



Product User Guide

Table of Contents

Overview	1
Intended Audience	1
System Requirements	1
Legal	2
Accessing the Software	3
Navigating the Home Page	4
Entering the Date	5
Entering the Time	6
Entering the Location	7
Showing & Hiding Labels	9
Interpreting the Results	11
Identifying Magnitude	11
Saving & Printing Results	12
Troubleshooting	13



Overview

SkyMap was created to allow users to enter a specific date, time, and location and see a resulting map of the sky. The software can identify Earth's moon and its phase (if visible), visible stars up to the 6th magnitude, planets, constellations, and other Messier deep space objects. The user can toggle the labels on the SkyMap and save or print the image.



Intended Audience

SkyMap was created for amateur astronomers, students, and anyone who has an interest in astronomy.



System Requirements

SkyMap is compatible with the following operating systems:

- Java SE 8 or later
- Windows 7 or later
- macOS 10.12 Sierra or later

***NOTE:** The latest operating system is recommended for optimal results.



Legal

Background Credits

Background Images courtesy of NASA, ESA, the Hubble Heritage Team (STScI/AURA), A. Nota (ESA/STScI), and the Westerlund 2 Science Team

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Accessing the Software

SkyMap is an executable application that can be downloaded and run locally on a machine with the minimum specifications listed in [System Requirements](#). You can access SkyMap at the following address: https://github.com/denvercoder2/Senior_Project.git.



Navigating the Home Page

- SkyMap is set up to make it easy to find a map of the sky for a given date, time, and location.
- The left side of the home page contains fields for **Date**, **Time**, and Location (**Latitude** and **Longitude**).
- The right side of the home page contains fields that allow you to toggle the labels produced for visible stars, constellations, planets, and Messier deep space objects.
- You can re-enter a new location or change your labeling settings and use the **Refresh SkyMap** button to refresh the map.
- If you wish to save the image (or print the image), click the **Save Image** button at the lower right of the screen.

***NOTE:** All fields must be completed. Failure to complete all fields will result in an error message. See [Troubleshooting](#).

The screenshot shows the SkyMap web application interface. On the left, there are input fields for 'Enter Date:' (Month: 11, Day: 23, Year: 2019) and 'Enter Location:' (Latitude: 25, Longitude: 75). Below these are dropdown menus for 'North' and 'West'. A 'Time (Military Format):' section has 'Hrs' (12) and 'Mins' (30) fields. An 'Apply' button is at the bottom left. The central area is a large 'Sky Map' showing a starry sky with constellation lines and labels. On the right, a 'Labels:' section has checkboxes for 'Star Names', 'Constellations', 'Planets', and 'Messier Objects'. Below this is a 'Refresh SkyMap' button. At the bottom right is a 'Save Image' button.



Entering the Date

SkyMap allows you to enter any date from 1 January 1900 through 31 December 2100. Entering an invalid date will produce an error message. See [Troubleshooting](#).

To enter the date:

Under the **Enter Date** field, you will see entry fields for **Month**, **Day**, and **Year**.

Enter Date:
Month
Day
Year

In the **Month** field, manually enter the number corresponding to the month you would like to enter (ex. For July, enter '7'.)

Month

In the **Day** field, manually enter the day of the month (1-31).

Day

In the **Year** field, manually enter the year in YYYY format (ex. 1969).

Year



Entering the Time

SkyMap allows you to enter the time of day in hours and minutes in order to produce a map of the sky for that time.

To enter the time:

Under the **Enter Date** field, you will see a field for **Time**.

Time (Military Format):

<input type="text"/>	:	<input type="text"/>
Hrs		Mins

In the **Time** field, enter the hour of the day in the left-hand box (00-24). Enter the minute in the right-hand box (00-59).

Time (Military Format):

<input type="text" value="20"/>	:	<input type="text" value="17"/>
Hrs		Mins

*NOTE: The time must be entered in 24-hour military format.



Entering the Location

SkyMap allows you to enter Earth's latitude and longitude in degrees to see a map of the sky at your given location.

Enter Location:

Latitude

North

Longitude

West

Apply

To enter the Latitude:

Under the **Enter Location** field, you will see a field for **Latitude**.

In the box next to **Latitude** enter the degrees latitude.

Latitude

In the drop-down field below **Latitude**, select either **North** or **South**.

Enter Location:

Latitude

North

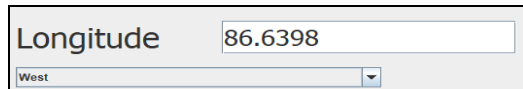
South

Apply

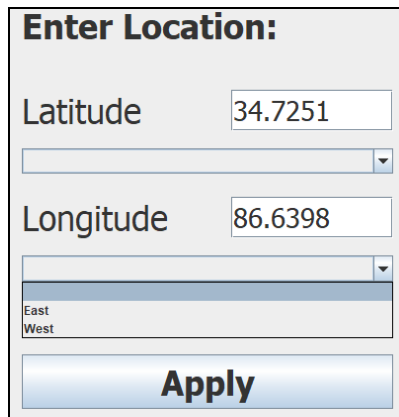
To enter the Longitude:

Under the **Enter Location** field, you will see a field for **Longitude**.

In the box next to **Longitude**, enter the degrees longitude.

A screenshot of a web form section. It features a label "Longitude" followed by a text input field containing the value "86.6398". Below the input field is a dropdown menu with "West" selected.

In the drop-down field below **Longitude**, select either **East** or **West**.

A screenshot of a web form titled "Enter Location:". It contains two rows of input fields. The first row has a label "Latitude" and a text input field with "34.7251". Below it is a dropdown menu. The second row has a label "Longitude" and a text input field with "86.6398". Below it is another dropdown menu. A third dropdown menu is visible below the second one, showing "East" and "West" as options. At the bottom of the form is a blue button labeled "Apply".

When you have entered the latitude and longitude, click **Apply**.



Showing & Hiding Labels

SkyMap allows you to toggle the labels that appear for visible stars, constellations, planets, and Messier deep space objects.

Labels:

- ☐ Star Names
- ☐ Constellations
- ☐ Planets
- ☐ Messier Objects

Refresh SkyMap

To toggle the labels for Star Names:

1. Under the **Labels** field, click the button to the left of **Star Names**.
2. Clicking this button will show the names of visible stars up to the 6th magnitude.
3. To hide the labels for **Star Names**, click the button again. Then click the **Refresh SkyMap** button.

☒ **Star Names**

To toggle the labels for constellations:

1. Under the **Labels** field, click the button to the left of **Constellations**.
2. Clicking this button will show the names of visible constellations.
3. To hide the labels for **Constellations**, click the button again. Then click the **Refresh SkyMap** button.

☒ **Constellations**

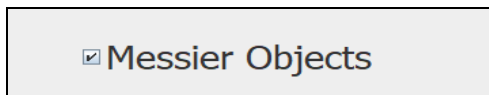
To toggle the labels for planets:

1. Under the **Labels** field, click the button to the left of **Planets**.
2. Clicking this button will show the names of visible planets.
3. To hide the labels for **Planets**, click the button again. Then click the **Refresh SkyMap** button.



To toggle the labels for Messier deep space objects:

1. Under the "Labels" field, click the button to the left of **Messier Objects**.
2. Clicking this button will show the names of visible Messier deep space objects.
3. To hide the labels for **Messier Objects**, click the button again. Then click the **Refresh SkyMap** button.





Interpreting the Results

Once you have created a SkyMap based on a specified date, time, and location, you can view a scrollable map in the center of the home page.

The screenshot shows a web interface titled "Sky Map". On the left, there are input fields for "Enter Date:" (Month: 11, Day: 23, Year: 2019) and "Time (Military Format):" (Hrs: 12, Mins: 30). Below these are "Enter Location:" fields for Latitude (25) and Longitude (75), with dropdown menus for North/South and East/West. An "Apply" button is at the bottom left. The central area is a large black rectangle representing the sky map, filled with white stars of varying sizes and connected by thin white lines representing constellations. On the right, a "Labels:" panel has checkboxes for "Star Names", "Constellations", "Planets", and "Messier Objects", all of which are checked. Below the checkboxes are "Refresh SkyMap" and "Save Image" buttons. The map itself shows various constellations and stars, with some labeled with names like "Ursa Major", "Orion", and "Betelgeuse".

To scroll the SkyMap, click the up or down buttons on the scroll bars to the right and bottom of the map pane.

If you have chosen to show labels for individual objects (stars, constellations, planets, and Messier deep space objects), you will easily be able to identify the different bodies in the map pane.

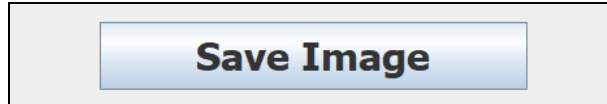
Identifying Magnitude

Only objects (other than Messier objects) that are visible to the naked eye will appear in the SkyMap. Each object's magnitude (or brightness) is represented by the size of its corresponding pinpoint. Therefore, brighter objects are indicated by a larger pinpoint, while dimmer objects have a smaller pinpoint.



Saving & Printing Results

To save a SkyMap image, click the **Save Image** button.



Follow the prompts to name and save the image to a file on your computer. To print the image, find your saved image and select File>Print.



Troubleshooting

Q. SkyMap will not load. What's wrong?

A. You do not have the correct version of Java or it is not in your path to run. See [System Requirements](#).

A. The file is corrupted. Delete and re-download the application.

Q. Why am I receiving an error message?

A. You have entered an invalid date in one of the **Enter Date** fields. Valid dates are dates from 1 January 1900 through 31 December 2100. Entering a date prior to 1 January 1900 or after 31 December 2100 will prompt the error message **"Please Enter Valid Inputs!"** Invalid fields will be outlined in red as shown below.

A. You have not completed all necessary fields. All fields for **Date**, **Time**, **Latitude**, and **Longitude** must be completed for the SkyMap to render. Omitting data from any of these fields will prompt the error message **"Please Enter Valid Inputs!"** Empty fields will be outlined in red as shown below.

Month	<input type="text"/>
Day	<input type="text"/>
Year	<input type="text"/>

