Teacher’s Guide

For

Clouds

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Teacher's Guide, Version 1.1.

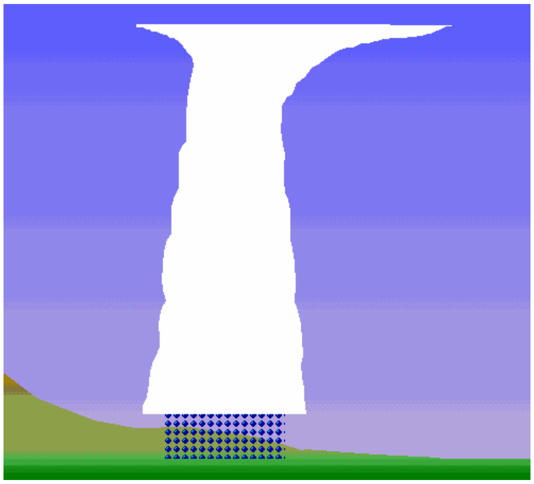
This book is intended as a guide to be used with the Riverside Scientific, Inc.™ *Clouds* program, Version 1.1.

This program has been adapted from a program developed for science museums by Augsburg College of Minneapolis, MN, and the Science Museum of Minnesota, St. Paul, MN, and supported by the National Science Foundation under grant ESI-9353480. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the Riverside Scientific and do not necessarily reflect the views of the National Science Foundation.

Contents

1. Introduction

This study guide is intended to provide a description of the *Clouds* program and to suggest some ideas of how you might use it in your classes. By changing the surface temperature, humidity, and the temperature above the surface, your students "design" the cloud they want. They can then view variables such as the temperature inside and outside the cloud, the phase of the water in the cloud, and a pictorial representation of the air flow in a growing cumulus cloud as they watch the cloud grow. (Note: *Clouds* does not attempt to simulate the dissipation process of the convective clouds.)



Clouds incorporates a mathematical model described in Section 3 of this guide. The basic screen of *Clouds* consists of two graphs and some buttons that your students can select. One of the graphs is a vertical profile of temperature in the atmosphere. Your students are able to change the temperature and the humidity at the bottom of this profile and the temperature at a level above the surface. The second graph is a "blueprint" of the cumulus cloud that would result from that profile. A second screen allows the students to watch the cloud they designed grow and to look at some of the characteristics inside the cloud. *Clouds* also incorporates an interactive explanation screen on humidity and several information panels that further describe some of the important physical processes necessary to have a convective cloud.

Clouds is an ideal learning tool for students if they have access to the program individually or in small groups (e.g. a computer lab). A logbook feature that allows your students to electronically save their experiments is available. You may review student logbooks to verify that the students have successfully completed designated tasks, or students may print pages of their logbook for assignments or to take home. Section 5 suggests some ways that you might use this program in your class.

You may also want to demonstrate some of the concepts of *Clouds* by projecting the computer screen display in front of your class. To do this, you need a projection device that will support a minimum screen resolution of 800 x 600 pixels for a PC and 1024 x 768 pixels for a Macintosh.

In addition to understanding the relationship between the surface temperature, humidity, and the air temperature above the surface, *Clouds* presents the opportunity to study several physical processes involved with the atmospheric temperature and pressure structure, phase changes of water, and the vertical motion of air in the atmosphere. These can structured as additional learning goals integrally related to *Clouds*. Depending upon the grade level of your students, one or more of the following subjects can be a topic of classroom discussion and/or a homework assignment.

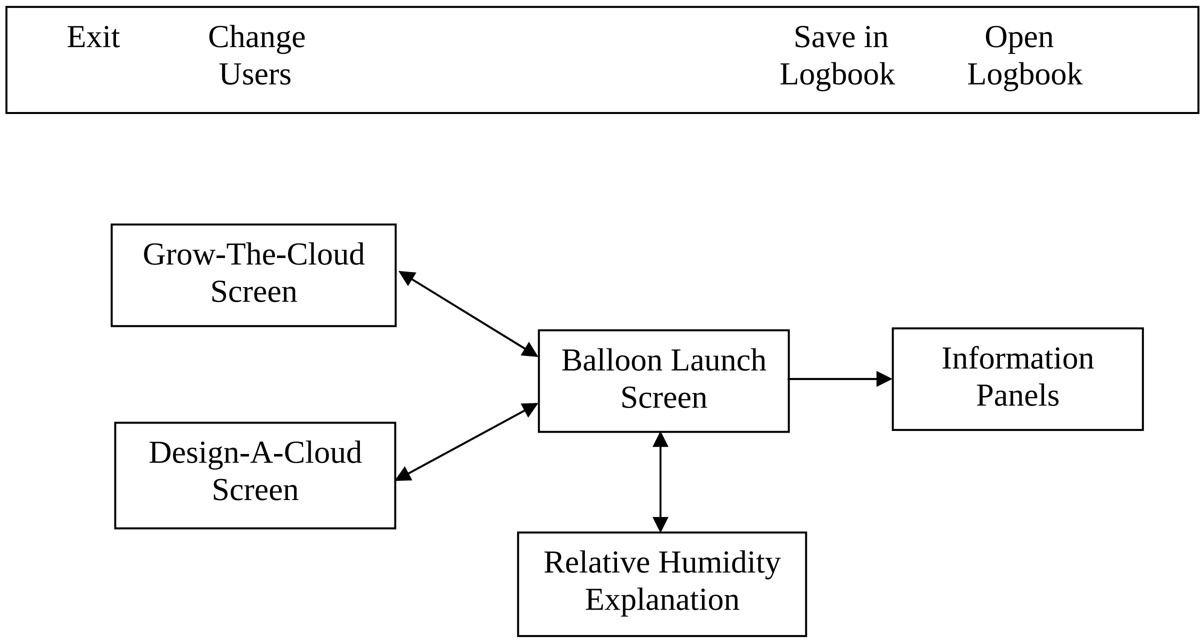
- What are clouds made of. (Earth Science)
- What are the concepts of “saturation” and relative humidity. (Earth Science, Physics)
- What is the dewpoint temperature?
- How does the pressure of the atmosphere change as one goes up in the atmosphere. (Earth Science)
- What is buoyancy? (Physics)
- How does the temperature of rising air change. (Physics)
- Why does rising air produce clouds? (Earth Science, Physics)
- What is latent heat? (Earth Science, Physics)

Section 2 presents a Tour of *Clouds*, describing the available screens. In Section 3, the science behind *Clouds* is described. Section 4 describes what you should expect to see and Section 5 presents some ideas for using *Clouds* in your classroom. Three appendices are also contained in this guide. Appendix A provides instructions for installing the *Clouds* program on your computer. Appendix B describes the Administrator program that allows you to set passwords that govern the use of the logbooks. Appendix C provides instructions on using the Configuration Utility that allows you to select such things as the speed of animations on your computers, password use, printing capability, and the logbook feature.

2. Tour of *Clouds*

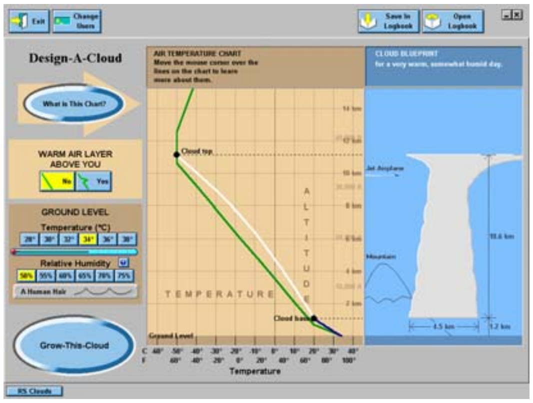
Clouds consists of a cloud design screen, a cloud growing screen, n explanation screens, a student login screen, and a logbook screen. The topology of the screens is shown in the diagram below.

Menu Bar (Available from all Screens)



If the use of passwords and/or the logbook is disabled (see Appendix C), the Change Users and/or Save to Logbook and Open Logbook buttons will not appear on the menu bar. The rest of this section describes each screen.

Design-A-Cloud Screen



The Cloud Design Screen is where your students can select the surface temperature and relative humidity and the temperature at a level above the surface. These controls are located on the left-hand side of the screen. On the lower left portion of the screen is the Grow-This-Cloud button which takes your students to a screen that will let them watch the cloud as it grows.

The left-hand panel is a graph of the temperature versus height. The dark (green) line on this graph represents the actual (environmental) air temperature from the surface of the Earth to a height of about 15 km. The white line on this graph represents the temperature that air rising from the surface of the Earth would have. As long as this temperature is warmer than the environmental temperature, the air will continue to rise.

The right-hand panel shows the resulting cumulus cloud. The base of the cloud will form at the level at which the rising air condenses, and the top of the cloud will be at the level at which the temperature of the rising air is equal to the temperature of the environment.

At the top of the screen is the menu bar that is common to all of the screens. It permits you to exit the program, change users, save your experiment in the logbook, and open the logbook to view past entries.

Grow-the-Cloud Screen

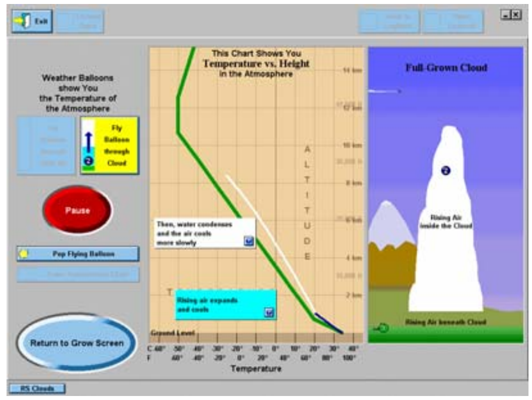
The Grow-The-Cloud Screen presents different views into the growing cumulus cloud. Your students may select to see the temperatures inside and outside the cloud, the temperature difference inside and outside the cloud, the phase of water (liquid or solid) inside the cloud, or watch a simulated circulation of the air as it flows upward producing the cumulus cloud.

The time graph along the bottom of the screen shows the time over which the growth of the cloud may happen. Individual cumulus clouds generally have life times from 10’s of minutes to a few hours.

The big oval buttons on the left side of the screen allow you to go back to the Design-A-Cloud Screen or go to the Launch-A-Balloon Screen.

Balloon Launch Screen

This screen allows your students to launch balloons that either rise through clear air or rise through a large cloud. As the balloon rises through the atmosphere, the temperature curve is plotted on the temperature vs. height graph. Small explanation boxes appear on the graph as the balloon rises, describing the temperature plot. Each of these explanation boxes contains a little question mark which, if selected, will provide information panels with additional information.

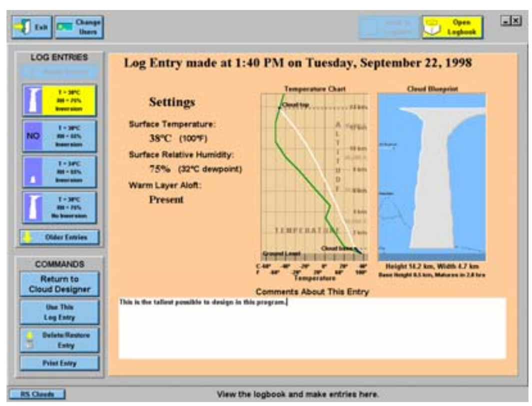


The Return button on the lower left will return you to the Grow-The-Cloud Screen.

Logbook

The logbook feature is optional, and whether it is available or not is determined by your selection in the Configuration Manager described in Appendix C. If the logbook feature is turned off, the two logbook buttons on the right-hand side of the menu bar do not appear. Since printing is activated through the logbook screen, printing results of your students' experiments is not possible if the logbook feature is not activated.

If you permit use of the logbook, your students can save each of their experiments in the logbook by clicking on the Save in Logbook button on the menu bar. The Logbook saves the values of temperature, relative humidity, and whether or not there is a warm layer above the surface. It also saves the temperature profiles of the environment and the rising air as well as a picture of the cloud. They can also write notes in the Comments entry. To view or add notes on their experiments, they can open their Logbook by clicking on the Open Logbook button.



The newest entry in the Logbook is displayed when the Logbook is opened. Previous experiments can be recalled by clicking on the appropriate log entry on the left side of the Logbook screen. Prior entries are identified temperature, relative humidity, whether or not there is an inversion above the surface, and a small picture of the cloud.

The Logbook may be printed by clicking the Print Entry button on the lower-left portion of the Logbook screen. The printed version of the logbook entry contains the information present on the logbook screen. Log entries may be deleted by clicking on the Delete Entry button.

Logbook entries are identified by student password, and only you and the student with the appropriate password may add, delete, modify, or look at logbook entries saved under that password. If the logbook feature is activated and the password feature is not, all logbook entries from all students will be written to the default user and cannot be differentiated between students.

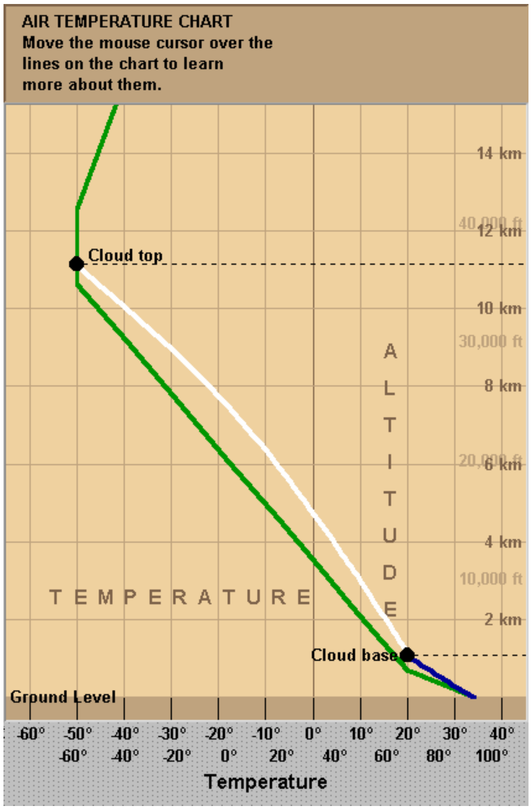
3. The Science Behind *Clouds*

The model used in *Clouds* is a simple model of the thermodynamics of rising air including the processes that occur in convective, or cumulus, clouds. Cumulus clouds are the puffy, white clouds that are often described as looking like cotton balls. Small cumulus clouds are common on sunny summer days, and, under the right conditions, they can develop into very large thunderstorms that extend up to the tropopause (about 7 miles or 11 km above sea-level on average). In real clouds, particularly large convective clouds, air enters the cloud from the sides as well as the bottom. This is called entrainment and is not considered in this model.

Even in this simple model, the complete understanding of clouds, why they form, the height they grow to, etc., requires an understanding of several physical concepts.

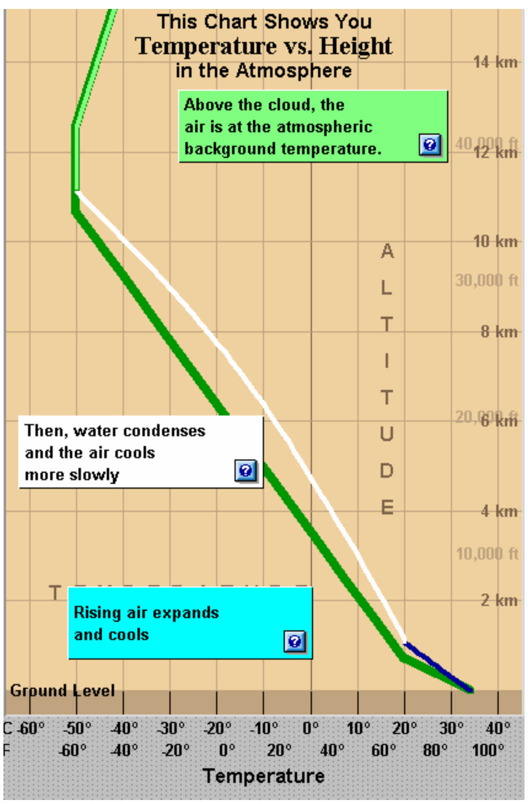
Buoyancy and Stability

When we talk about vertical motion in meteorology, we usually talk about the concept of a "parcel" of air. You may think of a parcel of air as being a small volume of air (say a cubic foot, or a cubic meter) inside an imaginary container that has no mass and whose walls are not constrained. For example, if the pressure outside the parcel were to decrease, the parcel would expand and its volume would increase. We also assume that the temperature and moisture content of the air in this parcel will not be affected by the temperature and moisture content of the air around it (i.e., there is no mixing between the air in the parcel and the air around it).



Consider a parcel of warm air. Warm air at a given pressure is less dense than cold air. Just as objects immersed in a liquid will rise if their density is less than the density of the fluid, air that is warmer than the air around it will also begin to rise. The upward net force acting on the parcel of warmer air is called the buoyant force. This parcel of air will continue to rise until it is no longer warmer than the air around it (the environment).

In the troposphere (the lowest 11 km [7 miles] of the atmosphere, on average, where all of what we call "weather" happens), the temperature normally decreases with height. Students are sometimes confused when they see a graph of the average temperature profile of the atmosphere. If the air at the bottom is warmer than the air above, why doesn't the air keep rising all of the time? In fact it would if the pressure didn't decrease with height or if the temperature decreased even more rapidly than it does on average. Pressure decreases with height because the pressure is a measure of the weight of the air above you, and as you go upward the pressure must decrease because you continually pass through more of the atmosphere. To determine whether or not our parcel of air will rise (or is buoyant), we must compare its temperature to the environmental temperature around it at the same pressure.



The atmosphere, or a layer of the atmosphere, is considered stable if the temperature profile tends to resist buoyant motion. For example, the temperature in the lowest layer of the atmosphere tends to cool at night. The temperature of the air at the ground might be 10°F or more colder than the temperature of the air at 1000 feet (300 m). If you heated a parcel of air at the ground it would start to rise, but it would quickly become colder than the environment and stop rising. When the temperature in the atmosphere increases with increasing height, as in this case, the atmosphere is very stable and there is very little vertical motion. A layer of the atmosphere where temperature increases with increasing height is called an "inversion." If the atmospheric temperature decreases rapidly with height, the atmosphere will be less stable, and likelihood of vertical motion will be enhanced.

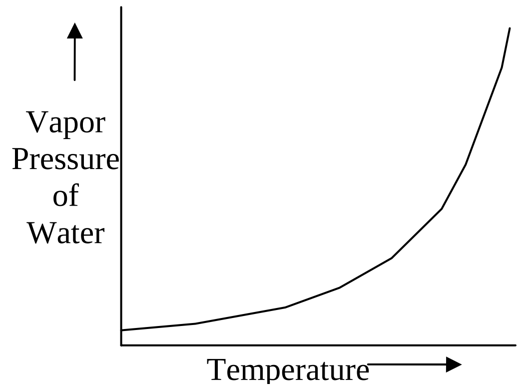
The Temperature Change in Rising Air

As a parcel of air rises in the atmosphere, its temperature will not remain constant even though there is no heat flow into or out of the parcel. As the parcel rises, the pressure on the walls of the parcel will decrease because of the decrease of pressure with height in the atmosphere.

The First Law of Thermodynamics says that if you don’t let heat flow into or out of the parcel, a change in the parcel's volume will produce a change in it's temperature. The temperature of a rising parcel of air will decrease. The rate of temperature decrease is about 5.5°F/1000 ft or 1.0°C per 100 m.

The Concept of Saturation

Another important concept in understanding the basics of cumulus clouds is the concept of saturation. If no more water vapor can be evaporated into the air, the air is said to be saturated, and its relative humidity is 100%. The relative humidity tells us how much water vapor is present relative to saturation. A relative humidity of 50% means that we would have saturation if we doubled the amount of water vapor in the air.

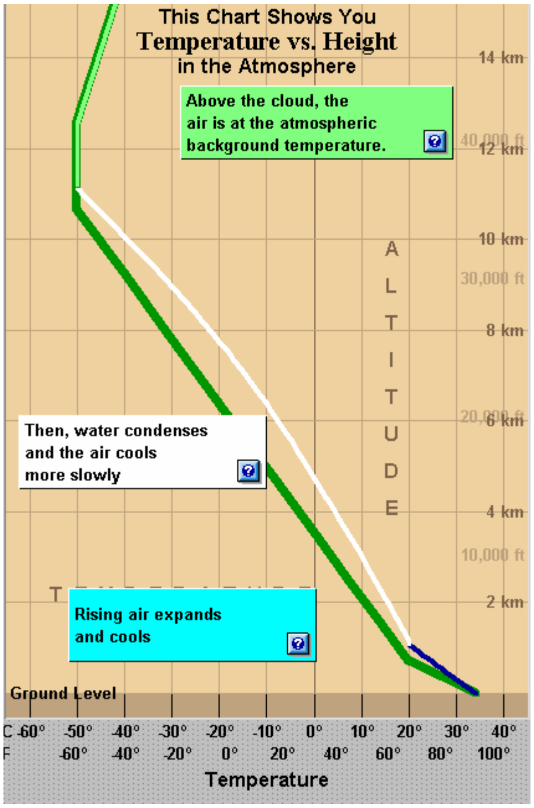


This maximum amount of water vapor that the air can hold depends upon the temperature of the air. The warmer the air, the more water vapor it can hold. Also, since saturation depends upon the temperature of the air, the relative humidity of a parcel of air will go down if its temperature rises and will go up if its temperature decreases, provided we don't change the number of water vapor molecules in our parcel of air.

(Note: Actually, the air doesn't "hold" water vapor. The concept of saturation does not depend upon the presence of air at all. However, since we are talking about water vapor in our atmosphere, it is common to talk about the atmosphere being saturated, etc.)

Combining the concepts of relative humidity, saturation, and rising air, we may conclude that as a parcel of air rises in the atmosphere and its temperature cools (due to expansion), the parcel's relative humidity will increase. If the parcel rises far enough, it will reach a relative humidity of 100%, or saturation. If the parcel rises further, it will continue to cool, the amount of water vapor required for saturation will decrease, and some of the water vapor will be forced to condense into liquid water. This liquid water forms the cloud droplets.

The base of the cloud will be at the altitude at which saturation occurs. From this discussion, it should be clear that if the rising air starts out with a high level of moisture, the bases of the cumulus clouds will be lower than if the air started out relatively dry. Clouds in the Great Plains where the air is relatively dry tend to have high bases. Clouds along the Gulf Coast where the air is relatively moist tend to have low bases.



The Concept of Latent Heat

The last concept for cumulus cloud formation is latent heat. Heat is absorbed by the water molecules to change liquid water to water vapor (evaporation). Heat is released when water vapor is changed back to liquid water (condensation). This latent (or "hidden" in Latin) heat is a part of the phase change of any molecule. Latent heat is involved only with the phase change and does not affect the temperature of the molecule undergoing the phase change.

Consider again our rising parcel of air. Assume that it is warmer than the environment, rises until it becomes saturated, and continues to rise while condensing water vapor into cloud droplets as it cools. The latent heat that is released by the condensation of water vapor will heat the parcel of air. Therefore, the parcel of air which cools as it rises will cool less rapidly once saturation is reached.

Summary

Convective clouds are the result of vertical motions in the atmosphere. Convection begins when air is heated and becomes less dense than the air around it. As an air parcel rises, it will cool. The air parcel will continue to rise as long as it is warmer than the temperature of the environment (air) around it. As the air parcel rises and cools, the relative humidity of the air will increase even though the number of water vapor molecules in the parcel remains unchanged. At some level, the air parcel will become saturated. If it continues to rise, water vapor will condense and form cloud droplets, and the air parcel will cool less rapidly with height because of the addition of latent heat from condensation. The top of the cloud will extend to the altitude at which the parcel has the same temperature as the environment. If there aren't any inversions or stable layers in the troposphere, the cloud will grow to the top of the troposphere (bottom of the stratosphere) which is always stable. Clouds that grow to the top of the troposphere are called cumulonimbus clouds.

4. Interpreting What You See

In clouds, your students can set the temperature and humidity of the surface and add a stable layer above the surface. The values they set will determine whether or not there is a cloud and how high a cloud will grow.

In *Clouds*, the temperature profile is set. In nature, convection can occur with nearly any surface temperature as long as the temperature profile above the surface is unstable (that is, the temperature decreases rapidly enough with height that a rising air parcel will be warmer than the environment). The absolute value of the temperature and humidity at the surface is not a determining factor of whether or not there will be convection unless the temperature profile is the same as that in *Clouds*.

No Clouds

In the *Clouds* program, no clouds will result if the surface temperature is 28°C. If the surface temperature is raised to 30°C, a cloud will develop if the humidity is 60% or higher. For a lower relative humidity, the air will not reach saturation before it becomes colder than the environment.

Tall Clouds

Tall clouds will result if there is not a warm layer above you and the surface temperature is 32°C or higher, or if the temperature is 30°C and the humidity is 60% or higher. If there is a warm layer above you, high clouds will still develop if the temperature and humidity are both high enough (T = 34°C and RH >= 75%; T = 36°C and RH >= 65%; T = 38°C and RH >= 55%).

Middle Sized Clouds

If there is a warm layer in the atmosphere above the ground, convective clouds may start to grow but their growth may be limited by the warm layer. A middle-sized cloud will result in *Clouds* if there is a warm layer above you and the combination of temperature and relative humidity are low enough.

Cloud Base

If a cloud develops, the cloud base is determined by the relative humidity at the surface. High relative humidity will result in low cloud bases.

Cloud Top

The cloud top is determined by both the temperature and relative humidity at the surface as well as the temperature profile above the surface. In the absence of a warm layer above the surface, high surface relative humidity and high surface temperature will result in high cloud tops.

5. Ideas For Using *Clouds*

Clouds was originally developed for relatively short interactions in science museum settings and has been successful in that environment. The advantage of bringing the program into the classroom is that you can integrate the program into your normal lessons to broaden and reinforce your students understanding.

Clouds can be used in lessons on physics (moisture variables, saturation, pressure, buoyancy, latent heat, thermodynamics), as well as traditional earth science. How you use *Clouds* depends upon the availability of computers and on the grade and ability level of your class.

Clouds may be used in projection mode (requires a projector with 1024 x 768 resolution) if you want to use the graphics for illustrative purposes in front of a class. However, *Clouds* works best if the students themselves are able to play and experiment with the program. Students tend to learn the mechanics of the *Clouds* interface very quickly. If you have access to a computer lab, you have an ideal situation. If you have your students work alone on a computer, it is best to develop a worksheet to guide the students. You may have students who can work effectively in groups of two or three. In this case, a worksheet is still useful, but good groups will generate a "what if" working method and can help one another in learning.

Teachers with access to only one computer have also used *Clouds* successfully by involving the students. If you have a junior high school science lab class with experiment stations that the students rotate through during the term, *Clouds* can be one of the experiments.

How you use *Clouds* is ultimately up to you, your imagination, and your resources. We would enjoy hearing about your experiences, your ideas that seem to work, as well as any frustrations you may encounter. Your ideas and experiences may be incorporated into future Teacher's Manuals and/or future versions of the *Clouds* program.

Clouds is applicable for students in the sixth grade through college. The level, type and duration of the exercises will vary depending upon the grade level and the ability of the students you teach. You know your students best and should design a worksheet suited to your students. The rest of this section provides some questions and exercises that you may incorporate into your worksheets.

Suggested Tasks for Your Students:

Whether or not we have convective clouds and what their size will be is determined by the temperature and atmospheric moisture content at the surface of the Earth as well as the temperature of the air above the surface. The following tasks and questions should help guide your students to these conclusions.

Note: Keep in mind that these specific numbers of surface temperature and surface relative humidity apply only to the vertical temperature profile in *Clouds*. In nature, these values will depend upon the temperature profile above the surface.

Make a cloud in which the cloud base is as low as possible.

Answers included in the manual distributed on your CD .

Make a cloud in which the cloud top is as high as possible.

Answers included in the manual distributed on your CD .

Find the conditions in which there will be no cloud.

Answers included in the manual distributed on your CD .

Make a cloud that is as short as possible.

Answers included in the manual distributed on your CD .

What do you have to do to have a short cloud?

Answers included in the manual distributed on your CD .

Make a cloud that is as thick as possible (largest distance from base to top).

Answers included in the manual distributed on your CD .

Why is it warmer inside a convective cloud than outside the cloud?

Answers included in the manual distributed on your CD .

How long does it take a short cloud to reach full size relative to a tall one?

Answers included in the manual distributed on your CD .

What is the direction of the air inside a cloud while it is growing?

Answers included in the manual distributed on your CD .

What direction is air moving outside the cloud?

Answers included in the manual distributed on your CD .

<u>Other Points of Discussion:</u>

Explain the concepts of saturation, relative humidity and dewpoint temperature.

What is buoyancy?

What is latent heat?

What is the effect of latent heat release? How would the heights of the clouds be different if latent heat were not released?

What can you infer about the atmospheric temperature structure near the top of small cumulus clouds?

Project

In the United States, approximately 70 weather stations launch balloons twice a day with instruments that measure the atmospheric temperature, moisture, and winds above the surface. These data are available on the World Wide Web in near real-time, and can be used in your classroom. Visit our web site at www.riversci.com to for some useful weather links.

You can have students in your class plot a real atmospheric temperature profile on a temperature vs. height graph like the one displayed in *Clouds*. Compare the graphs for days where there are no clouds and days when there are cumulus clouds.

Appendix A: Installation Instructions

Windows Installation

Before You Begin…

Before beginning the installation process, you should:

- Uninstall any previous versions of the Riverside Scientific *Clouds* program (like trial versions). Instructions for uninstalling applications are found below.
- Learn the drive letter of your CD-ROM drive, or know how to find out what the letter is.
- Be sure to have the installation Key Code available. It is found on the cover of the CD case.

To install and start Clouds, perform the following steps:

- Insert the installation CD in your PC.
- If the AutoPlay feature is enabled on your computer, installation will begin automatically. If the AutoPlay feature is disables, click on the “My Computer” desktop icon and find the CD drive. Right click this and select “Explore.” Double-click the “setup.exe” file on the CD.
- Follow the instructions presented by the installation program. You will need the Key Code from the CD case insert.
- To start the program, go to the Windows Start button, then Programs, Riverside Scientific, and RSI Clouds. In the RSI Clouds folder, click on Run RSI Clouds.

To uninstall Clouds, perform the following steps:

- Click on the Taskbar Start button, select Settings, and then select Control Panel.
- Double-click on the Add/Remove Programs icon.
- Scroll through the list of programs that can be uninstalled. When you find RSI Clouds, click on the Change/Remove button. When another window appears, click on the Remove option, and the program will be uninstalled.

Macintosh Installation

Before You Begin…

Before beginning the installation process, you should:

- Determine that your hard disk has adequate free space. You will need about two Mbytes per program.
- Uninstall any previous versions of the Riverside Scientific applications you are about to install. Instructions for uninstalling applications are found below.
- Be sure to have the Key Code, found on the back or the inside cover of the CD case, at hand.

To Install and Start the Program

Perform the following steps:

1. Insert the installation CD. A window will open for the CD.
2. Double-Click on the installer icon.
3. Follow the instructions presented by the installation program.
4. The installation program will add a folder named Riverside Scientific to the folder you specify during installation. Each program you install will be contained in a folder within the Riverside Scientific folder. To start the program, double-click the *Clouds* icon. To start the Clouds Configuration Manager, double-click the *Configure Clouds* icon.
5. If the Login window appears, enter the password GUEST. This permits you to use the program, and make and print temporary logbook entries.

To Uninstall the Program

To uninstall the programs drag the program's folder (or the Riverside Scientific folder) to the Trash. If you are uninstalling all Riverside Scientific programs, drag the Riverside Scientific folder to the Trash.

Appendix B: The Administrator Program

The Administrator program allows you to set passwords for the use of your Riverside Scientific (RS) programs. The use of passwords:

- Allows students to save and access logbook entries that are saved under their own names.
- Enables you to examine each students logbook entries with relative ease.
- Prevents a student from modifying or deleting another student's logbook entries.
- Prevents tempering with the files that control operation of the programs.
- Provides a way to easily delete the logbook entries of selected students.

Administrator maintains a database file that stores three types of information about each student:

1. Their name, or whatever type of text identifier you choose.
2. An identifier of your choosing, such as a student ID number. This can also be used to make a brief notation about the student.
3. The student's password.

You can add students to the Administrator database, modify the information about each student (including their password), view the student information, and delete students from the database. Each operation can be performed either through the menu bar or the dialog box buttons. Instructions for using these are provided below.

You Don't Need to Use Administrator if…

It is recommended that you install Administrator, even if you don't intend to make use of its features. However, if you are not concerned with the security of logbook entries or you are not going to make use of logbook entries at all, you don't need to use Administrator.

You may find that even if you are using your application for demonstrations only, passwords may serve some purpose. For example, you may wish to have a number of pre-made cases to use as a part of a demonstration so that you can replay each case without have to reset an number of variables manually; these can be stored as logbook entries and replayed from the logbook screen. If you have several sets of cases, you may find it easier to keep track of them if you assign each suite of cases its own password.

Starting Administrator for the First Time

Windows

To start the Administrator, double click on admin.exe located in the C:\Program Files\Riverside Scientific folder. The Administrator is common to all of the Riverside Scientific applications. The first time you use Administrator, you must enter the password "ADMNSTR8". Once you have started Administrator, you may choose to change the administrator's password, or continue using the same password.

If you change the password and then forget it, you will have to delete the admin.bin file located in the C:\Program Files\Riverside Scientific\Administrator folder. The admin.bin file will be recreated when you restart the program, but you will have lost all entries that the old file contained.

Macintosh

To start the Administrator, double click on the Administrator icon located in the Administrator folder (which is in the Riverside Scientific folder). The Administrator is common to all of the Riverside Scientific applications. The first time you use Administrator, you must enter the password "ADMNSTR8". Once you have started Administrator, you may choose to change the administrator's password, or continue using the same password.

If you change the password and then forget it, you will have to delete the admin.bin file located in the Riverside Scientific folder. The admin.bin file will be recreated when you restart the program, but you will have lost all entries that the old file contained.

Program Notes

- You can inspect a student's logbook entries by logging into the RS application using the student's password.
- The student passwords you create with Administrator apply to all the RS programs you have installed. This has been done to eliminate redundant (and perhaps contradictory) student passwords.
- Deleting a student from the Administrator database will cause all of that student's logbook entries to be deleted the next time each RS application is started.
- Changing a student's password does not prevent them from accessing logbook entries that they have made in the past.
- The special password GUEST is reserved. Students who log in using GUEST are allowed to create, replay, and print temporary logbook entries. However, all logbook entries created by a GUEST user are deleted when the program is ended.
- You may have a maximum of 1000 student passwords stored.

Usage Example

In this example, suppose you would like to add a password for student Ann, change the password of student Ben, and delete the password of student Claire.

Begin by clicking on the Add button. A dialog box will appear; fill in the fields with Ann's name, her student ID (optional) and her password. Click the OK button. You should see the information you entered appear as a line in the Student list Box.

Next, find the line in the list box that corresponds to student Ben. Click on it to select it, and then click on the Modify button. A dialog box will appear with Ben's previously-entered information showing. Highlight Ben's password, and then type in his new password. Click OK to close the dialog. You should see Ben's new password appear in the list box.

Finally, find the line in the list box that corresponds to student Claire. Click on it to select it, and then click on the Delete button. Her entry should disappear from the list box.

Finish by selecting the File item from the menu bar and clicking on the Save submenu item. Click on the File menu item once more, and then on Exit. The changes are now saved. Ann is now able to save logbook entries under her own name, and Ben must now use his new password to access old logbook entries or make new ones. Claire is no longer able to make entries except as a GUEST User, and her entries are deleted upon logging out of the program.

Using Menu Bar Commands

<u>File Menu</u>

Save Changes
Use this to save any changes you have made. Changes made using this command cannot be undone.

Exit
Use this to exit the Administrator. If you have made changes but not yet saved them, you will be prompted to save or discard these changes.

<u>Administrator</u>

Change Password
You can change the password you use to start Adminstrator using this command. You will be prompted for a new password.

<u>Student</u>

The following Student commands all operate on the student that you have highlighted in the list box. To highlight a student, click on the student's name.

View Selected Student
This command displays the information you have entered about the student. If you wish to edit this information, use the Modify Selected Student command.

Add Student
Use this command to enter information about a new student. The three fields you are able to fill are:

Name: This is the student's name, in any format you choose. The maximum number of characters you may enter is 60.

ID: This optional entry permits you to enter the student's ID ,other identifier, or text of your choosing. The maximum ID length is 30 characters.

Password: The password can be one to 15 characters long, and can use only the characters A-Z and 0-9; spaces and underbars (_) are not permitted. The password is case-insensitive and will be displayed as capital letters. You may not use GUEST as a password.

Modify Selected Student
You can change a student's password and other entered information using this command.

Delete Selected Student
Use this command to delete the information about a particular student. The deletion does not take place until you save the changes you have made. Logbook entries that belong to the student you have deleted will be erased the next time anyone runs the RS program that generated the logbook.

Help Menu

Help
What you are now reading.

Using Dialog Box Elements

View Button

This performs the same function as the **Students / View Selected Student** menu item.

Add Button

This performs the same function as the **Students / Add Student** menu item.

Modify Button

This performs the same function as the **Students / Modify Selected Student** menu item.

Delete Button

This performs the same function as the **Students / Delete Selected Student** menu item.

The Student List Box

Students are selected from entries in the student list box. You may select only one student at a time. To sort the students by either name, ID, or password, click on the appropriate column heading.

Appendix C: Configuration Manager

The *Clouds* Configuration Manager program allows you to control some of the behaviors of the *Clouds* program. Using this program, you can:

- Turn on and off password use, printing capability, and the maintaining of the logbook.
- Control animation speeds, so that *Clouds* will run properly on your PC. If you find that some animations are running too slow or too fast, you may be able to adjust their speed using this program.

You must know the Administrator password in order to use the Configuration Manager. The default password is provided in the Administrator section.

Using Menu Bar Commands

File Menu

Save Changes
Use this to save any changes you have made in the configuration of *Clouds*. Changes made using this cannot be undone.

Exit
Use this to exit the Configuration Manager. If you have made changes in the configuration, you will be prompted to save or discard these changes.

Configuration Menu

Restore Defaults
You can restore the installation configuration by selecting this.

Help Menu

Help
What you are now reading.

Using Dialog Box Elements

Optional Features

Login
When this is checked, program users are prompted for a password when starting the program. Logbook entries are cataloged by user, and each user can see only their own entries.

When this is not checked, there is no prompting for passwords, and all log entries are saved as belonging to the GUEST User. If you intend to use the program for demonstration purposes only, uncheck this option to simplify program use.

Printer
When this is checked, users can print logbook entries using the default Windows printer.

Logbook
When this is checked, users can make logbook entries.

Animation

Animation settings allow you to control the speed of animations.

Automatic Delay Mode
This option has been disabled.

Balloon Rise Delay
This controls the animation speed of the rising balloons. The entered value is the delay in milliseconds between animation frames. Small values cause faster animation; in general, you should not exceed an entry of 50.

Grow Cloud Delay
This controls the animation speed of growing cloud. The entered value is the delay in milliseconds between animation frames. Small values cause faster animation; in general, you should not exceed an entry of 50.

Cloud Drift Speed
This setting is currently disabled.

Balloon Rise Speed
This controls the size of steps that the rising balloons take. In other words, a balloon's motion will become "jerkier" if this setting is increased. A setting of 1 causes the smoothest motion; larger settings cause the balloon to jump more than one pixel at a time. **Do not set this to zero**; doing so will cause the balloon to stay on the ground!

Advanced Settings

These settings are only available for the PC version of Clouds.

DirectX Hardware Emulation
Warning! Changing this setting may cause the program to fail. DirectX allows different degrees of hardware emulation. For maximum compatibility, full emulation mode has been used as the default setting. Change this setting only after contacting Riverside Scientific support.

Video Resolution
This controls the screen resolution used by the program, and is provided mainly for use with laptops and video projection systems that may operate only at SVGA resolution (800x600 pixels). If you find that the program does not work correctly when autodetect mode is selected, you should choose either XGA or SVGA mode.