign groups to give him opportunity to make good choices with the activity. Student B I would make sure to pre teach the weather guidelines (great activitiy). Make sure she is close with me or in a group that is supportive. Student C would like to challenge student with higher order thinking skills.

KATIE BARKSTROM JUN 07, 2018 02:46PM

Focal Student Reflection

For my student in the AN program, I would be sure to stay nearby her while visiting the Ice/Rock lab. I would help prepare all of my students by providing some background knowledge and helping them prepare questions to ask. Students with LEP would receive vocabulary instruction prior to the field trip in order to make connections while visiting. This trip would open the door to numerous career connections for students, and I know they would find it as fascinating as I did!

KATYA SCHLOESSER JUN 07, 2018 02:38PM

Focal Students

I loved the tour this morning, and took lots of photos. I think the real world applications (and career path) connections would be engaging for all three focal students. It gave me the idea to highlight career paths that the Science and

Engineering Practices are important for (i.e. data science is becoming a very lucrative career path). The afternoon activities will be helpful for all students- I like the idea of training all students then having students cycle through responsibilities for collecting data on a daily basis.

NRAYNOR1 JUN 07, 2018 02:45PM

Focal Students

Working with Student Z, he would love the ice lab tour. He would get excited just being a part of a group.
I can see him talking about the trip for days, he is very outgoing student, that wants to get as much info. out of a lesson that interest him. He always asking questions about science topic, he just doesn't have the home support that he need to success. He constantly working hard in class to better himself.

ASHLEY GLENN JUN 07, 2018 02:38PM

All of today's activities would be great for all 3 of my focal students. The hands on experience definitely allows for the authentic inquiry. I am definitely going to get some ice from the ice core lab and use it to talk about weather and climate for my 3rd grade class. The temperature tracking on the calendar is MUST DO for all of my kids next year!

NIKOLE CALMEYN JUN 07, 2018 02:49PM

Reflection

I loved the weather calendar idea where students can collect data on temperature and cloud coverage. This is something that I would love to work with an older grade and do buddy work with. I would model for all students and then differentiate for those focal students who may have a difficult time understanding the scientific language or determining which term means what (warm, cool, cold). I would help them use their senses to recognize differences between warm cool and cold. I would have all students observe clouds outside and use adjectives to describe the clouds. This will help those focal students develop language such as fluffy, thin, thick, dark, light, etc. I also like using the legos as a visual and stacking them up so that they can see a visual of how many cloudy days vs sunny days or hot vs cold days, etc.

JESSIE PAPKE OSTENDORF JUN 07, 2018 02:48PM

Reflect on EMBJEE

These concepts were well over most of these kids' heads. However, making it part of a daily touch in/touch on towards a bigger thing makes it easier. This also helps the higher level students to mentor and peer teach. Makes a bigger connection to real world and why should I care about this.

JULIE PITZ JUN 07, 2018 02:51PM

When I do the Cloud Data activity I will give all my students the choice on how they want to represent the data. Student B would love to create a database online using Google Sheets. This would make him very successful because he would be able to help his classmates with their data. Student G I would encourage to represent his data using the pictures. I would also work with our CLD teacher to pre-teach some of the vocabulary words using some of the same picture graphics.

GRACE_ELEE JUN 07, 2018 03:05PM

Focal Students 6/7

My focal students would benefit from having outdoor experiences like observing cloud types and cover in small groups or pairs. I think it would be challenging for my focal students to work individually outside, but working in pairs would be very beneficial to their progress.

KAY BOLERJACK JUN 07, 2018 03:08PM

Real World Connections

If I were able to take my students to the ice core lab. I believe my focal students would feel empowered and inspired. I think they would connect to the career possibilities that are options for them. There are many types of jobs associated with the research.

ROBIN STAKER JUN 07, 2018 08:31PM

Focal Students

Well my shy girl would have loved the fact that the rock librarian can also drive a forklift. The low vocabulary reader would see some real life experience. My advanced student would have enjoyed the field trip and possibly I could have challenged him to try to construct an ice core that could simulate the real thing.

MARIA CROUSE JUN 08, 2018 07:59AM

There was a lot of data exploration today. I would like to challenge my students to find multiple ways to represent the

data. My focal student would be able to find something that speaks to him, and he might surprise the class with his creativity!

Career Connections

GRACE_ELEE JUN 07, 2018 03:07PM

Miner, rig operator, geologist, and meteorologist.

EPALMER99 JUN 07, 2018 03:58PM

Glaciologist, climatologist, climate change activist, climate change protester, director of the EPA (politician)

JENNIFER BOURGEAULT JUN 07, 2018 04:19PM

HVAC professional

Questions? Needs?

JANELLE JOHNSON JUN 06, 2018 08:27AM

Today's eval

2018 Summer Institute, Day 4: Water, Weather & ClimateThursday, June 7, 2018 Survey

Web survey powered by SurveyMonkey.com. Create your own online survey now with SurveyMonkey's expert certified FREE templates.

SURVEYMONKEY

EPALMER99 JUN 07, 2018 03:50PM

Climate Change

Just a thought....if we are presenting the theory of climate change/global warming, are we going to present the opposite view? Otherwise, it may appear that we are pushing our beliefs/views onto our students.

Katharine Hayhoe has some excellent resources, videos, a Facebook page, etc. about addressing how to discuss climate change with everyone and anyone. Here are a couple links to check out: http://theyearsproject.com/science-advisor/katharine-hayhoe-ph-d/ - particularly the "Pray for Rain" one. Also, https://www.facebook.com/katharine.hayhoe/.

— JENNIFER BOURGEAULT

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