

# Atmosphere Investigation



A GLOBE<sup>®</sup> Learning Investigation



# Atmosphere Investigation at a Glance



## Protocols

Daily measurements within one hour of local solar noon:  
precipitation (rain or snow) including precipitation pH  
maximum and minimum temperature for the last 24 hours  
(if using a Digital Multi-Day Max/Min thermometer this can  
be read at anytime of day)

At least one measurement per day:  
cloud cover and type and contrail cover and type  
aerosols  
water vapor  
relative humidity  
snow pack  
current temperature  
surface temperature  
ozone

## Suggested Sequence of Activities

- Read the *Introduction*, especially the sections *What Measurements Are Taken* and *Getting Started*.
- Read the brief description of the learning activities at the beginning of the *Learning Activities* section.
- Review the protocols and plan which measurements your students will take; feel free to start with an easily sustained level of effort and then expand.
- Order any new or replacement instruments required.
- Cloud measurements are the easiest place to start and are required for several other protocols; do these activities with your students before beginning cloud observations:  
*Observing, Describing, and Identifying Clouds*  
*Estimating Cloud Cover: A Simulation*
- Install the instrument shelter which is required for taking air temperature measurements.
- Check the calibrations of your instruments (thermometers and barometer or altimeter).
- Have students define their Atmosphere Study Site and submit site definition data to GLOBE.
- Install your rain gauge and barometer or altimeter and plan out measurement logistics (such as where will required instruments and materials stay, timing and time requirements, etc.).
- Choose which *Atmosphere Data Sheets* your students will use and copy them.
- Copy the *Field Guides* for the protocols your students will follow.
- Teach students how to take the measurements following the *Field Guides*, record their readings on the *Data Sheet(s)*, and report data to GLOBE.
- Transfer to the students as much responsibility as practical for taking measurements and reporting data.
- Have students look at their data and comparable data from other schools.
- Engage students in inquiry and help middle and secondary students conduct student research projects using the *Looking at the Data* sections of the protocols.



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## **Protocols**

- Instrument Construction, Site Selection, and Set-Up
- Cloud Protocols
- Aerosols Protocol
- Water Vapor Protocol
- Relative Humidity Protocol
- Precipitation Protocols
- Digital Multi-Day Max/Min/Current Air and Soil Temperature Protocol
- Maximum, Minimum, and Current Air Temperature Protocol
- Surface Temperature Protocol
- Ozone Protocol
- Optional Automated Weather Station Protocols\*
- Optional Barometric Pressure Protocol\*
- Optional Automated Soil and Air Temperature Monitoring Protocol\*
- Optional AWS Weathernet Protocol\*

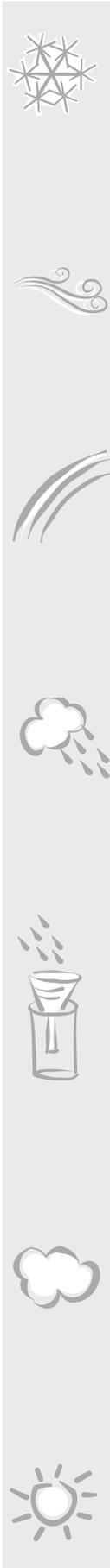


## **Learning Activities**

- Observing, Describing, and Identifying Clouds
- Estimating Cloud Cover
- Cloud Watch
- Observing Visibility and Sky Color
- Making a Sundial
- Calculating Relative Air Mass
- Studying the Instrument Shelter\*
- Building a Thermometer\*
- Constructing a Model of Parts Per Billion Surface Ozone in the Air\*
- Making a Contour Map\*
- Draw Your Own Data Visualization\*
- Learning to Use Data Visualizations:
  - An Example with Elevation and Temperature\*



\* See the full e-guide version of the *Teacher's Guide* available on the GLOBE Web site and CD-ROM.



**Appendix**

Site Definition Sheet..... Appendix 2

Data Sheets..... Appendix 3

    Clouds 1-Measurement Data Sheet

    Clouds 7-Measurement Data Sheet

    Integrated 1-Day Data Sheet

    Integrated 7-Day Data Sheet

    Aerosols Data Sheet

    Water Vapor Data Sheet

    Digital Max/Min Thermometer Calibration  
        and Reset Data Sheet

    Digital Multi-Day Max/Min Data Sheet

    Surface Temperature Data Sheet

    Ozone Data Sheet

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