



The Photographer's Assistant

User manual

V1.2.7

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THE PHOTOGRAPHER'S ASSISTANT (TPA)

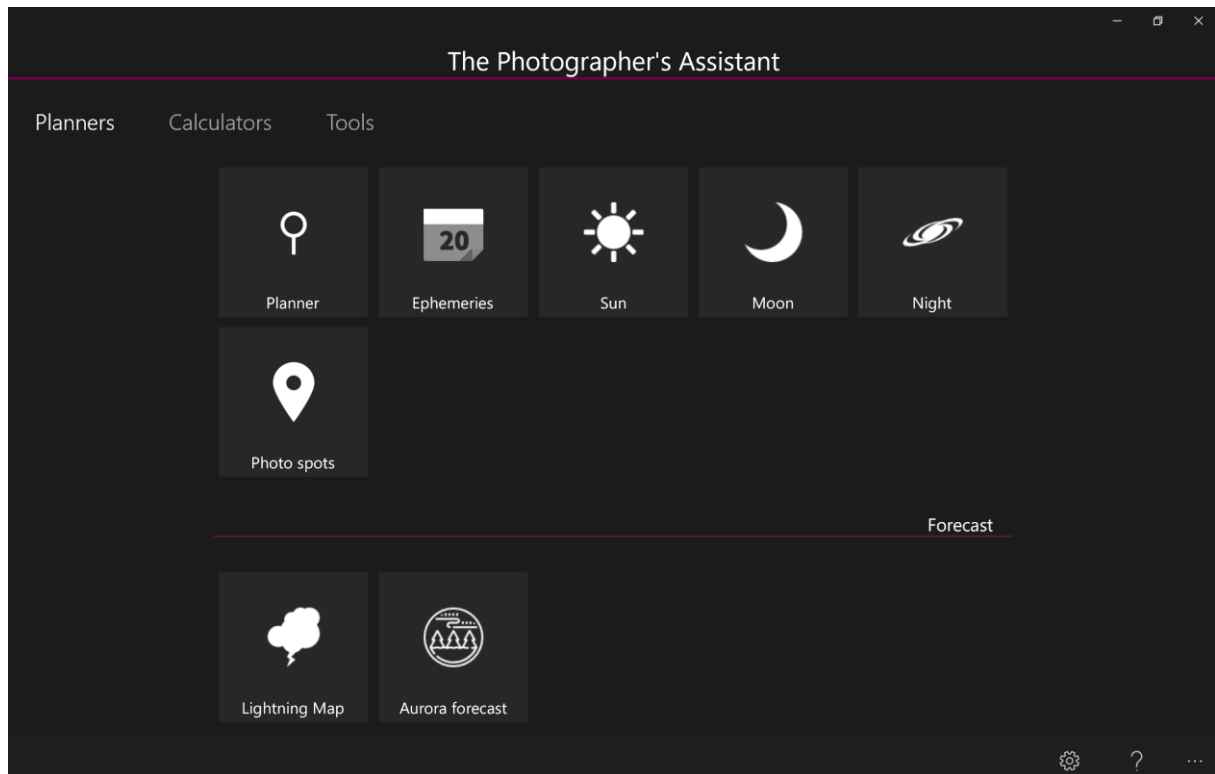


What is The Photographer's Assistant?

The Photographer's Assistant is an application with all the assistants you need for your photographs. Planning, sun, moon and night assistants, exposure calculators, ND filter, moon, startrails, stars as points, depth of field and many more tools.

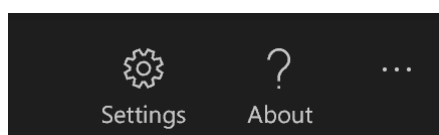
In this version we have 8 planners and 13 calculators.

INTERFACE



The application is divided into three groups:

1. Planning assistants (**planners**)
2. Calculation assistants (or **calculators**)
3. Other **tools** (these tools are derived from the version for Windows Phone and Windows Mobile)



In addition, we have the **configuration** and information about the application.

At the bottom right, the Configuration and Information options (Question symbol).

One of the first steps we would have to do once we have downloaded and installed the application, is to configure it to work as we want it to (see configuration).

The information about the application helps us to know the version we are using and to have access to the related pages about the application (web, Facebook, ...).

The configuration option allows us to configure different aspects of the application. To learn more, go to the **Settings** section.

PLANNER

It is the most complete assistant and the heart of the application. It will help us to plan from home the sun, the moon and the galactic center before going out to take our photos with 2D and 3D viewer.

EPHEMERIES

It is the viewer of all the events related to the sun, the moon and the night (eclipses, supermoons, meteor showers...) Use it to know when each one will happen and then plan how to turn it into a memorable photo.

SUN

It displays all the important information about the sun on one screen. Sunrise and sunset, the most photographic hours, eclipses of the sun, ...

MOON

Use it to know everything about the moon: the phase of the moon and when the next ones occur, rise and setting times, when it will change color, its position in the sky, dates of supermoons, eclipses, ...

NIGHT

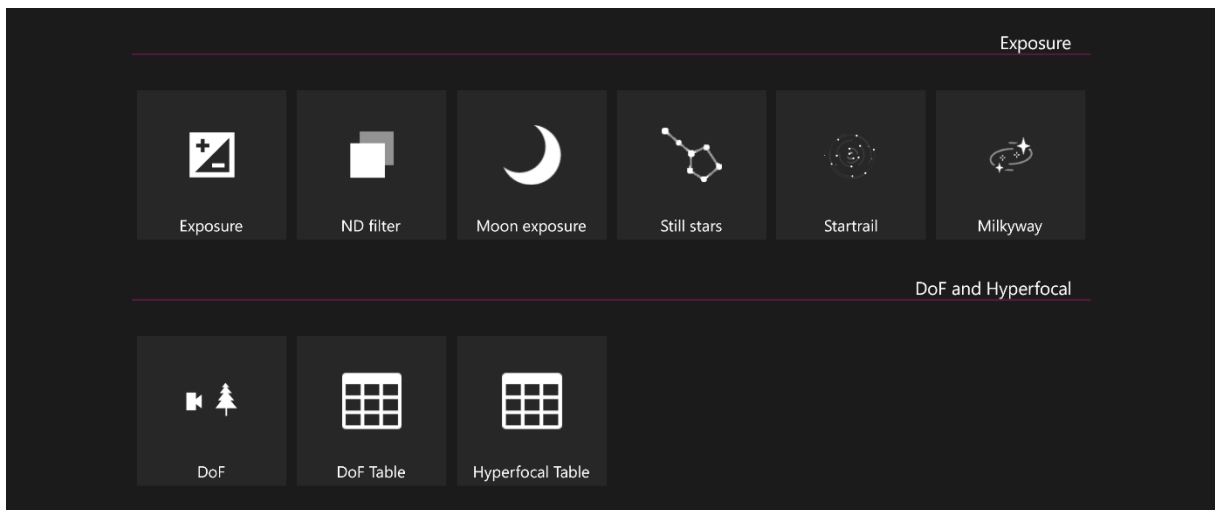
The Milky Way's assistant and the meteor showers. When will they be seen in the sky, their trajectories, their clarity, which are the best nights to capture them.

LOCATIONS

The list of locations you have saved from the planner will be displayed here. You will also be able to see them located on the map, filter by type, rating or name, and use them later to plan your photographs.

You can import .kml and .kmz files.

CALCULATORS



EXPOSURE

EXPOSURE

This assistant will help us calculate equivalent exposures for both short and long exposures.

FILTERS ND

This is your tool if you use a neutral density filter (DN or ND) and want to know what the equivalent exposure will be with a filter or two used at the same time.

MOON EXPOSURE

Use this tool to know what exposure time we need to have detail in the photographs depending on the camera values, moon phase and its position in the sky.

STARS AS POINTS

Based on the famous rule of 500, the calculator will tell us what maximum exposure time it allows for the stars to come out as points.

STARTRAILS

If we want the stars to draw traces on our photographs, this assistant will help us calculate the duration of the photos, the angle drawn in the sky, the amount of photos needed if we are going to stack, etc.

MILKYWAY

We want the Milky Way and/or the Galactic Center to capture out bright and defined in our photos; this tool will indicate the maximum exposure time to achieve this.

DOF AND HYPERFOCAL

DOF

It calculates the focal length and aperture so that the subject is defined. The hyperfocal so that both the subject and background are in focus.

DOF TABLE

View depth-of-field values for your camera for each distance and aperture.

HYPERFOCAL TABLE

All hyperfocals for your camera according to aperture and focal length.

OTHER CALCULATORS

FLASH CALCULATOR

Calculate GN, aperture, distance and ISO equivalents for your flash.

PRINT SIZE

This assistant will show us the paper output measurements for your photos according to resolution and print quality (dpi) and vice versa.

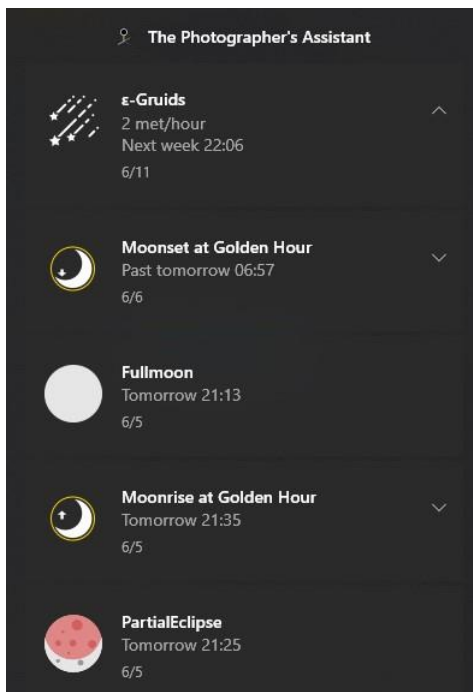
FOCAL EQUIVALENCE

It calculates the aperture and focal values for a second camera so that they have the same field of view and DoF.

TIMELAPSE

Use this tool to calculate all the necessary values of your timelapses so you don't have to try with values of clip duration, interval and space required on your memory cards.

NOTIFICATIONS

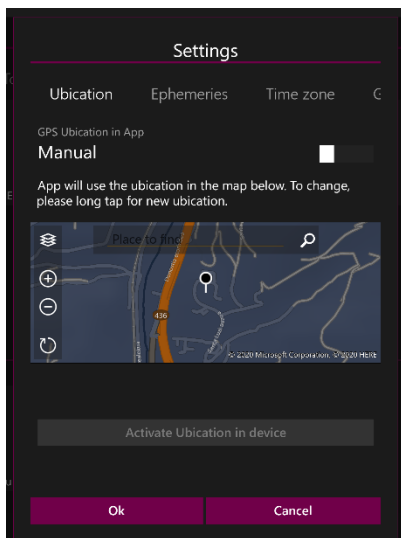


During the year a number of astronomical events of photographic interest occur such as eclipses, super moons, meteor showers, ... The Photographer's Assistant displays the notifications in advance appearing in the notification area of Windows 10.

Depending on the interest of the event, you will be notified one week in advance, two days in advance, the day before or only on the same day (events of minimum interest).

If we click on the event, the related assistant will open, as well as the date and time of the event.

CONFIGURATION



It allows us to configure different parameters and functionalities of the application: default values for the maps, the use of GPS, the time zone of our location and what to show in the event assistant.

It should be the first step once in the application; configure the use of GPS and the time zone. For more information, see [configuration](#).

PLANNER

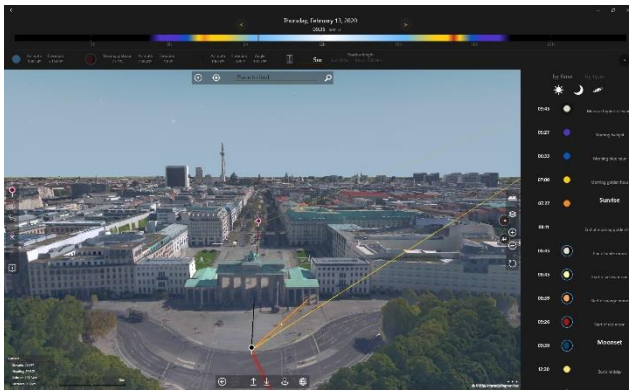
The Planner Assistant is the most complete, complex and interesting part of the whole application.

Its function is valid as a planner and previewer of events of the sun, moon, Galactic Center (GC from now on), eclipses, ... It works for any place on earth as for any date.

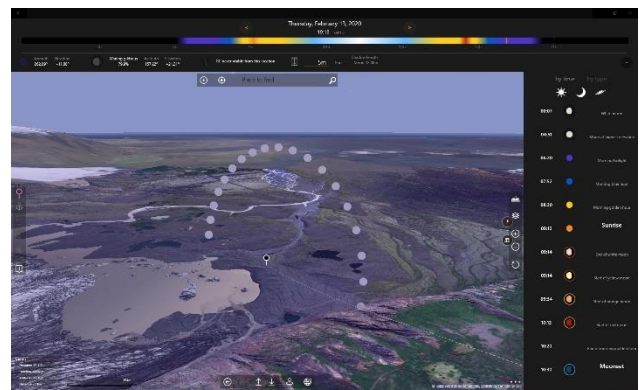
WHAT YOU CAN DO IN THE PLANNER

The planner is a tool with many possibilities, which will help us to visualize the photo before going to the location. From the comfort of home and using our computer, we can plan so that the photographic trips, photoshoots, ... are always fruitful and we do not have failed due to lack of planning or because we lack data from the environment or events.

By working with the large screen that any computer has, the previews and planning will be more practical, fast and accurate than doing them on a small mobile screen. In addition, the planner gives us the 3D view (see views for more details). This feature does not exist at the time of writing this manual in any other application of this type.



Berlin, from the Brandenburg Gate in 3D



Iceland landscape. The Galactic Centre arc drawn over the glacier.

We will be able to see the world with road maps, terrain, satellites photos and also as if we were in Google Earth, with mountains, rivers, coasts and cities in 3D.

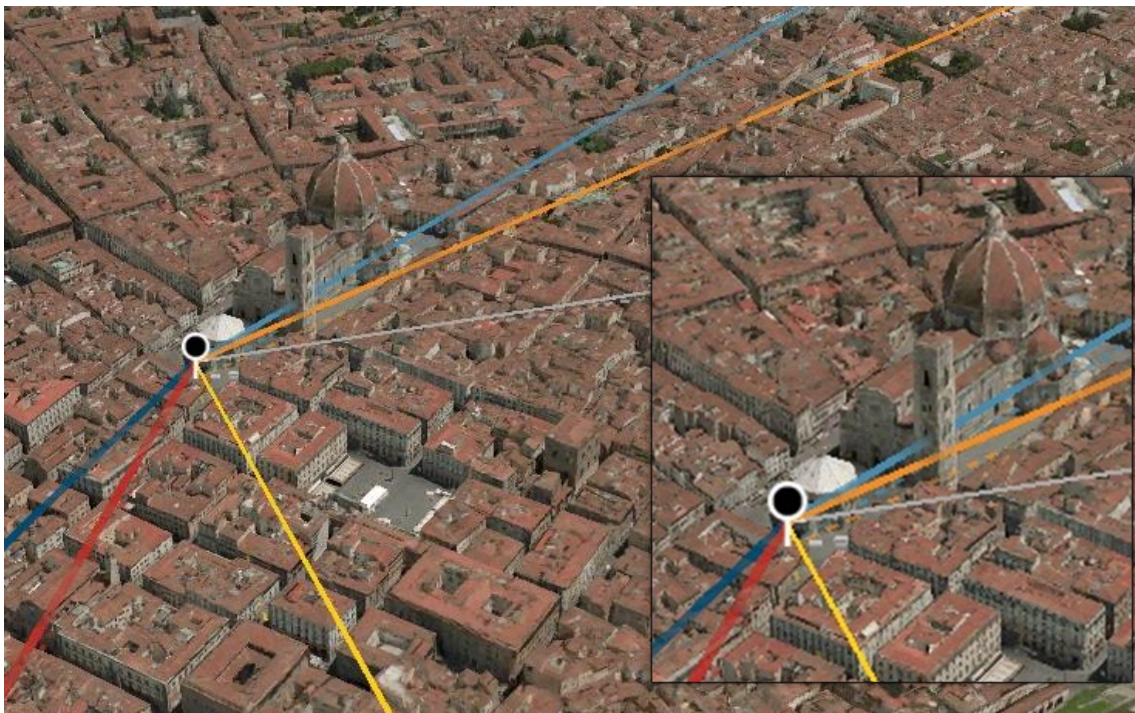
We will have the sunrise and sunset times, the best hours of special light (golden hour, blue hour, twilight), when the moon rises or sets, when changes color (have you noticed that the moon near the horizon changes its color?) position at any time of both the sun and the moon, if we are going to have meteor showers for a certain date and how the Milky Way will look, if the moon will reduce our visibility or if it will be a perfect night to capture it.

Also, to know if the photographic landmark, peak, summit, rock, ... will be visible from the intended location, or if we are obstructed by some element, to, in that case, look for a better place. Or, to see when a peak, part of the coast, or in what dates the sun comes out of the sea.

As you can see, the possibilities are endless and it is in your hands to make the most of it.



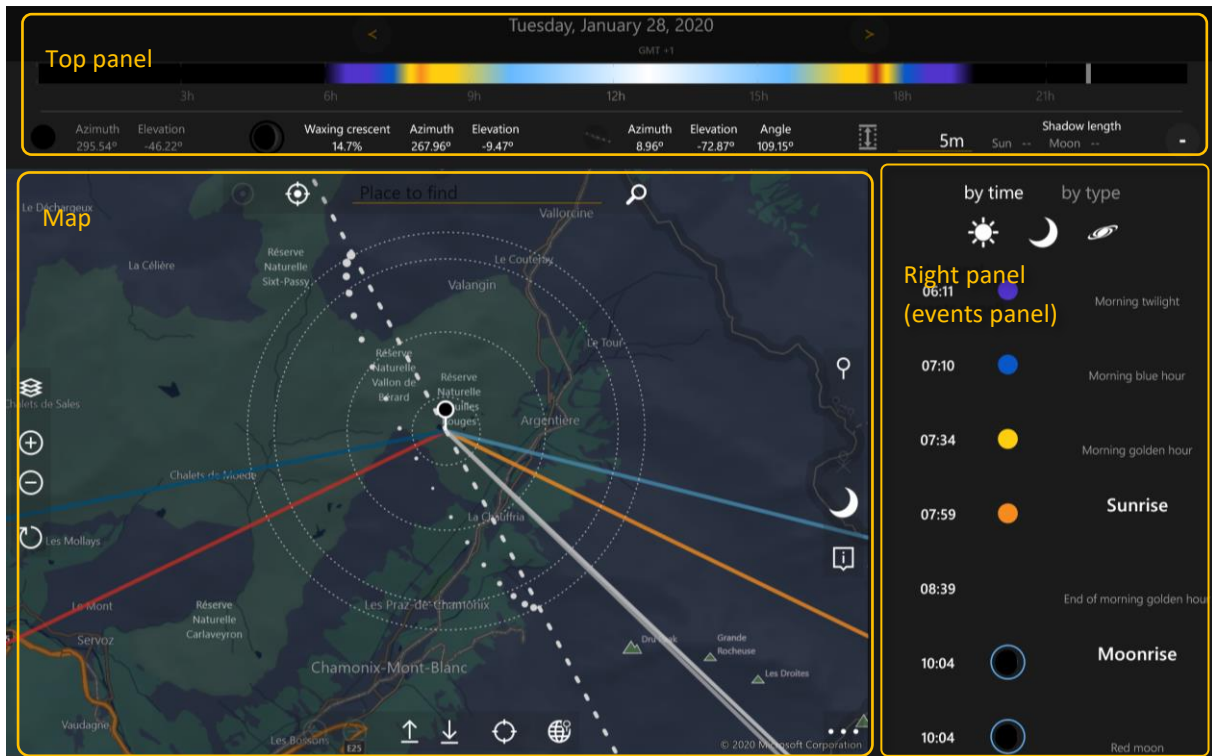
Florence in 3D. Do you see all the buildings, the cathedral of Santa Maria del Fiore, the Ponte Vecchio and the Palazzo Vecchio in 3D?



Detail. Currently, the cathedral tower is blocking the sunlight at our location.

INTERFACE

The planner assistant is divided into three parts, which are the top panel, the events panel on the right side and the map.



We'll look at each one in detail, but to get an idea,

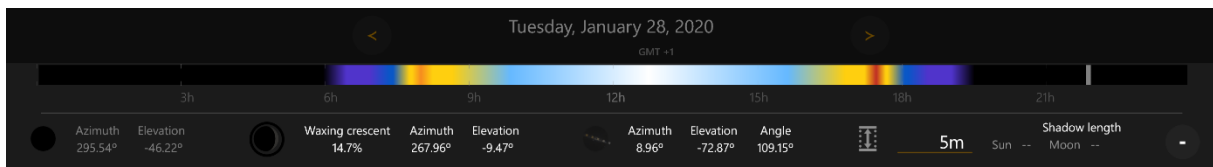
- the **top panel** is related to the current moment (time)
- the **right panel** with the events for that date (sun, moon and GC events).
- the **map** is the display on both a 2D zenith view and 3D map with customizable camera

TOP PANEL

In this panel we control the date and time of the assistant and everything related to the time of the instant. The values and images of the stars are relative to that instant.

At the same time, this panel can be divided into three parts (from top to bottom):

- Date and time
- Light bar
- Information of the moment



DATE & TIME

The date and time show us the values we have for the assistant and we can change it manually at any time.

These values influence the whole screen of the assistant since they are one of the parameters from which the rest is calculated.

CHANGE THE DATE

When you open the assistant, it will show you the date and time of the last session. If this is the first time we do it, it will be the current date and time. To change the date we can do it through the circular buttons that we have at the sides or by pressing on the date or through keyboard shortcuts.

Press the buttons:

- Press once on the left arrow button → previous day
- Press the right arrow button once → next day
- Press left arrow button twice (double press) → previous week
- Press the right arrow button twice (double press) → next week

Click on the date:

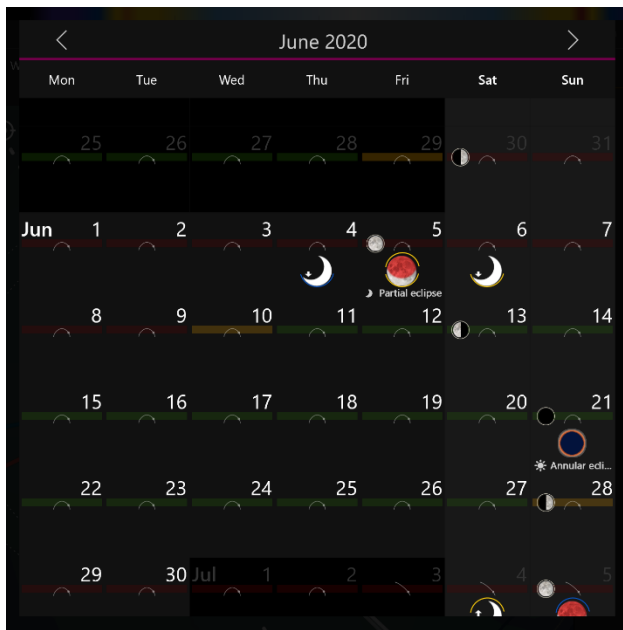
A single click on the date will open the calendar view to choose the new date.

A double tap will return the current date values to the assistant; however, the time will remain unchanged.

Keyboard shortcuts

Ctrl + T:	Current day (today)	Ctrl + ↑:	Next month.
		Ctrl + ↓:	Previous month.
Ctrl + ←:	Previous day.	Ctrl + Alt + ↑:	Next year.
Ctrl + →:	Next day.	Ctrl + Alt + ↓:	Previous year.
Ctrl + Alt + ←:	Previous week.		
Ctrl + Alt + →:	Next week.		

CALENDAR VIEW



This window can be accessed by double-clicking on the date.

The calendar view has two uses. On the one hand it allows us to choose the date for the assistant and, on the other hand, we can see what events occur and when. The calendar view of the Planner will show us all the sun, moon and night events.

In the image we can see both lunar phases, eclipses of the sun and moon, and other symbols that we are going to see right now.

Sun events

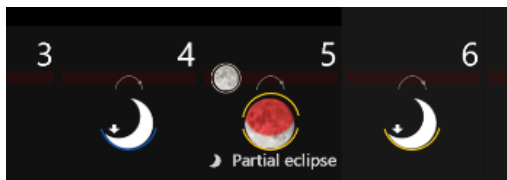
Eclipses (day 21 in the image, of the annular type)

Solstices and equinoxes.

Moon events

All moon phases are shown. On May 30th we would have the crescent quarter, on June 4th the full moon, on the 13th the waning quarter, on the 21st the new moon, etc.

On the 5th there is also a partial eclipse of the moon and the 21st annular eclipse of the sun. As we see these are interesting dates and we have them at hand in the calendar view.



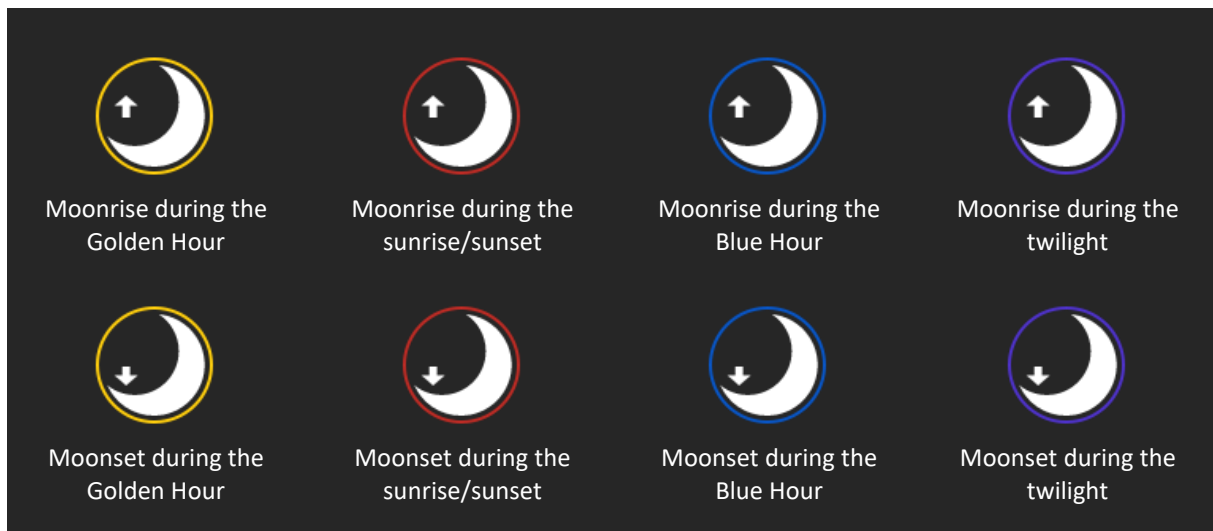
If we look at the 3rd, 4th and 5th of the month (see picture on the left), on the first date appears a moon icon with a downward arrow and a blue arc underneath, and on the third the moon image with a golden arc. On the day 4th day, we have a golden arc both above and below the eclipse image.

What does all this mean?

It means that the rise and fall of these days coincides with light that is appropriate for capturing the moon in a light environment and close to the horizon.

If the light coincides with the rise, we will have a small arrow at the top and an arc of color above (see sunlight colors).

If the light coincides with the setting of the moon, in that case the arc will be at the bottom and the arrow pointing downwards. If it occurs both at the exit and at the entrance, there will be an upward and a downward arrow, and, an arc at the top and another one at the bottom. This occurs on day 4, when we have both bows, but not the arrows that are hidden when having another event.



Evening events


Of the night events, the best (darkest) nights to photograph the Milky Way and the galactic center will be shown, when we will have meteor showers and the shape of the Milky Way's arc.

If we look, under the date number, we will see some colored stripes that can be either red, yellow or green. The color indicates the quality of the nighttime darkness. The darker the night, and the longer it lasts, the higher the quality. The quality goes hand in hand with the moon phase and the passage through the sky, as we have mentioned above.





If the color is red, it indicates that the night is not good for night photography; fewer stars will be seen than usual and the arc of the Milky Way as the galactic center will be less visible.

If the color is yellow, it is not the best night for night photography.

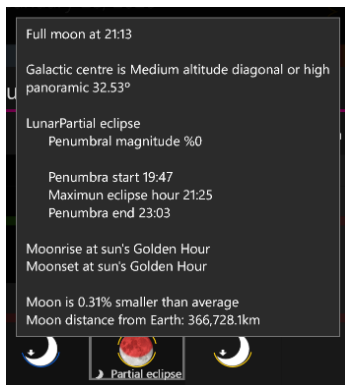
Dates in green will be good for capturing starry skies, capturing meteor showers, and seeing the brightest MW and GC.

 Dates with this icon mean that meteor showers are happening this night.

Depending on the angle values (of the MW arc), it describes the graphic possibilities that they can be:

-  **Low diagonal or horizontal panorama**, for angles less than 25°.
-  **Medium height diagonal or high panorama**, for angles between 25° and 50°.
-  **High diagonal** for angles between 50° and 75°.
-  **Vertical** for angles greater than 75°.

These are average values for the whole GC visibility session. That implies that, even if we have a value of 80° (vertical), it could be that at the beginning of the night we have a high diagonal value and that, little by little, it will go up in the sky until reaching 80° and more at the end of the night. Or, on the other hand, it may be higher and gradually lower.



Detailed information

In addition to all the above, it still provides us with more information if we are interested. If we pause for a moment on a date, a pop-up box will open with detailed information for the date, indicating all the events and when (at what time) they occur.

In the image, the times when the full moon occurs, detail of the MW arc, the phases of the eclipse, ...

Choose date

To choose a specific day, click twice on the date to be chosen.

The buttons to the left and right of the month are used to change to the previous or next month. We can also change by clicking on the month and year. If we move up and down in the day view, the months will change in turn.

CHANGE HOUR

To change the time, we can do it through the light-bar (see below), by clicking on the time or through keyboard shortcuts.

Click on the time.

A single click on the time will open the view of the clock to choose the new time.

A double tap will return the current time values to the assistant; however, the date will remain unchanged.

Keyboard shortcuts

Ctrl + N:	Current date and time (today and now)
. (dot):	Previous minute.
, (comma):	Next minute.
Shift + , (;):	Previous hour.
Shift + . (:):	Next hour.

KNOWING THE TIMEZONE

If we place the mouse over the time zone, it will show us more detailed information about it.

LIGHT-BAR

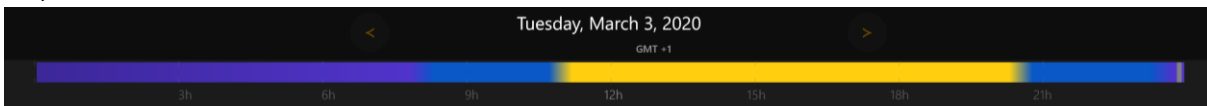


The light-bar shows the 24 hours of a day starting from 0:00 a.m. to 23:59. We have the scales at the bottom.

This will be a standard view of the light bar, starting with a black area indicating the night hours, then the twilight in purple turning to blue (blue time) and then another in yellow-gold indicating the golden time. Within the golden hour, both in the morning and in the afternoon, a small red band will appear; the time of sunrise or sunset will occur at that position of the bar. The whole area in blue refers to the daytime hours. The whiter part indicates the time of the solar noon (when the sun is highest in the sky). Finally, we will again have the golden hour, the sunset, the blue hour in the afternoon, the twilight and the night.

This color bar will change with the days and months as it is logical.

In some places of the planet and depending on the date, it can happen that we do not have a black or light blue strip.



In the image above, a light bar for a polar zone in the northern hemisphere indicates that there is no daylight (light blue band) and that it does not get completely dark either (black band).

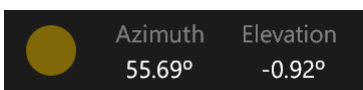
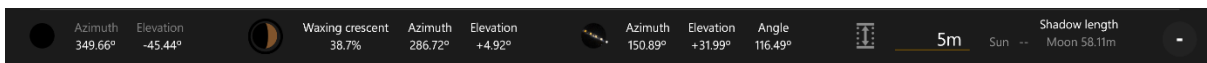
In the lower image, a light bar indicating a day of almost 24 hours, in which the sun is in the sky for about 20 hours and when it disappears it doesn't finish darkening to illuminate the sky again.



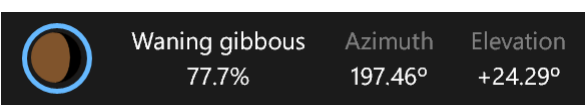
This time bar also allows us to choose the time through the slider, by clicking on a position of it or through the lower hours (double click).

CURRENT INFORMATION


This panel shows us the most important information of the three astros (sun, moon and GC). This data will change with time or if we move the slider on the light bar. Let's see from left to right the contents of this panel.



The first block informs us of the sun, showing the color of the light (color of the circle) and the position in azimuth degrees as the elevation in the sky, which in negative values will indicate that it is hidden.




The second block shows us the phase of the moon, its illumination, how it will look in the sky, and also its position in azimuth degrees and the elevation above the horizon.

	Azimuth	Elevation	Angle
	182.31°	+17.81°	151.8°

The third block deals with the GC. The image shows how it would look in the sky, the position, the elevation and the angle. The angle indicates whether the GC will be more vertical or more horizontal in the sky.


Wednesday, June 10, 2020
10:29 GMT +2

12h


	Azimuth	Elevation	Angle
	264.32°	-38.84°	-146.1°

If any image appears semi-dark, it means that at that moment that astro is not visible.

In the image on the right, the GC appears darkened because it is hidden below the horizon. The value of the elevation is negative (elevation: -38.84°) and if we also look at the planner's time, it marks 10:29: there is sunlight and therefore the GC cannot be seen in the sky.

 **5m** Shadow length
Sun -- Moon 58.11m

Finally, we have the length block of the shadow. Indicating the height of an object or milestone, it can be a tree, a building, ..., it calculates the length of its shadow for that instant. If any or both of the data are not shown, it is because the corresponding astro is below the horizon and does not cast any shadows. In the case of the image, the shadow length data is not shown because the sun is hidden (elevation -45.44°) and the

 **5m** Shadow length
Sun -- Moon --

moon is very long because the moon is still very low.

If we click on any of the images of the astro, it will hide the relative lines; if we click again they will be shown again.

Button on the right side of the panel



This button is used to show or hide the right panel or the events. It can also be activated with the keyboard shortcut **Ctrl + Tab**.

Keyboard shortcuts

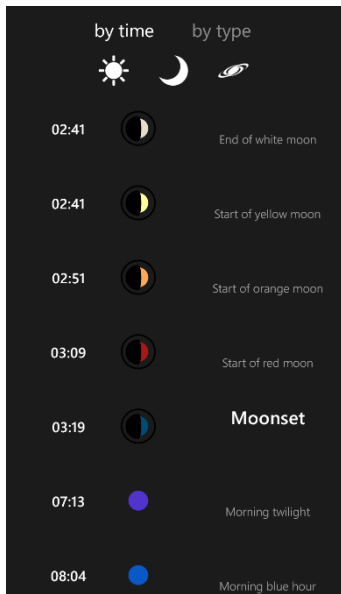
Ctrl + 1: Sun solo view. It hides all the lines of the map except those of the sun.

Ctrl + 2: Moon solo view. Hides all the lines of the map except the moon's lines.

Ctrl + 3: GC solo view. Hides all the lines of the map, except the GC ones.

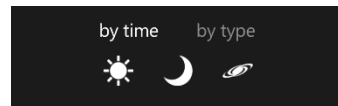
Ctrl + 0: Activate all the lines.

RIGHT PANEL



The right panel serves as a chronological table of all events relating to the moon, sun and GC that occur during the selected date and for the chosen location on the map.

You can hide the table with the (-) button above it and show it again with the (+) button. You can also switch the view through the keyboard (see keyboard shortcuts).



The way you want to view the event table can be ordered chronologically (**by time** view) or **by type**. They are at the top of the panel.

In the **by time** view, to the right, we have the icons for the three astros, which show us which types of events we want the table to show us. Clicking on them will change the visibility of their respective events. Clicking twice will show only the events of the selected star.




By type view shows basic information grouped by astro type.

For a quick look at the main events such as the rise and fall, the type view will be more useful, but the weather view is more complete and on days with meteor showers or eclipses, both solar and lunar, the information will only be visible in the first view, indicating that they occur and when.

Keyboard shortcuts

Ctrl + Tab: Show/hide right panel

Ctrl + Shift + Tab: Change by time/by type view

by time	by type
Sun	
	Sunrise 09:02
	Sunset 20:18
Moon	
	Moonrise 18:36
	Moonset 07:27
	Phase < Waxing gibbous >
	Visibility 94.8%
Night	
	Galactic Center rise 05:56
	Galactic Center set 07:43
Day info	
	Twilight 07:43
	Blue Hour 08:27
	Golden Hour 08:45
	Sun's Noon 14:40
	Golden Hour 19:51

MAP

The map is the main part of the assistant. This is where you can view the planning lines, the information of the Milky Way and the GC.

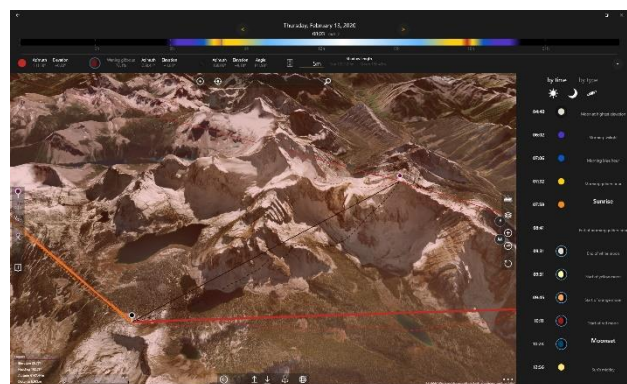
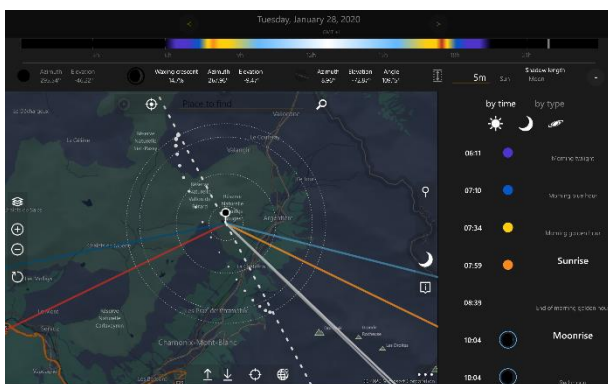
Everything is designed to be a very powerful tool, but at the same time it is accessible, intuitive and fast. All the information is visual to make the planning as clear as possible.

We need to understand the tools provided by the map: views, colored lines, black pin and purple pin, and the control buttons.

VIEWS

The map gives us two different views: 2D or zenithal view and 3D view. By default the overhead view is displayed, as if we were seeing a map above. At any time we can switch from one view to another. In both modes we will be seeing the same information but the way in which we are shown will be different.

The 3D view mode is a very powerful tool, both to preview the surroundings of the area that we want to photograph, as to know if we are looking for a special light such as a sunrise, a sunset, the exit or the setting of the moon or know if at a time a peak, building, ... will be illuminated or if something will stand between the light source and the landmark. This and more examples will be discussed in depth later.



Top view on the left and 3D view on the right. We can understand the difference in amount of information received at a glance.

Keyboard shortcuts




Ctrl + D: Change view type (2D) \leftrightarrow 3D), from 3D to zenith and 3D to overhead

Camera shortcuts




LINES

All color lines displayed on the map have a meaning. Knowing what each one is will help us better plan our photographic journeys. If we place the mouse pointer over the lines, it will show us the name of the line. Here's the name and function of each line:







Lines of the Sun

-  Sunrise
-  Sunset
-  Current position of the sun



Lines of the moon

-  Moonrise
-  Moonset
-  Current position of the moon

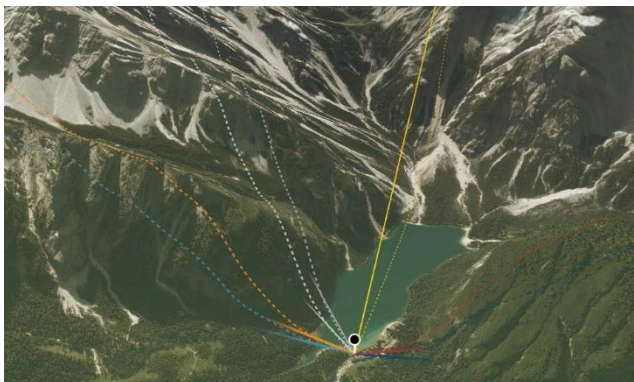
GC lines

-  Visibility start of the GC
-  Visibility end of the GC
-  Current GC position
-  Arc of the Milky Way
-  Start and end of the Milky Way arc
-  Elevations of the dome of the sky (0° , $+30^\circ$, $+60^\circ$ and $+80^\circ$)

Surface lines

  In the 3D view, we also have some dashed lines that are called surface. These lines tend to have the same color as their counterparts, but instead of drawing a straight line from the origin to their destination, they draw a dashed line on the surface. These lines help us visualize when an astro position line is blocked by an obstacle; we will

see the dash over the solid color or directly it will disappear under the obstacle.



If you look at the image, except for the yellow line of the current position of the sun, all the others are cut with the mountains that rise around the lake. All those lines come out of the black pin, cross the lake and disappear. While its dashed counterparts travel all the way over the mountains.

From here we can know that the sun will not be visible either at sunrise or sunset (orange and red lines), either the moon's rise or the setting (light blue and dark lines).

Other lines



Black and purple pin joining line.



Astro lines on purple pin. Astro lines can be activated over the milestone pin (once we have the pin activated and on the map).






These lines behave the same as the previous ones, both in 2D view and 3D. They will help us to know how the lights of the sun or moon affect the landmark, or to visualize whether or when the sunrises or sunsets will light up.

BLACK PIN



The position of the black pin indicates where the camera is. Each time you change your location, all the information displayed in the planner will be updated for the new location.

There are several ways to change the black pin from place:

- **Long press on the map.** The black pin will be positioned above that point on the map. 
- **Ctrl + tap on the map.** The black pin will be positioned where it has been clicked. 
- **New position button.** In the center of the map will appear a cross that we can move by moving the map. If we give it to accept, we'll reposition ourselves to the new location. 
- **Position button in GPS location.** It will load the GPS location and we will position ourselves in that location.
- **Search by place name.** In the text box we will type the name of the place.
- **Search by coordinates button.** Choose the new location by coordinates.
- **Load photo point button.** We will choose the place in the list shown to us. 
- **Previous/Next Location buttons.** These buttons help us navigate the location history we've been using recently. 



To refocus the map view over the black pin, just press the return button to the map view or with the space key on the keyboard.

PURPLE PIN



The purple pin is positioned on the landscape, urban or other landmark that we want to photograph. It is used to calculate the distance between the pins, such as the elevation difference between the two, so we can know if the landmark is at a higher or lower height. In the 3D view, you can also see if between the camera and the milestone there is visibility or if any object hinders you.

Here we also have different modes to activate the purple pin:

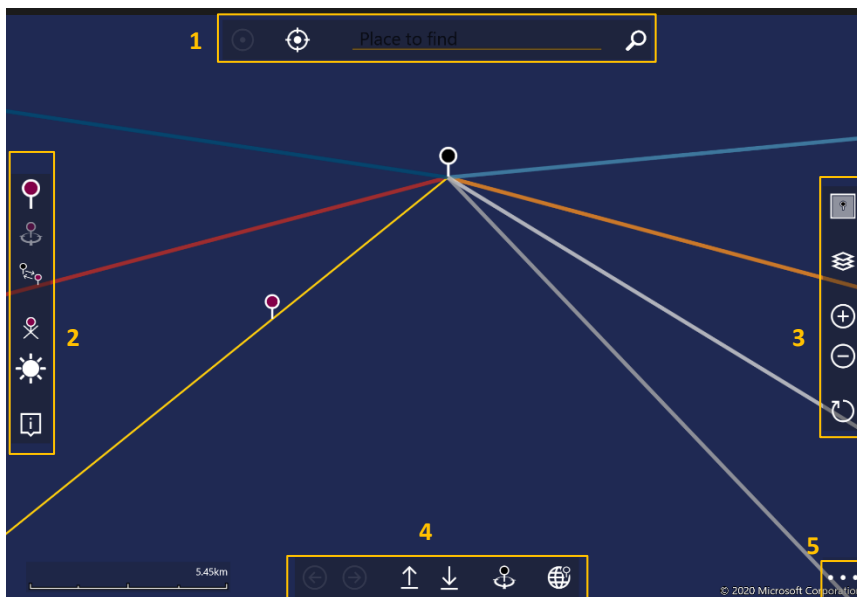
- **Position landmark** button. Click on the button and then on the map where we want to position the pin.
- **Alt + click on the map**. The landmark will be positioned exactly above the point we clicked on the map.
- **Swap black and purple pin button**. Black and purple pin positions will be exchanged.
- Once you have the purple pin on the map, the buttons related to it will be activated (see below).

CONTROLS

The map contains a series of buttons that are grouped into four groups.

1. **Top controls (1)**. We have buttons related to GPS and location finder by name.
2. **Left group controls (2)**. Here are grouped all related to the purple pin (or photo landmark pin), show and choose astro type over the landmark...
3. **Right group controls (3)**. The map and view controls. Change 2D/3D views, the type of the map, ...
4. **Bottom controls (4)**. Those related to the black pin (main). Change location to new position, navigate position history, load and save locations, ...

In addition, we have the button to hide/show all buttons (5).



TOP CONTROLS



GPS button. If our device has a GPS sensor, it will activate and show us with a blue dot where it is at all times. To deactivate, press again.



GPS positioning button. If our device can use the GPS sensor, it will position the black pin in that position. It may happen that the sensor needs a few seconds for it to get the position.

If we have the application set up to make the location manual, GPS positioning will put the position pin in the manual location that we have chosen.



Search location by name. If we do not know exactly or are not very sure where it is, but we do know the name of the site, we will be able to type it in the search text box and then hit **enter** key.

If you have not found any place with that name you will indicate that you have not found any results. We may have misspelled the name or changed some place letter (place names in other languages).

If you have found any results, you will show us in a list the name of the site and country sorted by the most common result in the first place. We choose the site by clicking on the list entry.

Keyboard Shortcut: **Ctrl + F**

CONTROLS ON THE LEFT



Show/hide purple pin (landmark) button. If you have the pin positioned, you can click on this button to change the state of the pin visibility. In addition to the pin, if we have the landmark lines turned on (see below), they will also change the visibility state.



Position purple pin button. As we have pointed out before, after pressing the button we have to choose the position for the pin. To do this, we will click on the map.

If we previously had a purple pin, the previous one will disappear to position itself at the point we clicked.



Swap pins button. We will exchange the positions of the two pins.



Milestone lines button. This button allows us to show or hide the helping lines of the chosen astro (next button).



Astro type button. This button allows us to choose what kind of lines we want to show you about the landmark. We can choose a single astro at a time.



Display Info button. It will show us the pin information or only the black pin if we don't have purple turned on.

The information shown will be the coordinates of the positions (longitude and latitude), the altitude and, the distance between the pins, the elevation difference and the azimuth.

Keyboard Shortcut: **Ctrl + I.**

CONTROLS ON THE RIGHT



Change View. This control allows us to switch between 2D (overhead) and 3D view (see views)

Keyboard Shortcut: **Ctrl + D.**



Map type. It allows us to choose the type of map that will be displayed on the screen. Possible options are:

1. **Roads:** The map will show roads, cities, and geographic objects in flat colors.
1. **Terrain:** This mode will show a shading indicating the sloped areas.
2. **Aerial:** This mode is the most complete and you need 3D view to show in addition to terrain, with aerial photo textures, view cities and buildings in 3D.
3. **Air with roads:** Same as the previous mode, but with overprinted roads in the photos.

Keyboard Shortcut: Change Map Type (**Ctrl + M**)

Restore Standard Map Type (**Ctrl + Shift + M**)



Change zoom. If we give the control (+) the map will zoom in and out if we hit the (-). You can also zoom in with the mouse wheel.

Keyboard Shortcuts: Zoom In (+)

Zoom Out (-)



Restore Map View. Restores the standard values of the map: default zoom, centered on the black pin and with the north above.

Keyboard Shortcut: **Ctrl + Space**

Compass (3D view only). Rotates the map horizontally. When you turn, the compass will indicate where the north is (red arrow). It will always rotate with the center of the map as a pivot.

Perspective (3D view only). Allows you to change the perspective of the 3D camera. We can go down/up, turn the camera. You will always change the perspective with the center of the map as a pivot.

LOWER CONTROLS



Position history browser. It allows us to return to the positions we have used previously (left arrow) or to the next (right arrow). If any of these controls are grayed out, it means that we have reached the end of the history.

Keyboard Shortcuts: **Ctrl + RePag** (Previous)

Ctrl + AvPág (Next)



Load photographic location. A list will open with all the photographic positions where you can choose a place to use as a new position (see [Photospots](#)).

Keyboard Shortcut: **Ctrl + L.**



Save Photographic Position. You can save the current position as a photo location for later use (see [Photospots](#)).

Keyboard Shortcut: **Ctrl + S.**



New position. Allows you to position the black pin wherever you want (see black pin)

Keyboard Shortcut: **Ctrl + Mouse Click**



Go to coordinates. Opens a window where we can use different coordinate systems to indicate the new position.

Keyboard Shortcut: **Ctrl + G.**

MAP INFORMATION



Scale. Indicates the distance between the scale marks.

Note that in the 2D view that scale will be constant throughout the map screen but, in the 3D view, as the perspective changes, the areas farther away from the camera (top direction of the map screen), the scale will be smaller. This scale will change with zoom.



Camera position. Displays information about the current camera position such as elevation in degrees above the black pin, height above sea level, and distance to the center point of the map. These values will change when we rotate and change the perspective of the camera.

KEYBOARD SHORTCUTS

PIN

Place black pin.	Ctrl + Press (on map):
Place purple pin	Alt + Press (on map)
Swap black and purple pin positions.	Ctrl + Space
Show/hide pin information (for both pins)	Ctrl + I

MAP

Change View Type (2D ← → 3D)	Ctrl + D
Show/Hide Map Controls	Ctrl + H
Change map style.	Ctrl + M
Default map style	Ctrl + Shift + M

Camera shortcuts

TIME

Current date (today)	Ctrl + T
Current date and time (today and now)	Ctrl + N
Previous minute	, (coma)
Next minute	. (period)
Previous time	Shift + , (;)
Next hour	Shift + . (:)
Previous day	Ctrl + ←
Next day	Ctrl + →

Previous week	Ctrl + Alt + ←
Next week	Ctrl + Alt + →
Previous month	Ctrl + ↓
Next month	Ctrl + ↑
Previous year	Ctrl + Alt + ↓
Next year	Ctrl + Alt + ↑
LOCATIONS	
Search by name	Ctrl + F
Go to coordinates	Ctrl + G
Previous location	Ctrl + RePág
Next location	Ctrl + AvPág
Save location as photo location	Ctrl + S
Load photo location	Ctrl + O
VIEWS OF ASTROS	
Sun solo view. Hides all lines on the map except of the sun.	Ctrl + 1
Moon solo view. Hides all lines on the map except those of the moon	Ctrl + 2
GC solo view. Hides all lines on the map except those of the GC	Ctrl + 3
Activate all lines	Ctrl + 0
EVENT PANEL	
Show/hide right panel	Ctrl + Tab
Change view by time/type	Ctrl + Shift + Tab

EXAMPLES

Here are two examples of real situations that we can take advantage of both to learn the application and to see how easily complex scenarios can be calculated.

MOONRISE

Situation:

We have an imagined photo or we have seen something that we want to do ourselves from a moon rise over some pieces of ice on Jokursarlon beach in Iceland. We want to know if on that beach, by the date of February 15, 2021 what phase of moon we will have, when it leaves and where.



How are we going to do that?

First, we choose on the map the location of the photo (Jokursarlon) either manually or by name search, then choose the date and then look on the screen both the time table of the moon, as well as the direction lines of both the output, set and the dynamic position of the time.

In the image we can see the result of the assistant for the location and dates we have chosen.

In the center of the map screen we have a black pin (user or camera location), a series of lines that leave it in different directions and of different colors. At the top of the map data relating to the sun, moon, GC, ... and to the right a table of events of the day, in this case relative to the moon.

Let's go back to the question of what phase we're going to have, when it comes out and where.



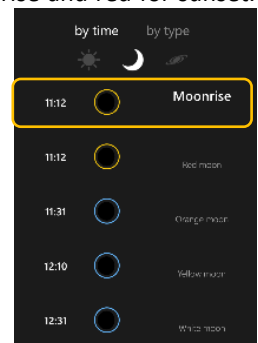
To know **where** it comes from we have to look at it on the map around the black pin. The bluish lines are related to the moon, and the yellow-orange-red lines are related to the sun. Light-colored ones will always be output and dark ones of the same tone will be the set ones. The clear blue line going east-southeast is that of the moon's exit (the one we are interested in); in that direction comes out by that date. We can zoom and move on the map to see it both from further and closer.

If we pass the mouse pointer over the lines, it will tell us which event and astro belongs to. As we said the light blue line is moon-out, and the dark blue for the moon sunset. Orange for sunrise and red for sunset. The yellow thin line belongs to the current position of the sun, at the time we are in the assistant. There will also be for the moon, but as it is hidden at that moment the line is not shown.

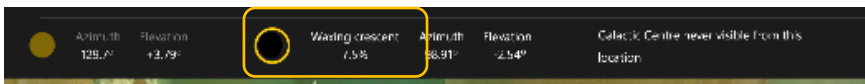
Rising time it is visible in the event table, indicating that it happens at 11:12.

In that table you can see all the events for the date and when each one occurs, both for the moon, the sun and relative to the GC.

They can also be filtered to show us only one astro.



The phase in which it is located is indicated in the information that is right at the top of the map.



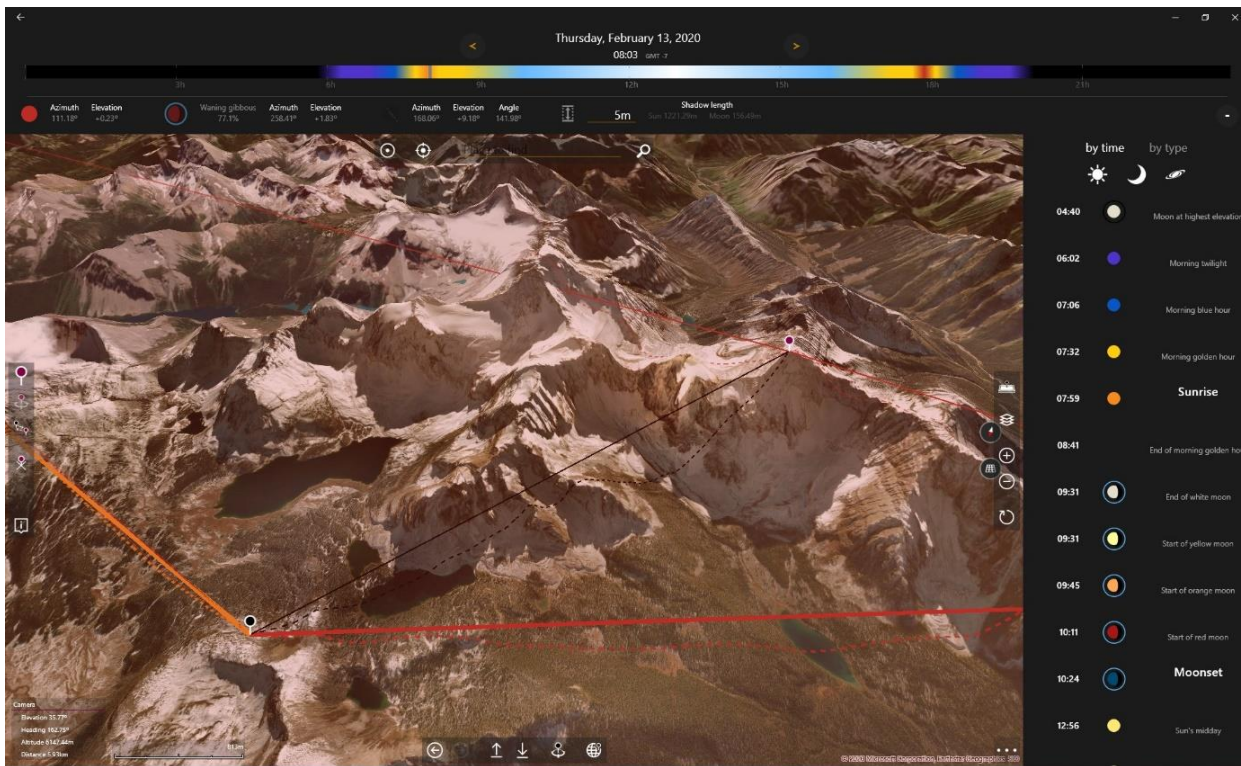
By that date, the moon phase is fourth and 7.5% illumination.

SUNSET

Situation:

We intend to travel to the Canadian Rockies and have a photo in mind in the Assiniboine massif area with some mountains in the background and we want to know if the sun will light it up at the last minute to make it look red. In the background we would have the lakes and in the foreground, the descent from the hill that we are going to take the photo.

We choose the 13th day from the most photogenic and photographed area.



Steps:

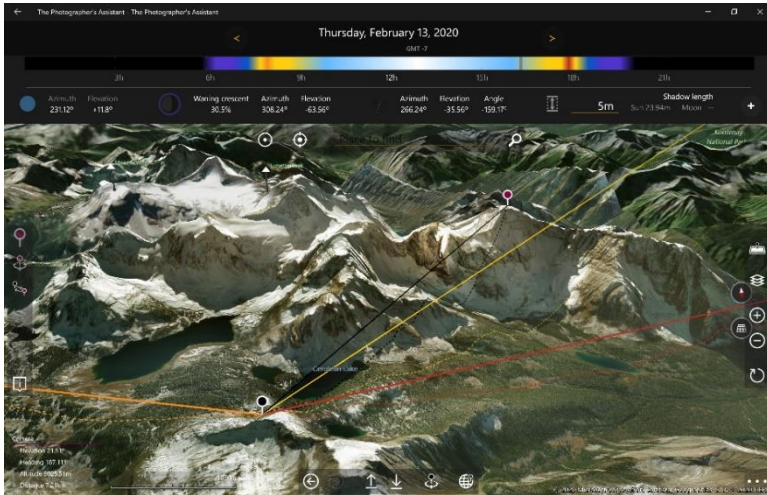
We search for Mt Assiniboine or Mount Assiniboine in the search box by name. We hit *enter* key and wait for the inputs to come out. The view will be centered over the mountain, from an overhead view with the black pin (our position) in the center.

The first thing we will do is change the view, clicking on the top button of the group that we have on the right or with the keyboard combination **Ctrl + D**. We are already in the 3D View and we can rotate and change the altitude of the camera, which will be very practical when planning our photo. To change the perspective of the camera, press the right mouse button, and while we have pressed, we will move the mouse. To get closer or further away, we'll use the wheel.

Let's place the black pin more or less on the slope that we see in the image, making a long press on the point. The black pin will change places and the color lines will be displayed for that new position.

Since we want to work only with the sun, we will disable the moon lines and the GC with the **Ctrl + 1** key combination.

Then we'll pick the date. Click on the top of the assistant where you indicate the date and we will navigate the calendar until February 13. We'll press twice.



Purple pin. We will pose the landscape landmark pin on the mountain to the west of our Mt. Assiniboine. To do this we use the Alt keyboard and mouse combination + mouse click just above the peak. If we have not succeeded, we repeat until we are satisfied with the position.

Between the two pins will draw a solid black line and another that runs through the entire surface as if it were the shadow of the previous one, which is discontinuous. If at any time, the discontinuous one was above the solid one, it would indicate that there would be an obstacle in that place that would prevent the view between the camera position and the landscape milestone. Of the case, we will have visibility between the two points.



Next, we'll activate the sun lines over the landmark to see if at dawn the chosen summit will be illuminated or not. The button to activate it is on the left, with the purple pin image with lines below.

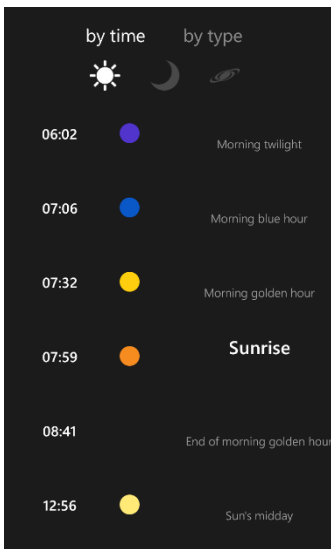
By default, the sun lines will be activated on the purple pin; if we wanted the moon's for example, we'd change with the bottom button.

Lines above the milestone will not be seen if the sun is not visible in the sky. If we change the slider in the light bar, both the lines on the black pin and the purple pin will rotate, both in parallel.

Finally we have to take the light bar at sunrise time. In the event panel we see that the sunrise occurs at 07:59.

To carry the light bar or time we can slide it until that moment, by clicking on the time or double-clicking on the sunrise row. The time will be set to 07:59 and we will see how the light lines on the pins have changed.

We now analyze what information the 3D View assistant shows us.



First, we notice that the colors of the lines have changed to red, indicating that the light is sunrise (the light of the setting is also of the same color).

Next, we analyze the behavior of the light lines on the ground.

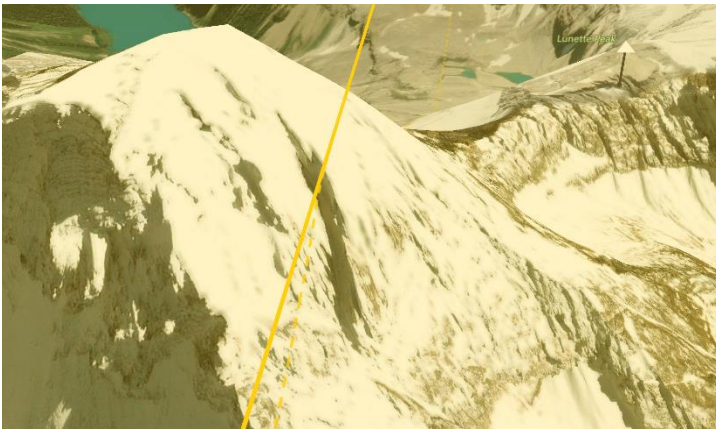


As we are interested in the selected summit with the landscape milestone pin we follow the origin of the light that we want to have on top. At dawn the light comes from the east and following that line, we realize that the top of the Mt Assiniboine is hampering it to influence the purple

pin at that hour. If you still don't see it clear, the solid line disappears inside the mountain and the dashed line passes over, clear obstacle indicator. Look at the area marked in the image.

It is clear that at sunrise, our summit will not be illuminated, but we can know, since we will be there, when it will light up.

To achieve this, we will move the time slider little by little or if we want to do it more accurately than with the mouse, using the keyboard (comma key (,) to subtract a minute and the dot key (.) to increase).



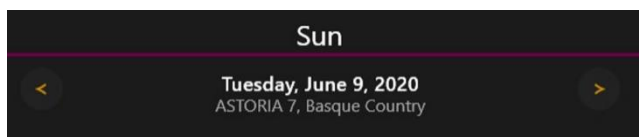
The first moment when the light hits directly and Assiniboine does not hinder it. The clock marks 08:36; it's not the best light and we won't have the reddish light we wanted in the photo anymore.

SUN

The sun assistant gives us all the information about the Sun that interests us: the time of sunrise, sunset, altitude and position, different types of special light (golden hour, blue hour and twilight) and astronomical events of the day.



DATE, TIME AND LOCATION



Left arrow

Date and location

Right arrow

Just above the Sun icon we have the date and location. Below the time and time zone icon. All information is calculated about this data.

CHANGE THE DATE

By default, the Sun assistant shows us the current position and time information, but we can change the date through the circular buttons that we have on the sides or by clicking on the date.

Press the buttons:

- 1. Press once on the left arrow button → previous day
- 2. Press once on the right arrow button → next day
- 3. Double-click the left arrow button (double press) → previous week
- 4. Double-click the right arrow button (double press) → next week

Click on the date.

A single click on the date will open the calendar view to choose the new date.

A double press will return the current date and time values to the Sun assistant.

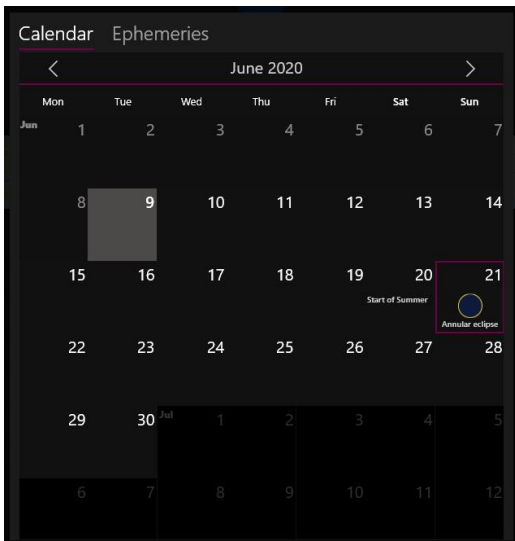
UPDATE LOCATION

If you double-click on the location, the assistant will reload the location name based on your PC's GPS data or location, which can be defined automatically or manually in the app's settings screen.

KNOW THE TIME ZONE

If we place the mouse over the time zone, it will show us more detailed information about it.

CALENDAR VIEW



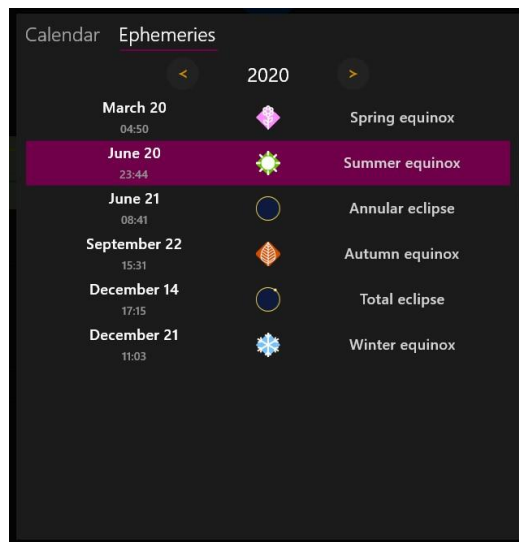
This is the calendar view.

This window has double utility. On the one hand, it allows us to choose the date for the assistant and, on the other hand, we can see what events occur and when.

All calendar views can display events about the **calendar** (month by month, image on the left) or in a list of all events (**ephemerids**). These two view options are chosen at the top.

CALENDAR

In the image you can see that June 20, 2020 starts summer and that on the 21st of the same month there is an annular solar eclipse.



To choose a specific day we will click twice on the date.

The buttons to the left and right of the month are used to switch to the previous or next month. We can also change by clicking on the month and year. If we scroll up and down in the view of the days, they will change the months in turn.

LIST OF EPHEMERIS

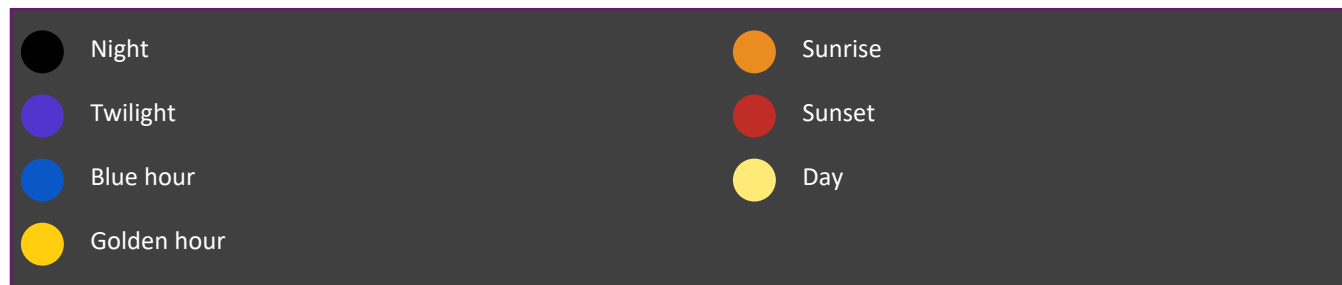
In the left image we can see the list of all events related to the sun: eclipses, equinoxes and solstices.

To choose any of these events, we will double-click.

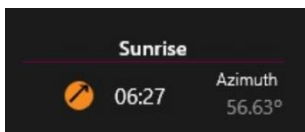
The new date will be displayed in the sun assistant.

IMAGE OF THE SUN

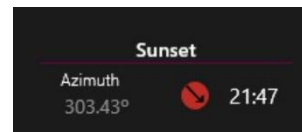
The image of the Sun will change color as the light changes that depends on the elevation in the sky. It will be light yellow during the day, golden in golden hour, red at sunrise and in the sun on the horizon, blue in blue hour, purple in the twilight and black at night. These colors will be the same throughout the application.



SUNRISE AND SUNSET



To the left and right of the hour, we have the sunrise and sunset times along with the position in which they occur (in azimuth degrees). If they do not occur, the time and position values will be empty. This occurs in areas near the poles that, for months,



do not have sunlight or no dark.

When you double-click, we will tell the assistant that the new time to be displayed will be the chosen one.

CURRENT VALUES



The elevation and position of the Sun for the date and time is displayed below the time and time zone. These values will change as the time changes.

CHANGING THE TIME

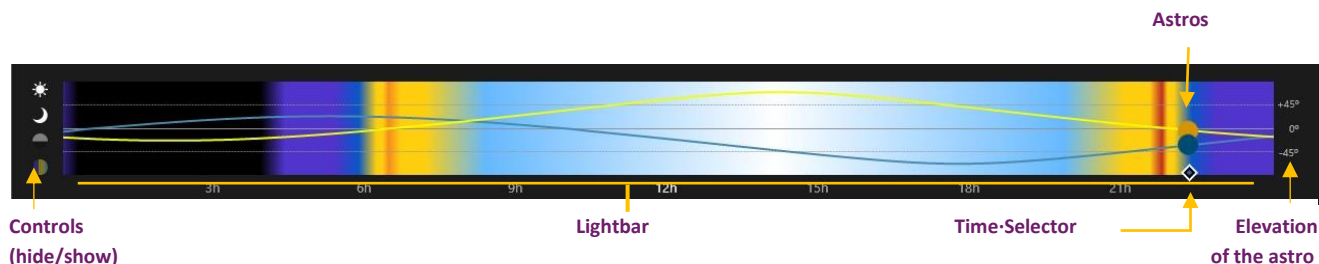
We have already seen how the date is changed; now let's see how to change the time.

If you click once on it, the clock view will open to choose the new time.

A double-click will return the current time values to the assistant, however, the date will remain unchanged.

THE LIGHT BAR

Below is what is called the light bar. The colors shown indicate the type of light for that time of day, from 00:00 to 23:59 on the same day, from left to right.



Double-clicking on the light bar changes the time to the chosen time.

Swiping the time picker or pressing and dragging the images of the stars also serves the same purpose. In the sun assistant, you can see the paths of both the sun (yellow) and the moon (blue).

The sinusoidal lines indicate the path of the stars in the sky, the elevation for that moment, being 0° on the horizon, 90° above our head, $+45^\circ$ halfway between the horizon and the zenith (top half of the bar). Negative values would indicate (bottom half of the bar) that the astro would be hidden behind the horizon.



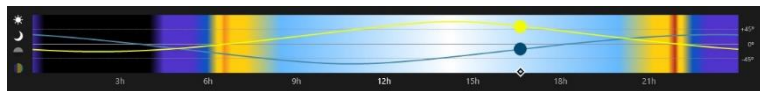
To the right of the bar, we would have the elevation indicators of the astro and their respective lines superimposed on the light bar. The highest point would be equal to 90° and the lowest point would be -90° .



Controls

The controls to the left of the bar help us choose what we want to display.

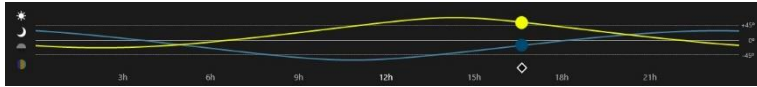
Being the icon of the sun and moon (1st and 2nd icon starting from the top) to hide or show the astros and their paths on the light bar.



Default view: both light colors and the complete of the sun and the moon trajectories are shown.

The 3rd control with the icon of a black and white circle allows you to hide the bottom of the horizon

line, making it easier to visualize when the astros are visible in the sky.

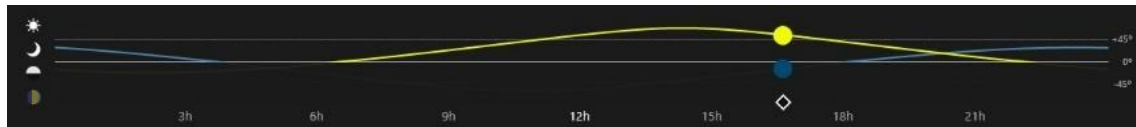


The 4th control is used to hide the colors of the light bar.

Hide colors. Paths are displayed on a gray background. They make it easier to see them, but we won't know the time of day they happen.



The astro paths below the horizon are hidden.



Hide both colors and paths below the horizon. We'll know at a glance when the astros are over the horizon (both lines visible at the same time).

EXTENDED SUN INFORMATION

Below the previous block, we can get more information from the sun. It is organized as a table:

Sun moment	Daylight
Season	Winter
Coordinates	43.31246055 , -1.9775205
Altitude	4m
Shadow ratio	x2.22
Angular diameter	0.525°

Sun moment: Indicates the name of the sunlight of the moment. It goes hand in hand with the image of the sun (see colors of the sun).

Season: Indicates the season of sun.

Coordinates: Latitude and longitude of the location.

Altitude: Altitude in meters above sea level of the location.

Shadow ratio: The ratio between the height of an object and the length of its shadow on a planar surface. It will appear empty if the sun is not visible (hidden below the horizon).

Angular diameter: The angle in degrees that the sun occupies in the sky.

TIME TABLE

The time table is located to the right of the assistant. It shows us the sun lights that occur on the chosen date.

A normal table will begin with the end of the night/start of the morning twilight, then the blue hour, the golden hour, sunrise and afternoon, the sunset, and again, the golden hour, etc., until the night.

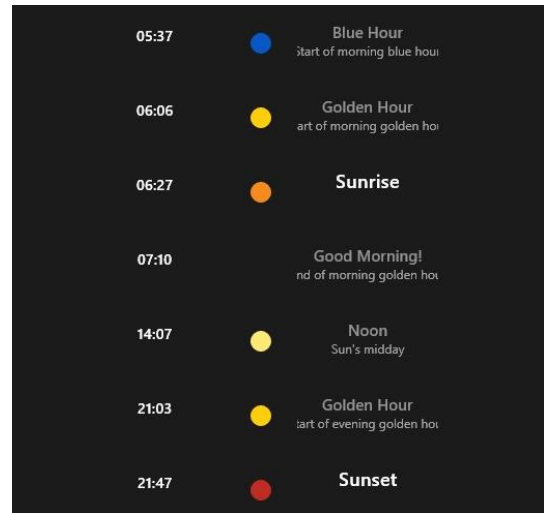
On the left indicates at what time the event or the start of the light occurs. If we are on today's date, it will indicate how long it is left.

In the second column, we will see the sun with the colors of light as we have seen above.

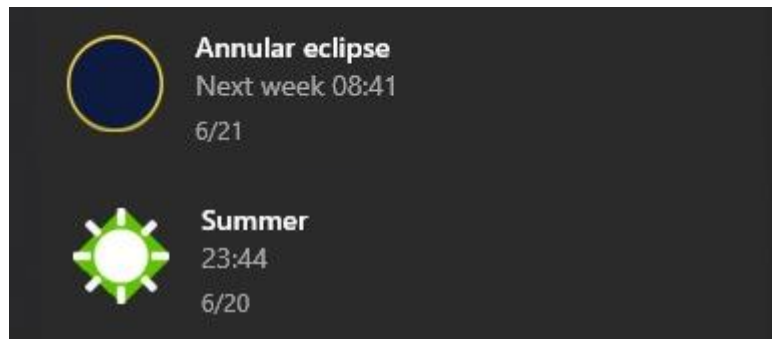
Finally, the name of the event or light will appear in the left column.

It should be noted that just as there may not be a sunrise and/or a sunset, twilight lights may also not occur.

A double-click, again, serves to tell the attendee the time to display.



EVENT NOTIFICATION



The sun assistant launches two types of notifications:

Sun eclipse notifications. As they are of special interest, they start one week in advance.

Notifications of **solstices and equinoxes**. They are notified on the same day (minimum photographic interest).

All notifications indicate the time when events occur and the date. In addition, they will remind us if the date is today, tomorrow, the day after tomorrow or within a week.

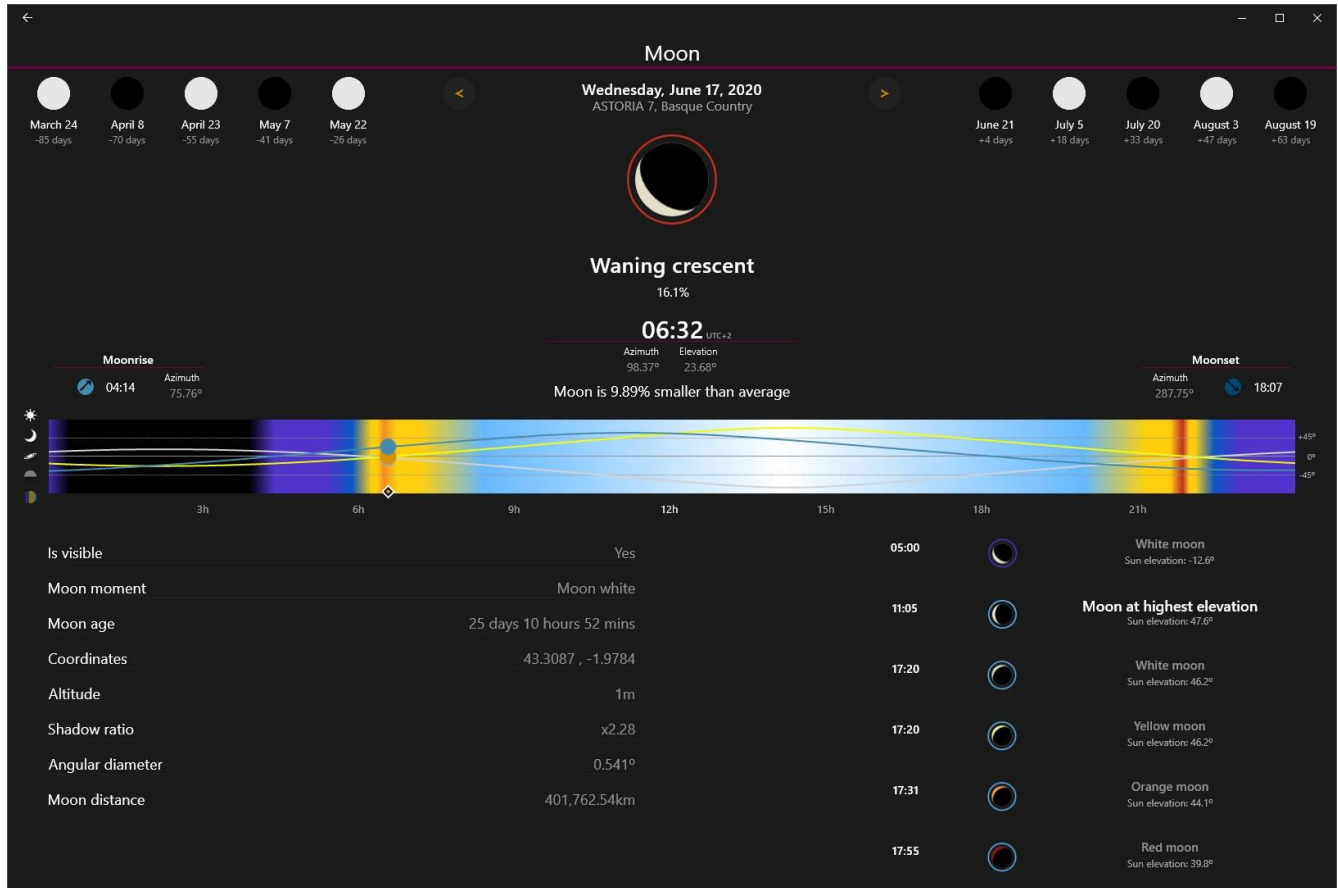
KEYBOARD SHORTCUTS

TIME	
Current date (today)	Ctrl + T
Current date and time (today and now)	Ctrl + N
Previous minute	, (comma)
Next minute	. (dot)
Back 15 min	Shift + , (;)
Advance 15 min	Shift + . (:)

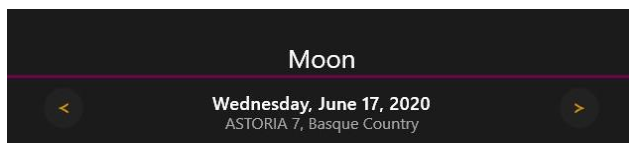
Previous time	Ctrl + ,
Next hour	Ctrl + .
Previous day	Ctrl + ←
Next day	Ctrl + →
Previous week	Ctrl + Alt + ←
Next week	Ctrl + Alt + →
Previous month	Ctrl + ↓
Next month	Ctrl + ↑
Previous year	Ctrl + Alt + ↓
Next year	Ctrl + Alt + ↑
LIGHT BAR	
Show sun and moon	Ctrl + 0
Show/hide sun	Ctrl + 1
Show/hide moon	Ctrl + 2
Show/hide lines below the horizon	Ctrl + 8
Show/hide colored light bar	Ctrl + 9
Reset View. Activate all lines	Ctrl + Alt + 0
Sun single view. Hides all lines on the map except of the sun.	Ctrl + Alt + 1
Moon single view. Hides all lines on the map except those of the moon	Ctrl + Alt + 2

MOON

This assistant gives us all the information about the moon that interests us: the time of rising, the setting, altitude and position, the phases, different types of special light and the astronomical events related to the moon.



DATE, TIME AND LOCATION



Left arrow

Date and location

Right arrow

Just above the image of the moon we have the date and location, below the icon the time and time zone. All information is calculated about this data.

MOON PHASES



This block shows us the nearest phases (full moons and new moons) to our date and when each one happens, indicating the dates and the difference of days until the event. The previous lunar phases (before the assistant date) are on the left, and show a negative value of days of difference. The following phases are on the right (after the date in the assistant). They also tell us how many days are left for the event (positive number).

If you double-click on one of them, the assistant will change to the chosen phase date.

CHANGE THE DATE

By default, the moon assistant shows us the current position and time information, but we can change the date through the circular buttons that we have on the sides or by clicking on the date.

Press the buttons:

- | | | |
|---|---|---------------|
| 1. Press once on the left arrow button | → | previous day |
| 2. Press once on the right arrow button | → | next day |
| 3. Double-click the left arrow button (double press) | → | previous week |
| 4. Double-click the right arrow button (double press) | → | next week |

Click on the date.

A single click on the date will open the calendar view to choose the new date.

A double press will return the current date and time values to the moon attendant

UPDATE LOCATION

If you double-click on the location, the assistant will reload the location name based on your PC's GPS data or location, which can be defined automatically or manually in the app's settings screen.

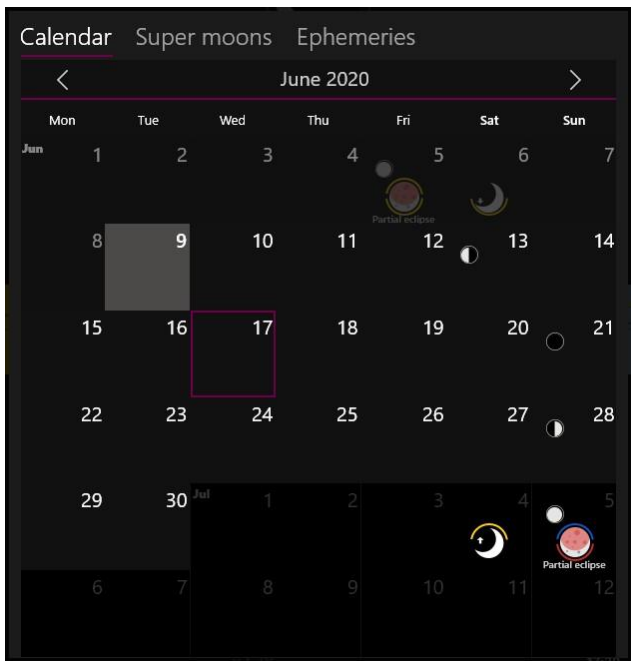
KNOW THE TIME ZONE

If we place the mouse over the time zone, it will show us more detailed information about it.

CALENDAR VIEW

This is the calendar view.

This window has double utility. On the one hand, it allows us to choose the date for the attendee and, on the other hand, we can see what events occur and when.



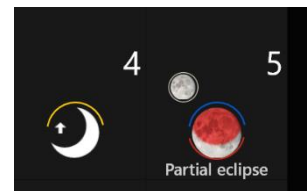
All calendar views can display events about the **calendar** (month-to-month, left image), in a list of all events (**ephemerides**) or the list of **supermoons**. These view options are chosen at the top.

CALENDAR

In the image you can see that on July 5, 2020 we have a full moon, the 13th waning, the 20th new moon and the 27th crescent. August 3, half dark because it is no longer the month of July, full moon again. In addition to the phases, it warns us of a partial eclipse on day 5th.

If you look at days 4th and 5th of the month (see enlarged image), a moon icon with an up arrow and a golden arch above appears on one, and on the other the image of the moon with a blue arch above and a red arc appears.

What does all this mean?



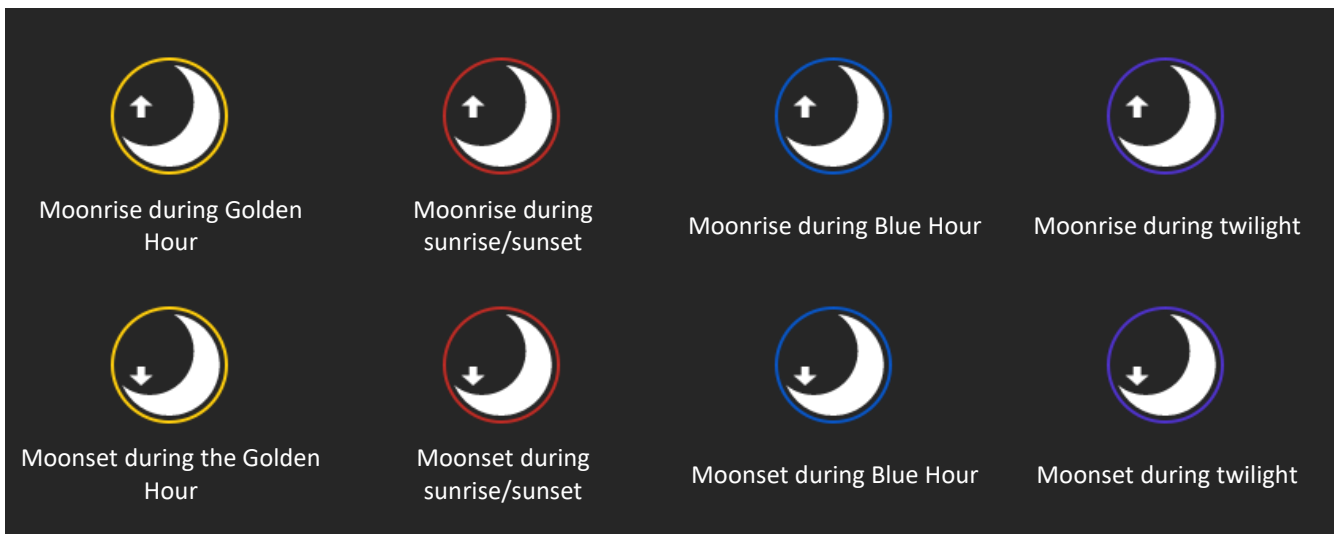
It means that the exit and setting of those days coincides with an appropriate light to capture the moon in an environment of light and close to the horizon.

If we have a small arrow pointing upwards and a colored arc is above, the light matches the moon's exit.

If the arrow points down and the colored arc is below, the light is at the moon setting

If it occurs at both the exit and the set, there will be an up arrow and one arc at the top and another at the bottom. This happens on day 5th, we have both bows, but not the arrows that when having another event are hidden.

To know the meaning of the colors of the arches, see the section of the colors of the sun.



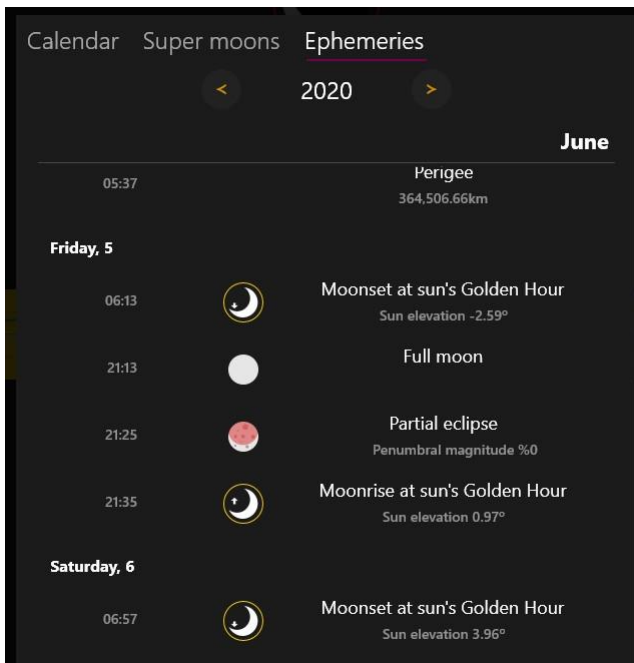


LIST OF SUPERMOONS

In the image on the left we have the list of supermoons, those in which the visible size of the moon is greater than 15% to the normal size and in which it is in the phase of full moon.

To choose any of these events, we will double-click.

The new date will be displayed in the moon assistant.



LIST OF EPHEMERIES

In the left image we can see the list of all events related to the moon: eclipses, equinoxes and solstices.

To choose any of these events, we will double-click.

The new date will be displayed in the moon assistant.

DETAILED INFORMATION ABOUT THE DAY

If we pause the mouse pointer over an event for an instant, the calendar will show us the detailed information of the day, with all the events, data and times in which it occurs.

Day 5 is a very intense day in terms of lunar events (pictured right).

To choose a specific day we will click twice on the date.

The buttons to the left and right of the month are used to switch to the previous or next month. We can also change by clicking on the month and year. If we scroll up and down in the view of the days, they will change the months in turn.

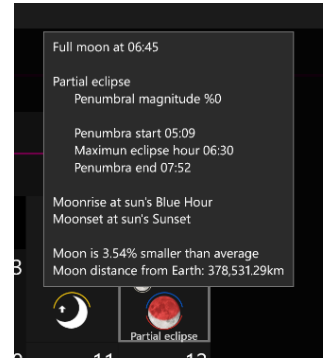


IMAGE OF THE MOON



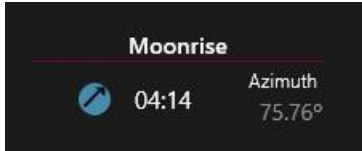
The image of the moon shows us the lunar phase and the light for the date, time and location. The image will change according to those values.

In addition to visually showing the phase, we'll have the name and lighting in percentage form. If the moon is hidden - below the horizon-, half-transparent (pictured on the right) will be displayed.

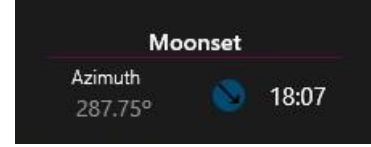
The moon icon is surrounded by a colored ring or circle. The color of the circle will change with sunlight (see image of the sun), indicating the time of day that occurs.

	Night	Examples:		White moon (raised in the night sky)
	Twilight			Red moon (slightly over the horizon during the blue hour of the sun)
	Blue hour			Yellow moon (in daylight)
	Golden hour			Orange moon (during sunset)
	Sunrise			
	Sunset			
	Day			

MOONRISE AND SETTING

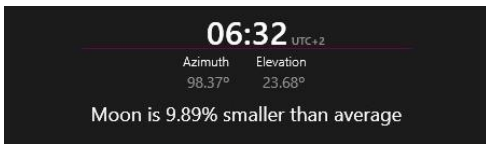


To the left and right of the hour, we have the rising and setting times along with the position where they occur (in azimuth degrees). There will be days when the moon's rising or setting will have no values.



When you double-click, we will tell the assistant that the new time to be displayed will be the chosen one.

CURRENT VALUES



Below the time, the position and elevation values of the moon are displayed. The position is in degrees with the geographic north as a reference (azimuth) and the elevation in degrees above the horizon (0° horizon, 90° above our head and negative values hidden behind the horizon).

It also indicates the percentage difference (greater or smaller) of the normal size. On supermoons days, their size usually varies by 8%-15% larger than normal.

CHANGING THE TIME

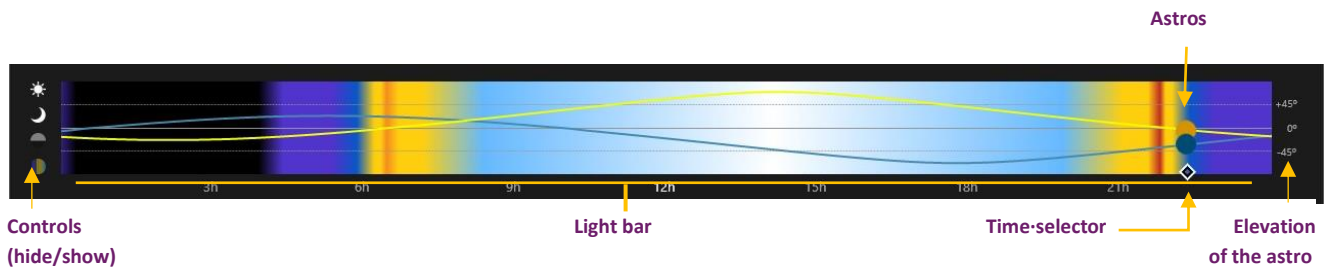
We have already seen how the date is changed; now let's see how to change the time.

If you click once on it, the clock view will open to choose the new time.

A double-click will return the current time values to the assistant, however, the date will remain unchanged.

THE LIGHT BAR

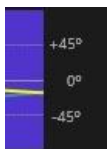
Below is what is called the light bar. The colors shown indicate the type of light for that time of day, from 00:00 to 23:59 on the same day, from left to right.



Double-clicking on the light bar changes the time to the chosen time.

Swiping the time picker or pressing and dragging the images of the astros also serves the same purpose. In the sun assistant, you can see the paths of both the sun (yellow), the moon (blue), and the GC (grey).

The sinusoidal lines indicate the path of the astros in the sky, the elevation for that moment, being 0° on the horizon, 90° above our head, $+45^\circ$ halfway between the horizon and the zenith (top half of the bar). Negative values would indicate (bottom half of the bar) that the astro would be hidden behind the horizon.



To the right of the bar, we would have the elevation indicators of the astro and their respective lines superimposed on the light bar. The highest point would be equal to 90° and the lowest point would be -90° .



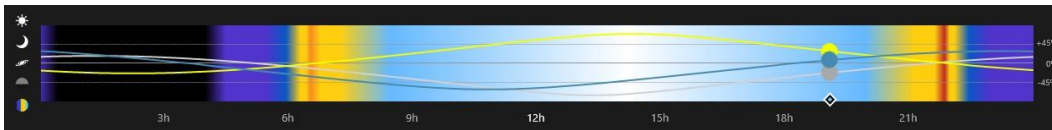
Controls

The controls to the left of the bar help us choose what we want to display.

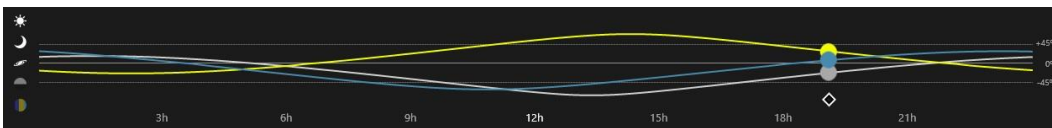
Being the icon of the sun, moon and GC (1st, 2nd and 3rd icon starting from the top) to hide or show the astros and their paths over the light bar.

The 4th control with the icon of a black and white circle allows to hide the bottom of the horizon line, making it easier to visualize when the astros are visible in the sky.

The 5th control is used to hide the colors of the light bar.



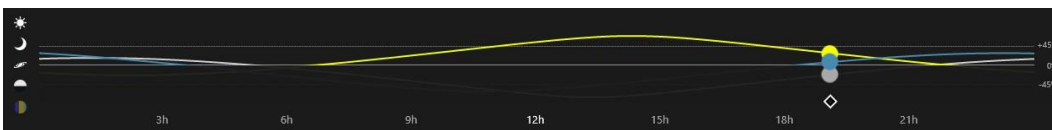
Default view: Both the colors of light and the full paths of the sun, moon and GC are displayed. .



We hide the colors. Paths are displayed on a gray background. They make it easier to see them, but we won't know the time of day they happen.



The trajectories of the stars below the horizon are hidden.



Both colors and paths below the horizon are hidden. We'll know at a glance when the astros are over the horizon (both lines visible at the same time).

EXTENDED INFORMATION

Is visible	Yes
Moon moment	Moon white
Moon age	25 days 10 hours 52 mins
Coordinates	43.3087 , -1.9784
Altitude	1m
Shadow ratio	x2.28
Angular diameter	0.541°
Moon distance	401,762.54km

In this section of the assistant we can see more information about the moon. It is organized as a table:

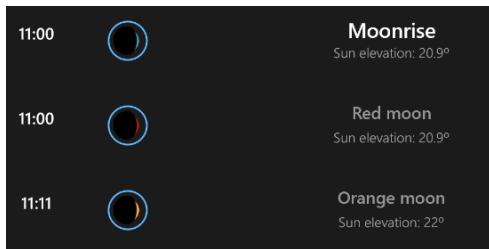
Visible: Indicates whether the moon is visible over the horizon or not (for date, time, and location).

Moon moment: Name of the moonlight.

Moon age: Age of the lunar phase since the last full moon.

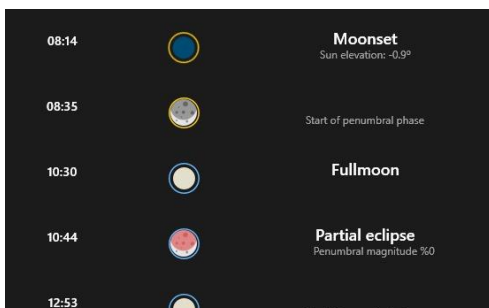
- Coordinates:** Latitude and longitude of the location.
- Altitude:** Altitude in meters above sea level of the location.
- Shadow ratio:** Ratio between the height of an object and the length of its shadow on a planar surface. It will appear empty if the moon is not visible (hidden below the horizon).
- Angular diameter:** Angle in degrees that occupies the moon in the sky.
- Moon distance:** Distance between moon and earth.

TIME TABLE



The time table is located to the right of the assistant. It shows us the events and moonlights that occur during the chosen date. They're sorted chronologically.

On the left indicates at what time the event or the start of the light occurs. If we are on today's date, it will indicate how long it is left.



Phases of the lunar eclipse in the time table

In the second column, we will see the moon with the phase, the color of the moonlight and around, in a circle, the moment of sunlight in which it occurs.

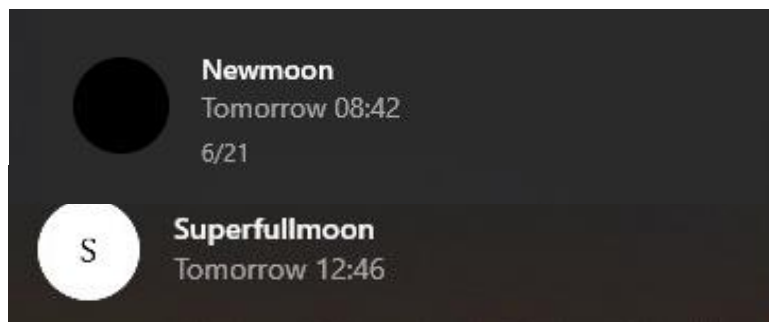
Finally, the left column will indicate the name of the event or light.

Keep in mind that just as there may not be a sunrise and/or sunset, we only have one moon entrance or exit on that day.

A double-click, again, serves to tell the attendee the time to display.

EVENT NOTIFICATION

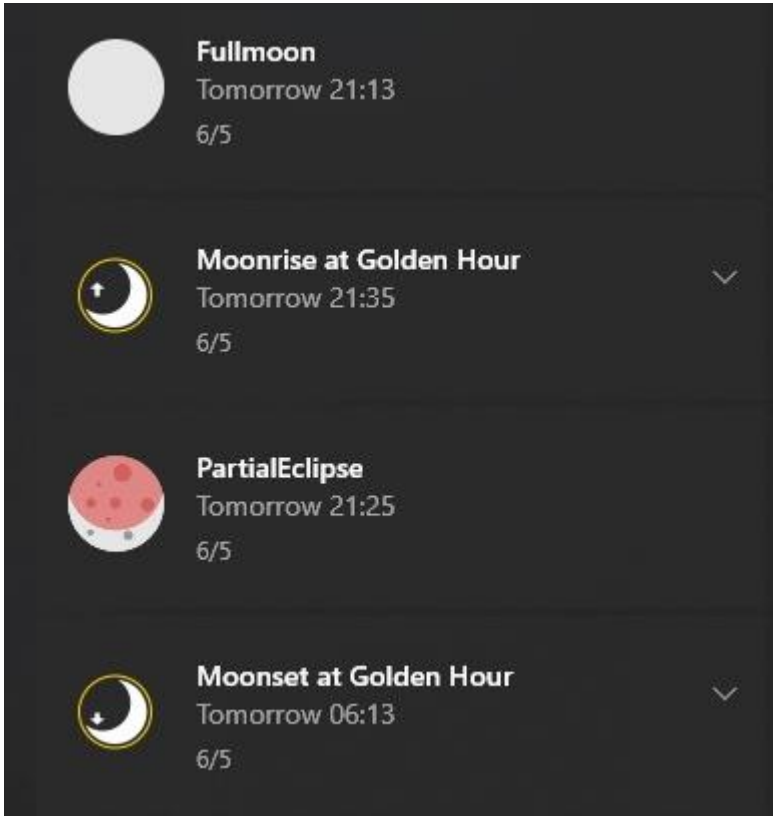
The Moon Assistant launches several types of notifications:



Moon eclipse notifications. As they are of special interest, they start one week in advance.

Lunar phase notifications. Full moon and new moon.

Supermoon notifications.



Notifications of **moonrise** and **moonset** during golden hour, blue hour, twilight and sunrise and sunset.

All notifications indicate the time when events occur and the date. In addition, they will remind us if the date is today, tomorrow, the day after tomorrow or within a week.

KEYBOARD SHORTCUTS

TIME

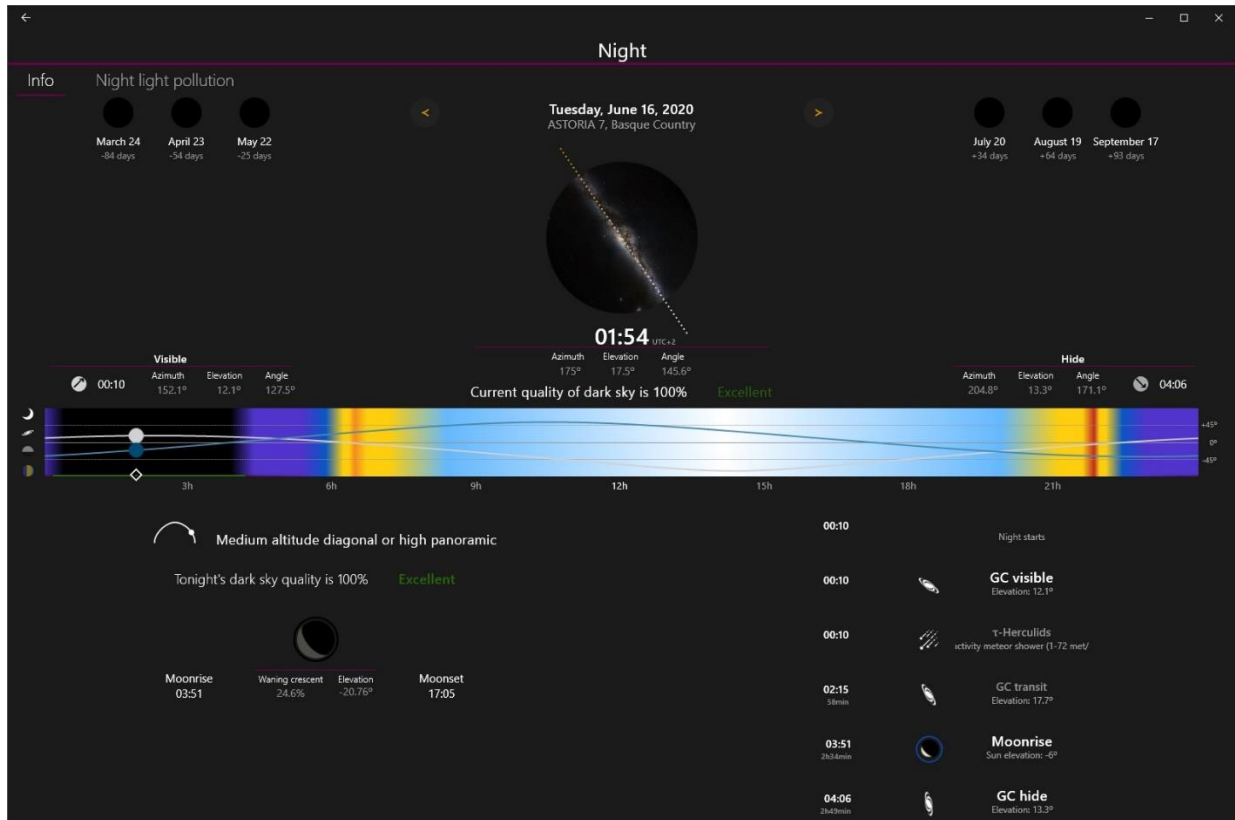
Current date (today)	Ctrl + T
Current date and time (today and now)	Ctrl + N
Previous minute	, (comma)
Next minute	. (dot)
Back 15 min	Shift + , (;)
Advance 15 min	Shift + . (:)
Previous time	Ctrl + ,
Next hour	Ctrl + .
Previous day	Ctrl + ←
Next day	Ctrl + →
Previous week	Ctrl + Alt + ←
Next week	Ctrl + Alt + →
Previous month	Ctrl + ↓
Next month	Ctrl + ↑
Previous year	Ctrl + Alt + ↓
Next year	Ctrl + Alt + ↑

LIGHT BAR

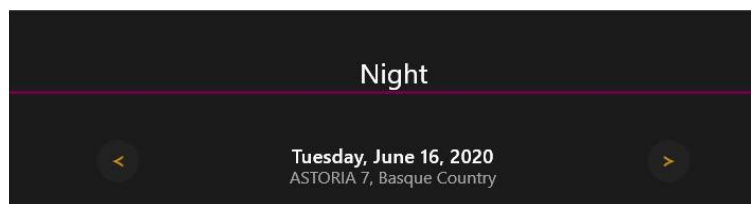
Show sun, moon and GC	Ctrl + 0
Show/hide sun	Ctrl + 1
Show/hide moon	Ctrl + 2
Show/hide GC	Ctrl + 3
Show/hide lines below the horizon	Ctrl + 8
Show/hide colored light bar	Ctrl + 9
Reset View. Activate all lines	Ctrl + Alt + 0
Sun single view. Hides all lines on the map except of the sun.	Ctrl + Alt + 1
Moon single view Hides all lines on the map except those of the moon	Ctrl + Alt + 2
GC single view. Hides all lines on the map except GC lines	Ctrl + Alt + 3

NIGHT

The night assistant gives us all the information about the night we are interested in: the time when galactic center (GC from now on) is visible, when it hides, altitude and position, the phase of the moon (affects us in the quality of the night), and the astronomical events of the night.



DATE, TIME AND LOCATION



Just above the image of the galactic center we have the date and location, below the time and time zone. All information is calculated about this data.

CHANGE THE DATE

By default, the night assistant shows us the current position and time information, but we can change the date through the circular buttons that we have on the sides or by clicking on the date.

Press the buttons:

1. Press once on the left arrow button → previous day
2. Press once on the right arrow button → next day
3. Double-click the left arrow button (double press) → previous week
4. Double-click the right arrow button (double press) → next week

Click on the date.

A single click on the date will open the calendar view to choose the new date.

A double-click will return the current date and time values to the assistant.

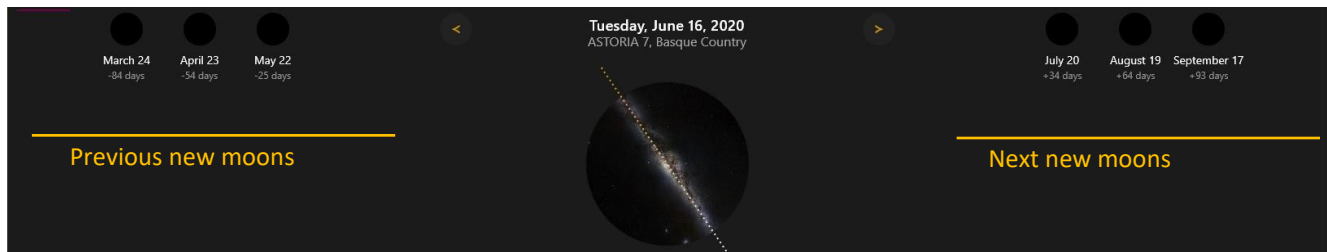
UPDATE LOCATION

If you double-click on the location, the assistant will reload the location name based on your PC's GPS data or location, which can be defined automatically or manually in the app's settings screen).

KNOW THE TIME ZONE

If we place the mouse over the time zone, it will show us more detailed information about it.

MOON PHASES



This block shows us the nearest phases (new moons) to our date and when each one happens, indicating the dates and the difference of days until the event. The previous lunar phases (before the assistant date) are on the left, and show a negative value of days of difference. The following phases are on the right (after the date in the assistant). They also tell us how many days are left for the event (positive number).

Only the new moon phases are shown because they are the ideal dates for shooting stars, MW and GC.

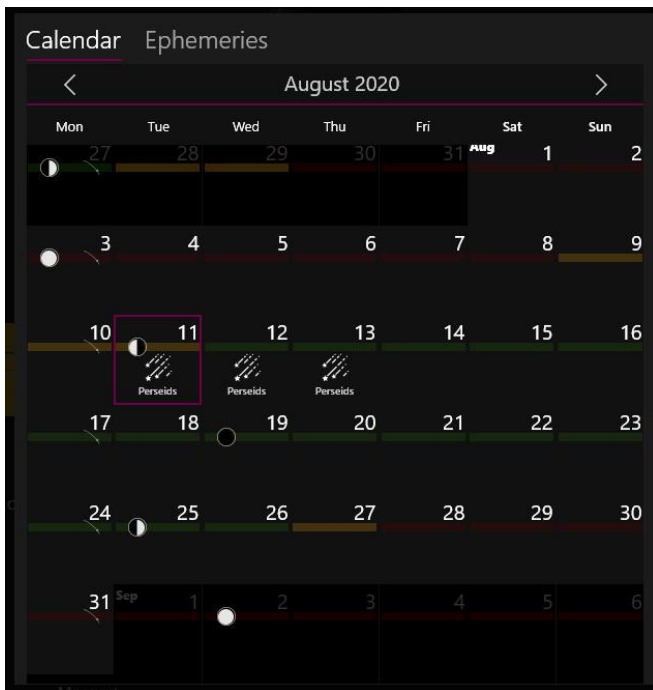
If you double-click on one of them, the assistant will change to the chosen phase date.

CALENDAR VIEW

This is the calendar view.

This window has double utility. On the one hand, it allows us to choose the date for the attendee and, on the other hand, we can see what events occur and when.

All calendar views can display events about the **calendar** (month by month, image on the left) or in a list of all events (**ephemeris**). These view options are chosen at the top.







CALENDAR

In the image we can see:

- Lunar phases (day 3, 11, 19, 25)
- Meteor showers (Perseids on days 11, 12 and 13)
- GC arc type every Monday. If we place the mouse pointer on a date it will show us the angle in degrees. This value indicates the angle of the arc of the Milky Way relative to the horizon being 0° completely horizontal and 90° vertical.

According to the angle values it describes graphically possibilities that can be:

-  **Low diagonal or horizontal panorama**, for angles less than 25 degrees.
-  **Mid-height diagonal or high panorama**, for angles between 25° and 50° .
-  **High diagonal** for angles between 50° and 75° .
-  **Vertical** for angles greater than 75 degrees.

These values are mean values for the entire GC visibility session. This implies that even if we have a value of 80 degrees (vertical), it may be that at the beginning of the night we have a high diagonal value and that, little by little, it goes up in the sky until it reaches 80 degrees and more at the end of the night. Or the other way around, it's higher and it's slowly coming down.

Below the date number, we will see some color stripes that can be both red, yellow and green. The color indicates the quality of the night darkness. The darker the night and the longer the quality, the higher the quality. The quality goes hand in hand with the lunar phase and the passage through the sky, as we mentioned above.

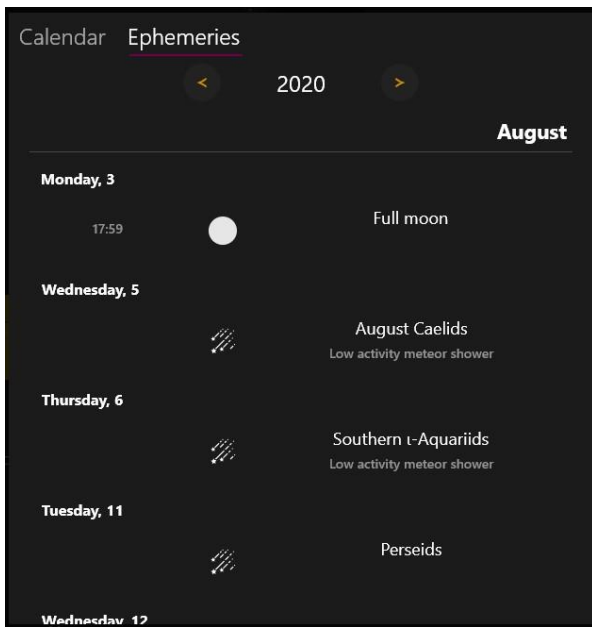
If the color is red, it indicates that the night is not good for night photography; fewer stars will be seen than usual and the arc of the Milky Way as the galactic center will be less visible.

If the color is yellow, it's not the best night for night photography.

The dates in green will be conducive to capturing starry skies, capturing meteor showers and seeing the brightest MW and GC.

To choose a specific day we will click twice on the date.

The buttons to the left and right of the month are used to switch to the previous or next month. We can also change by clicking on the month and year. If we scroll up and down in the view of the days, they will change the months in turn.



LIST OF EPHEMERIES

In the left image we can see the list of all events related to the moon: eclipses, equinoxes and solstices.

To choose any of these events, we will double-click.

The new date will be displayed in the moon assistant

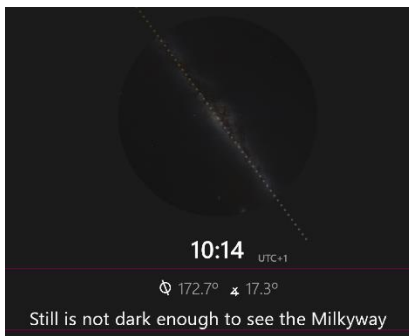
DETAILED INFORMATION ABOUT THE DAY

If we pause the mouse pointer over an event for an instant, the calendar will show us the detailed information of the day, with all the events, data and times in which it occurs.

Day 5 is a very intense day in terms of lunar events (pictured right).

To choose a specific day we will click twice on the date.

IMAGE OF THE GALACTIC CENTER



The image of the GC shows us what the brightest area of the MW will look (or look) like. The angle will change from a more horizontal view to a more vertical view depending on the time and months.

If the image is obscured, it means that it is not yet visible in the sky and will tell us in the text below that there is still too much light to see it with the naked eye.

START AND END OF GC VISIBILITY

Visible			
	Azimuth	Elevation	Angle
🕒 00:10	152.1°	12.1°	127.5°

Hide			
Azimuth	Elevation	Angle	
204.8°	13.3°	171.1°	🕒 04:06

To the left and right of the time, we have the start and end times of the GC visibility along with the position in which they occur (in azimuth degrees). We say start and end, because many times it will not coincide with the rising and setting of the GC on the horizon. It may happen that when the rise happens, the sky is not yet dark enough, in which case the start of visibility will be later or, that it does not occur.

NO GC VISIBILITY

There are some cases where, for one reason or another, the GC will not be visible for days.

If we are close to the latitude 60 degrees in the northern hemisphere, the GC will barely appear above the horizon throughout the year. At higher latitudes it will not be visible at any time. This is because the GC is about 30 degrees south of the equator. This does not happen in the southern hemisphere, as it will be seen at all latitudes and at higher elevations.

It can also happen that, during the night hours, the GC is below the horizon and we have to wait for a few months until it becomes visible again.

CURRENT VALUES

Below the time and time zone, we have the values of the position in the sky, both the azimuth and the elevation.

CHANGING THE TIME

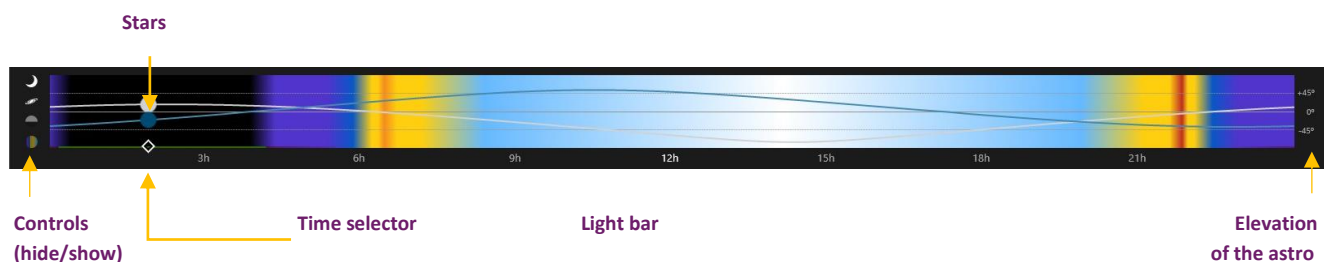
We have already seen how the date is changed; now let's see how to change the time.

If you click once on it, the clock view will open to choose the new time.

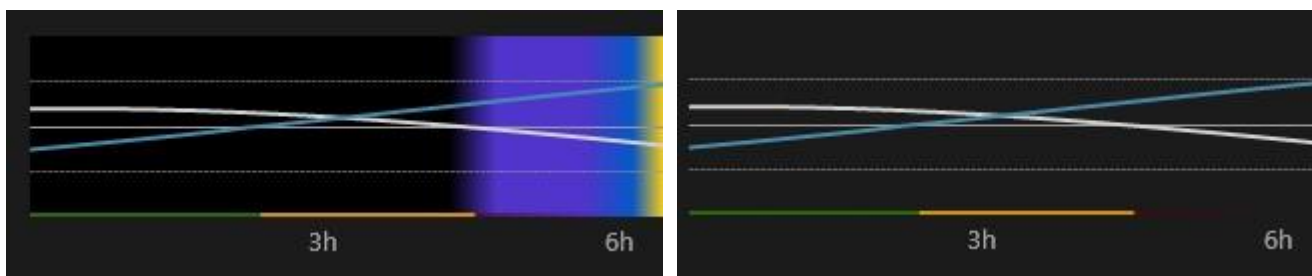
A double-click will return the current time values to the assistant, however, the date will remain unchanged.

THE LIGHT BAR

Below is what is called the light bar. The colors shown indicate the type of light for that time of day, from 00:00 to 23:59 on the same day, from left to right.



For many nights, the quality of it will not be the same. As noted above, as long as the moon is hidden below the horizon or its phase is new or near moon, the quality of the night will be higher. Under the light bar and above the timestamps, you can see color lines indicating the quality during that time of night.



In the images above, we can see that between 0:00 and something before 3:00 we have good darkness. Then, until 4:30 or so, of medium quality, caused by the moon. Finally, the night would end and the quality would be poor (red line disappearing).

Double-clicking on the light bar changes the time to the chosen time.

Swiping the time picker or pressing and dragging the images of the astros also serves the same purpose. In the sun assistant, you can see the routes of both the GC (grey) and the moon (blue).

The sinusoidal lines indicate the path of the astro in the sky, the elevation for that moment, being 0° on the horizon, 90° above our head, $+45^\circ$ halfway between the horizon and the zenith (top half of the bar). Negative values would indicate (bottom half of the bar) that the astros would be hidden behind the horizon.



To the right of the bar, we would have the elevation indicators of the astro and their respective lines superimposed on the light bar. The highest point would be equal to 90° and the lowest point would be -90° .

Controls

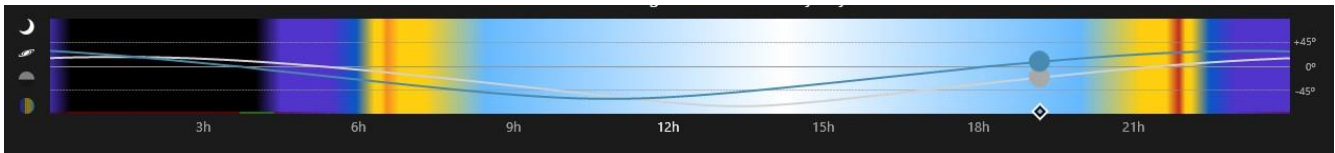


The controls to the left of the bar help us choose what we want to display.

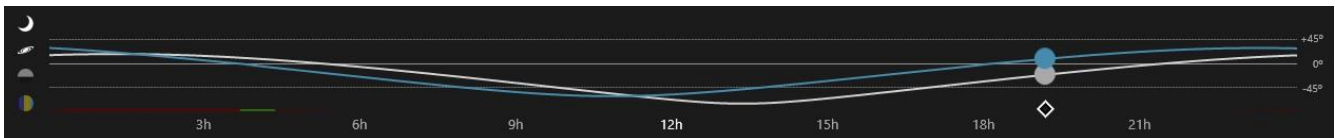
Being the icon of the sun, moon and GC (1st, 2nd and 3rd icon starting at the top) to hide or show the astro and their paths on the light bar.

The 4th control with the icon of a black and white circle allows to hide the bottom of the horizon line, making it easier to visualize when the astros are visible in the sky.

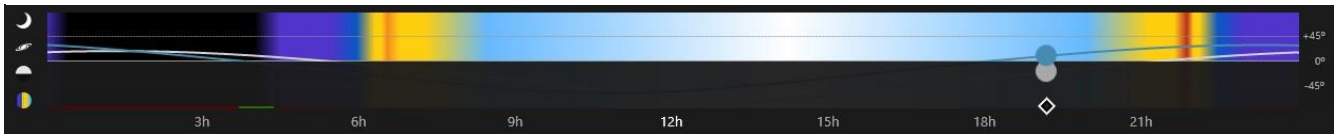
The 5th control is used to hide the colors of the light bar.



Default view: Both the colors of the light and the full paths of the moon and GC are displayed. .



Colors are hidden. Paths are displayed on a gray background. They make it easier to see them, but we won't know the time of day they happen.



The trajectories of the astros below the horizon are hidden.



Both colors and paths below the horizon are hidden. We'll know at a glance when the astros are over the horizon (both lines visible at the same time).

EXTENDED INFORMATION



This block gives us information about the quality of the darkness of the night hours.

The quality is the result of the lunar phase and your pass through the sky. The more advanced the phase (closer to the full moon) the more light there will be in the sky and the visibility of both the GC and the Milky Way will be lower. The opposite will occur if the moon is hidden even if the phase is advanced.

In short, if the quality of the night sky is 100% or very close values, they will be very suitable dates for the photograph of the GC and the Milky Way as of the meteor showers.

TIME TABLE

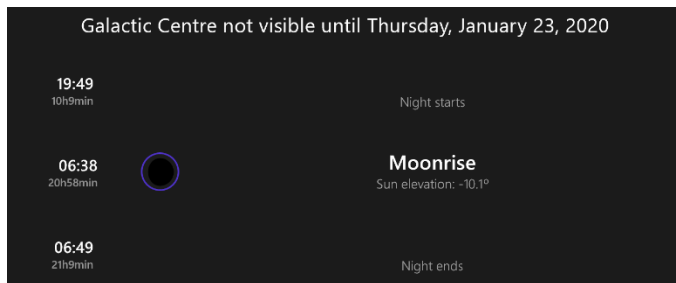
The time table is located to the right of the assistant at the bottom. It shows us the events and lights of the night for the chosen date. They're sorted chronologically.

If we are on dates when the GC is not visible it will tell us what the next date will be when the GC station will begin. A double tap will take us to that date. If we are at latitudes that are never visible, it will tell us that it will never be visible at that location.

The left column indicates when the event occurs. If we are on today's date, it will indicate how long it is left.

In the second column, we will see the image of the GC and its angle.

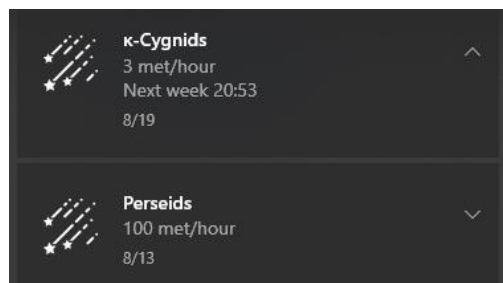
Finally, the name of the event will be indicated in the left column.



The types of events that show us are, the times of the start and end of the night, start and end of the visibility of the GC, name of the meteor shower (and of what kind they are) and the passage of the GC by different elevations (10°, 20°, ...) and its transit. Also, if in the period of the night coincides with the moon's rising and its setting.

A double-click, again, serves to tell the assistant the time to display.

EVENT NOTIFICATION



The night assistant launches only one type of notification:

Meteor showers notifications. The most active ones are notified one week in advance, but the lower-active ones on the same day.

KEYBOARD SHORTCUTS

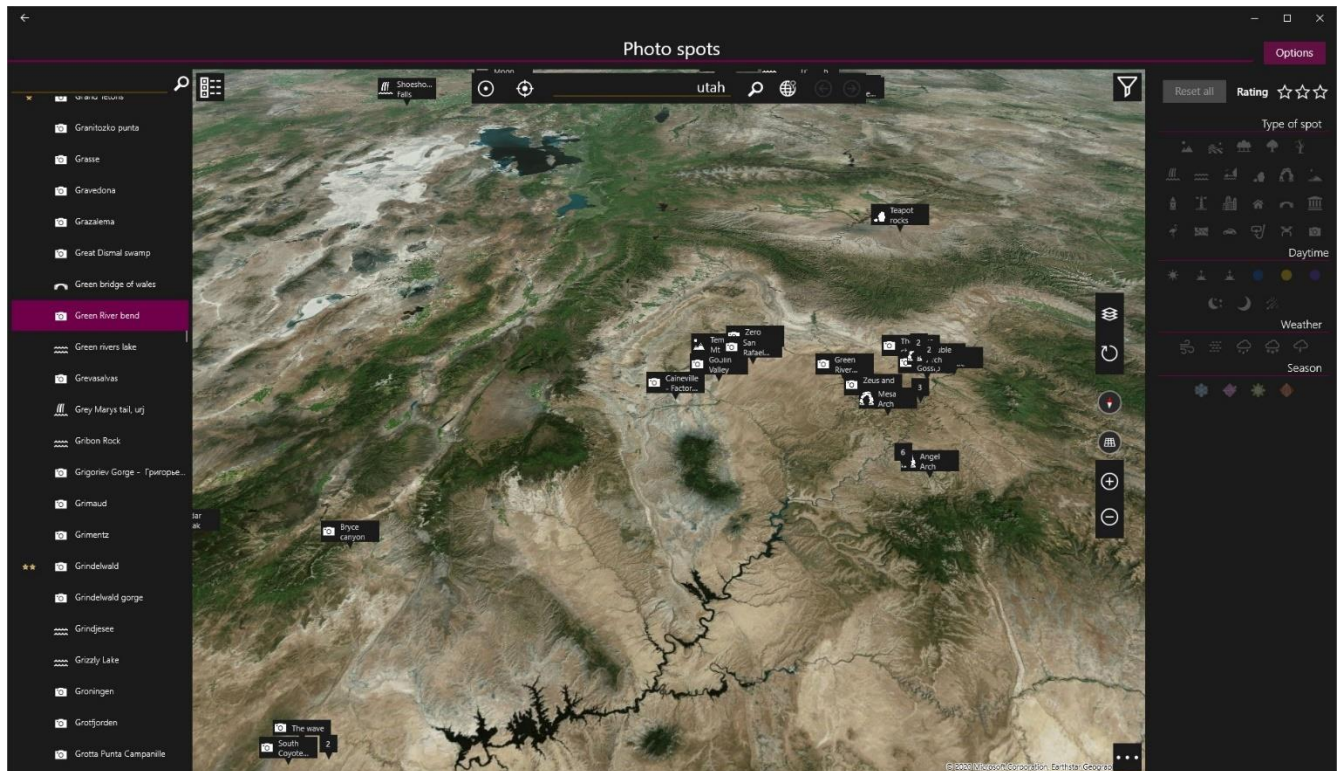
TIME	
Current date (today)	Ctrl + T
Current date and time (today and now)	Ctrl + N
Previous minute	, (comma)
Next minute	. (dot)
Back 15 min	Shift + , (;)
Advance 15 min	Shift + . (:)
Previous time	Ctrl + ,
Next hour	Ctrl + .
Previous day	Ctrl + ←
Next day	Ctrl + →
Previous week	Ctrl + Alt + ←
Next week	Ctrl + Alt + →
Previous month	Ctrl + ↓
Next month	Ctrl + ↑
Previous year	Ctrl + Alt + ↓
Next year	Ctrl + Alt + ↑
LIGHT BAR	
Show sun, moon and GC	Ctrl + 0
Show/hide moon	Ctrl + 2
Show/hide GC	Ctrl + 3

Show/hide lines below the horizon	Ctrl + 8
Show/hide colored light bar	Ctrl + 9
Reset View. Activate all lines	Ctrl + Alt + O
Moon single view. Hides all lines on the map except those of the moon	Ctrl + Alt + 2
GC single view. Hides all lines on the map except of the GC lines	Ctrl + Alt + 3

PHOTOSPOTS

This assistant will serve us to view the locations that we have saved from the planner, be able to import from different files from Google Earth, Google Maps, ... (kml and kmz extensions), edit and classify locations, and use them for our Planner Assistant.

INTERFACE

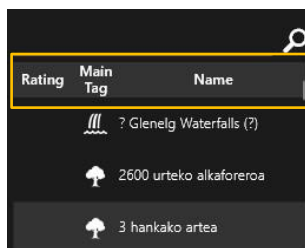


The main view is divided into three parts: in the center, the map with the locations visible, on the left, the list of locations and on the right, the filters.

Let's take a closer look at each one.

LIST OF LOCATIONS

In the left pane we can see a list of locations.

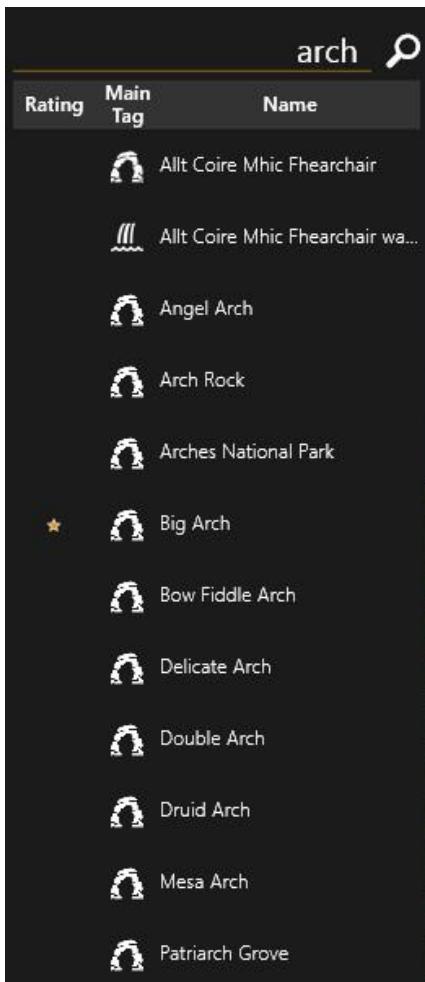


In yellow, the sort bar.
Above, the search box.

If no filter is applied (see filter pane), all uploaded locations are displayed in the assistant. This list will be modified as we filter what type of locations we want to see.

By default, the list is sorted by location name, but we can change it if we want to sort it by name, rating (number of stars) or by type (icon). To do this, click twice on the top bar of the list to choose the sorting method.

In addition, we have the option to search for a location by name. At the top of the list you can see a text box with a magnifying glass image (search), where we can type the name (or part) of the location. As we complete it, the list of locations that match the text will be reduced.



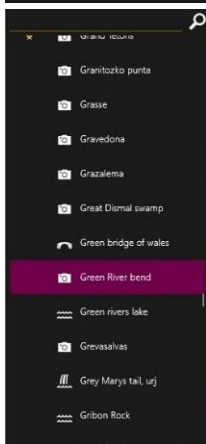
Example: From among the hundreds of locations we want to find all entries that contain the word “arch”.

We type the term to filter in the search box. As we type, all entries will be filtered showing only those that contain the text.

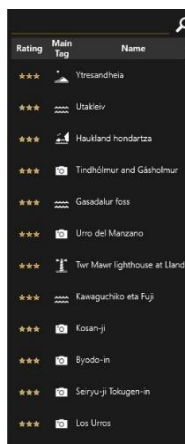
In the image on the right, of the hundreds of locations we had, it shows us only a few.

As you can see, in addition to those that have the word arch as indicate of the location, there are also other locations that have nothing to do with natural formations: *Allt Coire Mhic Fhearchair*, *Patriarch Grove*.

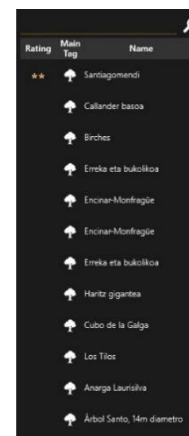
So, for a quick search it will make it much easier for us.



SORTED BY NAME.
LOCATIONS WILL BEGIN WITH THE LETTER A TO Z.



SORTED BY RATING
LOCATIONS CAN BE RATED 3, 2, 1 OR 0 STARS, INDICATING THAT THE MORE STARS, THE MORE INTERESTING THE LOCATION.
THE LIST WILL BE SORTED STARTING WITH THE LOCATIONS WITH THREE STARS.



SORTED BY TYPE
ALL LOCATIONS HAVE AN ICON INDICATING THE LOCATION TYPE.

FILTER PANEL

The filter pane is to the right of the assistant.

This panel consists of the reset button all filters, the rating selector (minimum of stars to be displayed), and the location tag type selector.

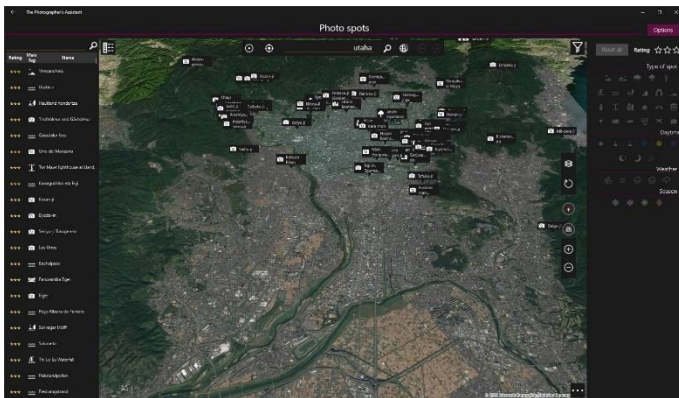
The reset button is only activated when we have some active filter.

If all the stars in the rating filter are empty, it means that we do not have the filter active, showing all the locations of any rating (0 stars, 1, 2 or 3). We can change the filter by indicating the minimum titration. To return the filter to 0, double-click the title (Rating).

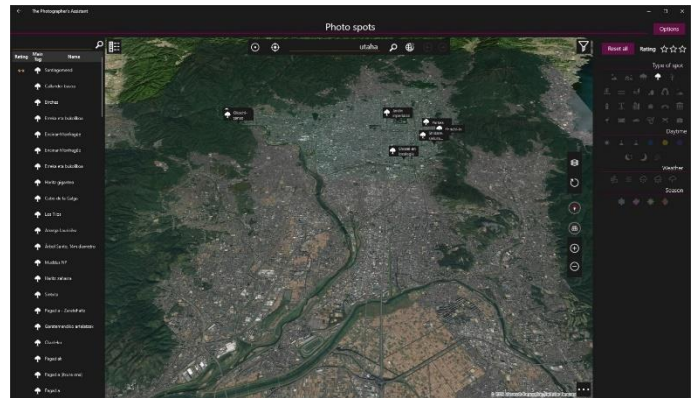
Below are all the icons (tags) of locations grouped by type:

- Type of location or photographic milestone. Indicates the primary subject type.
- Light labels. Indicates the ideal moment or light potential for the milestone.
- Atmospheric or weather labels. Indicates the atmospheric or time conditions for the milestone.
- Seasons. We can indicate the season of the year for the location. Some locations are more conducive in certain seasons than in others.

If you click on the icons, you'll see how both the map view and the list are marked and filtered. This filter tool is very practical when we look for a certain type of milestone and we just want them to be shown filtering the others.



Unfiltered map



Filtered map.

It only shows locations with tree as a main tag

MAP

The entire central area of the assistant is occupied by the map with the pins of the locations.

When we are planning an outing or a photographic trip, this assistant will help us a lot by being able to visualize all the photographic points of interest that we have loaded, where they are, what type they are and their value of interest.

MAP CONTROLS

The map contains a series of buttons that are grouped into four groups.

Top buttons **(1)**. We have buttons related to GPS and location finder by name.

Right group buttons **(3)**. The map controls.



Hide/show location list **(2)**.



Hide/Show Filter Panel **(4)**.

In addition, we have the button to hide/show all buttons (5).



TOP CONTROLS



GPS button. If our device has a GPS sensor, it will activate and show us with a blue dot where it is at all times. To deactivate, press again.



GPS positioning button. If our device can use the GPS sensor, it will position the black pin in that position. It may happen that the sensor needs a few seconds for it to get the position.

If we have the application set to make the location manual, GPS positioning will put the position pin in the manual location of our choice.



Search location by name. If we do not know exactly or are not very sure where it is, but we do know the name of the site, we will be able to type it in the search text box and then we will hit the **enter** key.

If you have not found any place with that name you will indicate that you have not found any results. We may have misspelled the name or changed some place letter (place names in other languages).

If you have found any results, you will show us in a list the name of the site and country sorted by the most common result in the first place. We choose the site by clicking on the list entry.

Keyboard Shortcut: **Ctrl + F**

CONTROLS ON THE RIGHT



Map type. It allows us to choose the type of map that will be displayed on the screen. Possible options are:

1. **Roads:** The map will show roads, cities, and geographic objects in flat colors.
2. **Terrain:** This mode will show a slight shading indicating the sloped areas.
3. **Aerial:** This mode is the most complete and you need 3D view to show in addition to terrain, with aerial photo textures, view cities and buildings in 3D.

4. **Aerialwith roads:** Same as the previous mode, but with overprinted roads in the photos.

Keyboard Shortcut: Change Map Type (**Ctrl + M**)

Restore standard map type (**Ctrl + Shift + M**)



Change zoom. If we give the control (+) the map will zoom in and out if we hit the (-). You can also zoom in with the mouse roulette.

Keyboard Shortcuts: Zoom In (+)

Zoom out (-)



Restore Map View. Restores the standard values of the map: default zoom, centered on the black pin and with the north pointing upward.

Keyboard Shortcut: **Ctrl + Space**

Compass. Rotates the map horizontally. When you turn, the compass will indicate where the north is (red arrow). It will always rotate with the center of the map as a pivot.

Perspective. Allows you to change the perspective of the 3D camera. We can go down/up, turn the camera. You will always change the perspective with the center of the map as a pivot.

LOCATIONS

Locations are displayed above the map as a mark or gray pin.



If they are unitary, that is, they are ungrouped, they display the name and icon.



If they are grouped, they show only a number indicating how many locations we have near that point.

Why are locations grouped? To prevent them from overlapping each other and to speed up navigation.



You can choose a location by clicking on it. The location will be marked in the list.

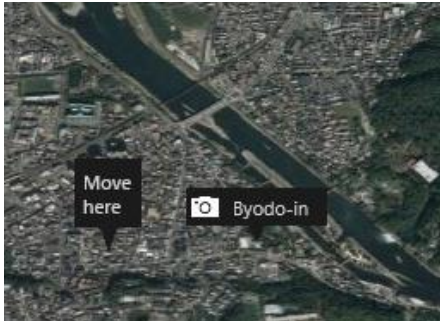
A double press (or Ctrl + tap) will show you the details of the location.

To edit the location, we will press twice with the Ctrl key activated or with the combination Ctrl + Shift + press.

For more information on editing and viewing locations, see the below.

If we pass the pointer over the locations it will show us a summary indicating also the rating.

To open the context menu of the location, we must press the right button. In addition to the actions described above, we can also open the location in the Scheduler.



If at any time the pin has been located in an unwanted position, we can move it to a new position. To do this, we choose the move option in the context menu and bring the label *move here* to the position we want.

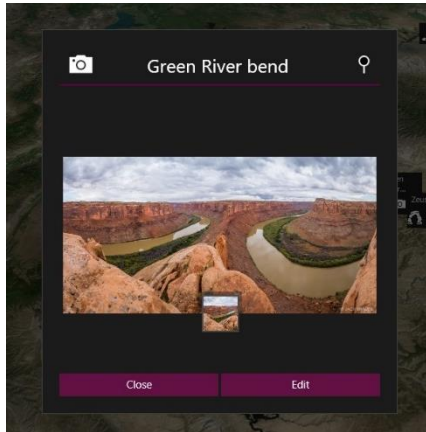
If you click to delete, it will ask you if you really want to delete it. If we accept, it will disappear from the list of locations.

LOCATION DETAILS

This window will show you all the details of the chosen location. Starting from above, we have the milestone icon, the name and a black pin (see black pin).

Below would appear the description if we have added more details to it. Here are the details of how to get to the site, places to park, walking distance, slope, historical details, time tables, ... Anything of interest.

Then we show the captures and images related to the location, which will serve both to remember the location and to have a list of model photos. When we have a few hundred locations saved, it's good to have a visual reference to the place to make memory.

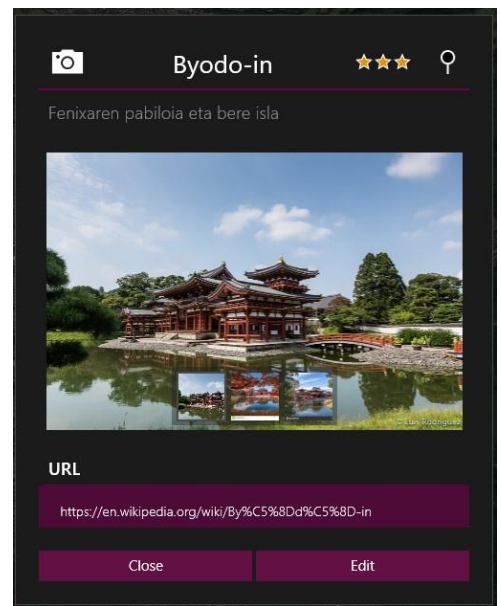


Detail of the location Green River Bend.
Only one photo has been added.

In addition to the description, we may also add different links to web pages to have more information at hand, especially when the amount of information exceeds the use and purpose of the description.

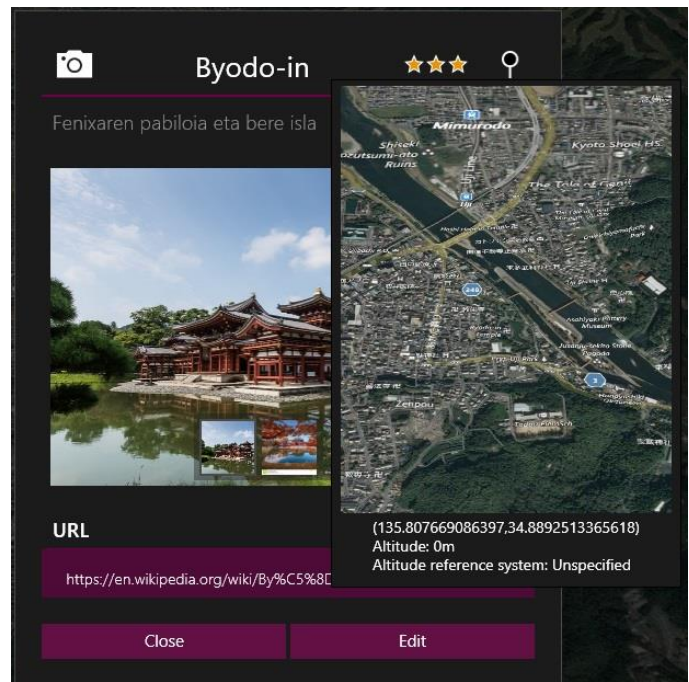
Detail of the Byodo-in location, near Kyoto.

In addition to the required details (name, and icon), the rating (3 stars), a small description, three images found on the internet and a link to a web page with more information about it have been added.



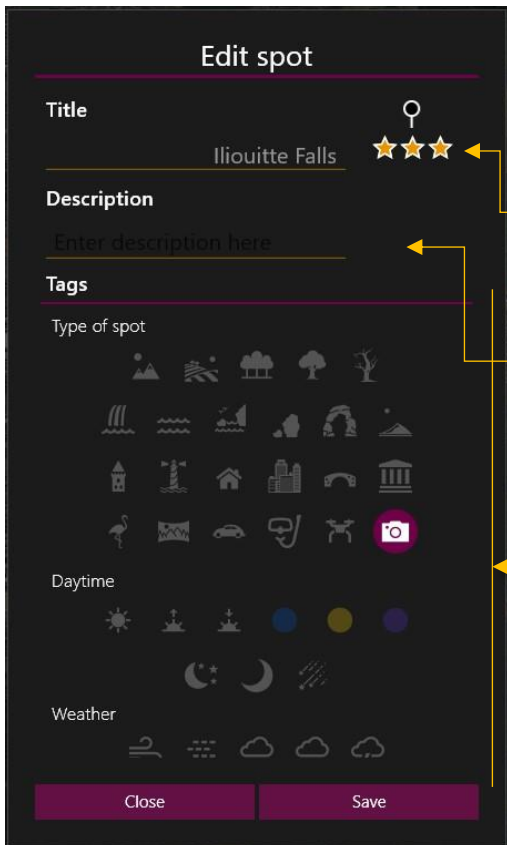


Source image missing
We'll have to replace it with a new one.



Pausing the mouse pointer allows us to visualize the location and when it exists, the line to the milestone.

EDIT LOCATION



Here we can edit the location details.

A location will have at least one name (or title) that identifies it and the landmark type icon.

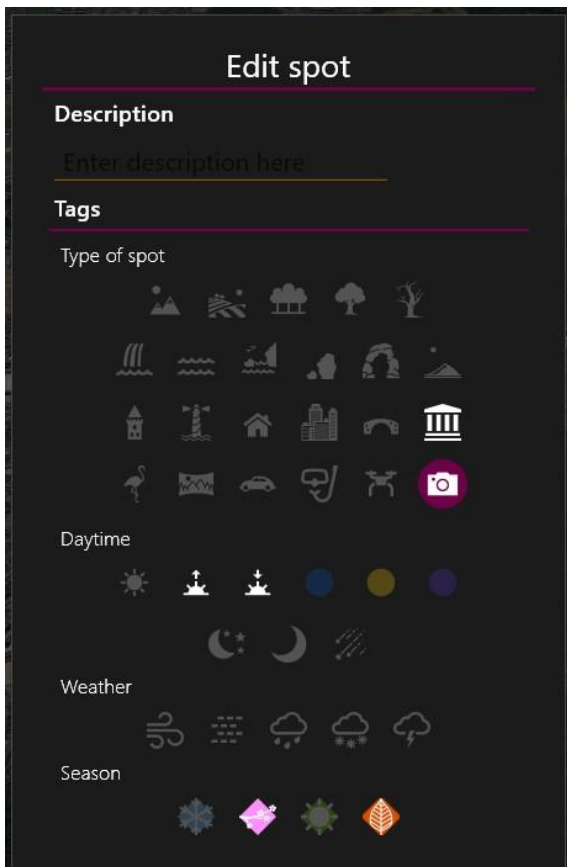
Depending on the interest and possibilities of the location, you will have a defined **rating** with the stars (0 stars, minimum interest, 3 stars, maximum interest).

In addition, we can add a small **description**. Here are details of how to get to the site, places to park, walking distance, slope, historical details, time tables, ... Anything of interest.

The description has a length limit, so any information that cannot be added must be accessible through links to web pages, ... (see URL links).

Tags are used to identify what type of photograph we can make and the most interesting lights/atmospheres for the location.

Tags are grouped into different types, each for its own purpose.



Tag selection.

This location indicates that it is of a general type, with a possible monumental landmark, interesting for both sunrise and sunset, both in spring and autumn.

The first group serves to indicate the **type of photographic landmark**, whether it is a forest, a wide, urban landscape, a historic building, ... This will be the icon that identifies you both in the list and on the map. You can add more than one tag, but only one will be the main one.

The second indicates the **type of sunlight or moment**, whether it is an interesting place for a sunset, moon or simply to make night with or without meteor showers. It is not mandatory to mark one of these tags, but you can also mark more than one, indicating that the place may be interesting with different types of light or for different stars.

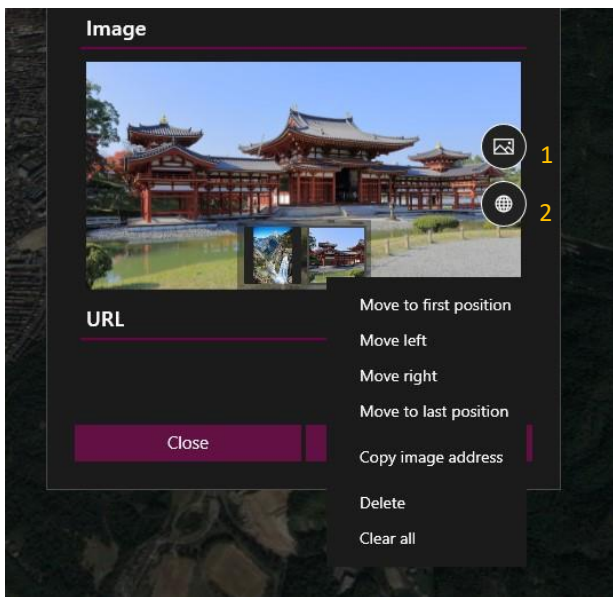
The third group allows to indicate the different **atmospheres or weathers** for the location. Some sites are very interesting on fog days, others during storms or others after rainy days. Here we can also leave unchecked or on the contrary, mark more than one.

Finally, the fourth group, serves to indicate the time or **season** of year (winter, spring, autumn or summer).

If we go down, under the tags we can see the section to add the **images and photos**.

The source of these can be either from a local file that is in a folder on our machine (1) or via a link to a web image (2).

All the images we've added will appear right at the bottom of the image in a big way, being able to sort or delete them.



Add web image.

Web images that are added, are not downloaded. A link to the source is maintained that may disappear over time.

All images are by their respective authors and serve only as an example.

Finally, press the save button to apply the changes. If, on the other hand, click close, the changes will not be applied.

UPLOAD AND IMPORT LOCATIONS

On the one hand, we have the locations saved with the application. These are usually those created from the Planner or those imported from an external file (kml/kmz extension, usually created in Google Earth or Google Maps).

These locations will load automatically each time we launch the app.

To import new locations, we can do it in two ways.



Sort the images

We can sort the images, such as adding new ones or deleting them.

1. From the Options button at the top right of the assistant, and from the pop-up menu, choose Import (Ctrl + L). A window will open to choose the file to import. *Due to certain restrictions on Microsoft Store apps, files sourced in the Downloads, Documents, and the app's own folder (accessible from the settings window) can only be accessed.*
2. Dragging files with kml or kmz extension to the assistant.

Once the process is finished, it will tell us if it has completed successfully showing the number of locations imported or if there might be any problems in the import, possibly caused by folder permission issues or incompatible file format.

New locations will be displayed on the map.

SAVE CHANGES

If we want to save these new locations in the application, we will press the options button and in the drop-down menu, we will choose save to DB (first option, Ctrl + S).

If we do not do this step, the imported locations will not be saved and to use them again, we will have to import them again.

EXPORT AND BACKUP

It is possible to export the locations in kml or kmz format, to be able to open them in external applications. To do this, under Options, we will choose export to file.

It will ask us for extension of the file to export and where to save it. Here again, we will choose one of the folders described above.

KEYBOARD SHORTCUTS

FILTERS

Filter by rating	Ctrl + 0..3
Reset filters	Ctrl + Shift + 0

MAP

Show/Hide Map Controls	Ctrl + H
Change map style.	Ctrl + M
Default map style	Ctrl + Shift + M

Camera shortcuts

LOCATIONS

Search by name	Ctrl + F
Go to coordinates	Ctrl + G
Previous location	Ctrl + RePág
Next location	Ctrl + Page Up
Load kml/kmz	Ctrl + O
Export DB locations	Ctrl + S

PANELS

Show/hide location list	Ctrl + Tab
Show/Hide Filter Panel	Ctrl + Shift + Tab

NAVIGATION LIST

Upload list	RePág
Download list	AvPág
Top position on the list	Ctrl + Home
Last position on the list	Ctrl + End
Delete Selected	Delete
Open in Planner	Enter
View location details	Ctrl + Press
Edit location	Ctrl + Shift + Press
Focus on map	Double-tap
Shortcut menu	Right mouse button

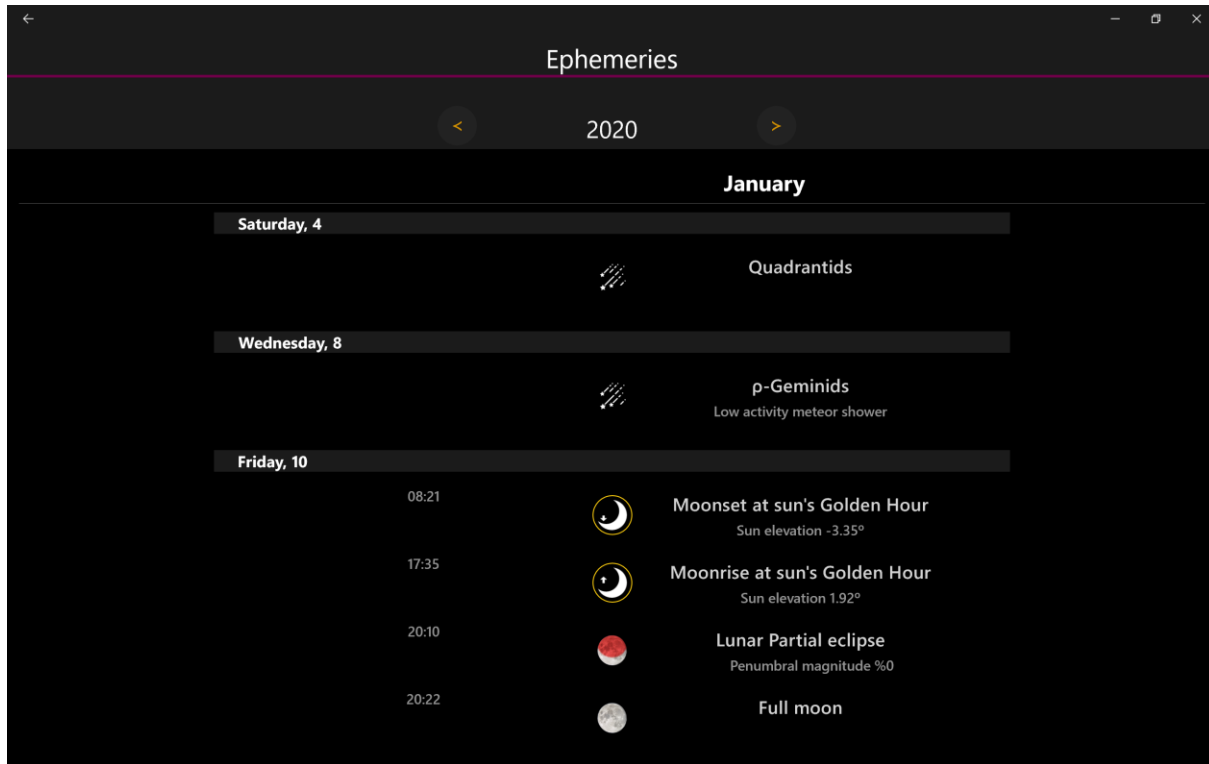


Figure 1 Main view of the assistant

This assistant allows us to see all the ephemeris that happen in our location for a whole year. Astronomical events are sorted by date and grouped by month and by day (pictured, it shows us that four events occur on January 10, 2020). We can also know at what time the events occur, next to the image of the ephemeris and a description of it.

Scroll up will show us events before the current view and do it down the subsequent events.

Clicking on the year or on the buttons on the left and right will help us to change the year.

What kind of events can we see?

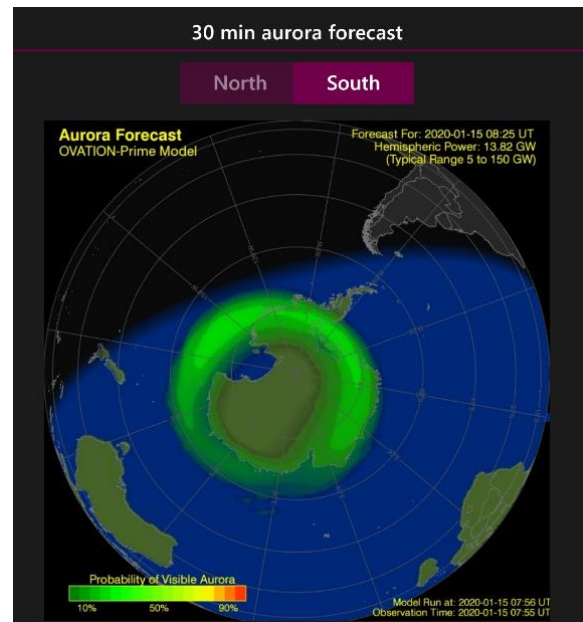
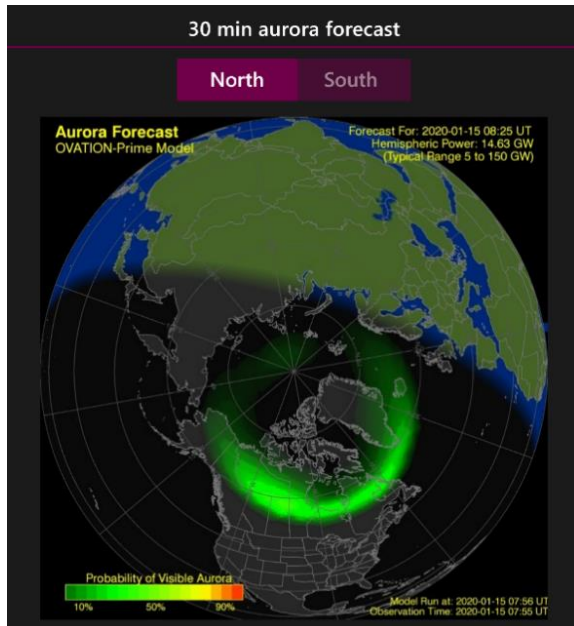
- Moon Events
 - Full moons
 - New moons
 - Orbital apogees and perigee (visual size of the moon)
 - Supermoons
 - Moon eclipses
 - Sunrise and moon-setting with good light
- Sun events
 - Solstices and equinoxes
 - Eclipses of the sun
 - Latest sunrise date
 - Early sunset date

- Evening events
 - Meteor rains, both high-activity and low-activity
 - Start and end of the galactic center's visibility season

All events can be filtered from the **application settings**.

AURORA FORECAST

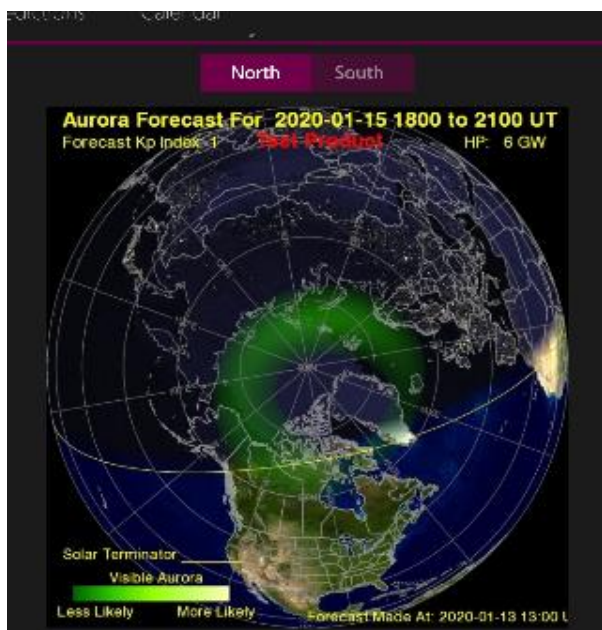
This window allows us to know the current state of the boreal skies and have the predictions from the next 30 minutes to 3 days.



PREDICTION AT 30 MIN

It shows us the visibility of the auroras at this time and for 30 minutes.

By clicking on the buttons of the hemispheres, you can choose which one to see.



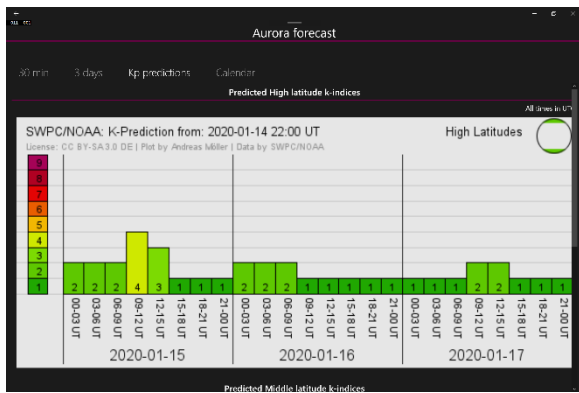
3-DAY PREDICTION

We can see the predictions of the areas with visibility of the auroras (in green), both in the northern and southern hemispheres. Predictions are three days in UTC, which can be seen in 3-hour jumps, selectable with the time slider below the image.

Night zone. Half of the globe will be black and no color detail (pictured, the top half of the globe).

Daytime area. Half of the globe will be in color detail (in the image, the bottom half of the globe).

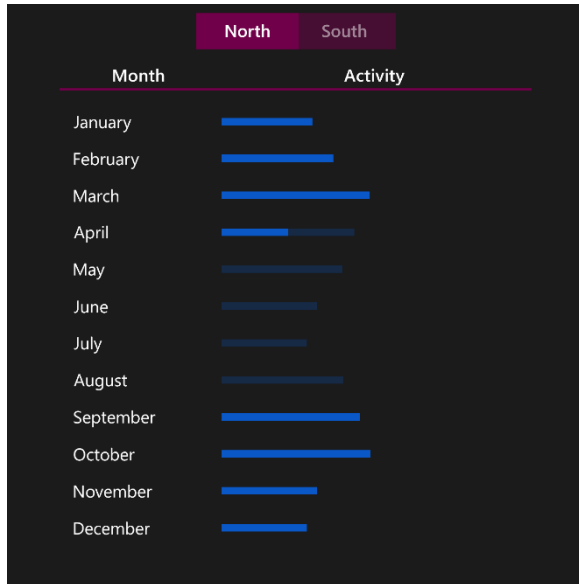
When predictions indicate more chances of having auroras, the green areas at the poles will turn yellow.



KP LEVELS PREDICTION

It shows us the intensity predictions of the auroras in Kp units (Kp 1, low intensity, Kp 9, very high intensity). Starting with Kp 3 levels, auroras have acceptable to good visibility.

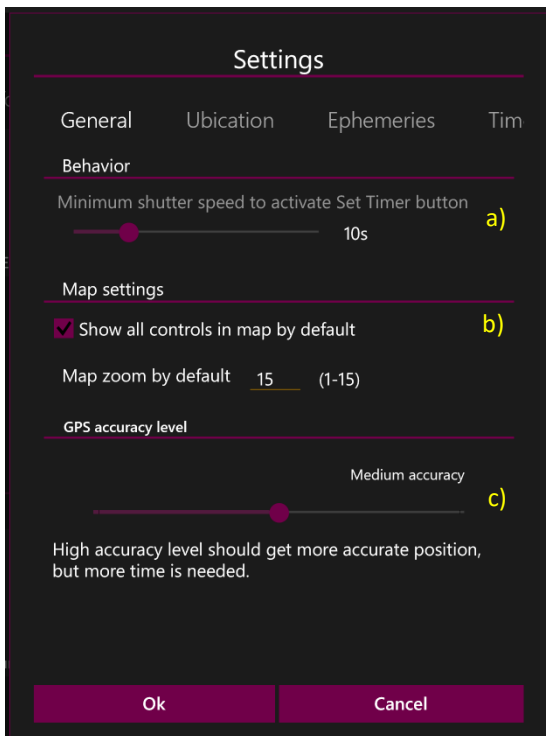
There are two sections, high latitudes and mid latitudes. The first shows us the most extreme latitudes $>+-80^\circ$. The second $>+-60^\circ$.



CALENDAR

Displays the average or standard activity for each month. More activity, longer bar.

Dark bars indicate that even if there is activity, due to the polar day, the auroras cannot be seen.



The settings window is divided into four blocks:

General. In the image on the left, it is used to define general values of the application.

Location. It allows us to set the location mode (manual or GPS, if our device allows it).

Ephemeris. You can choose what is displayed in the ephemeris or event lists.

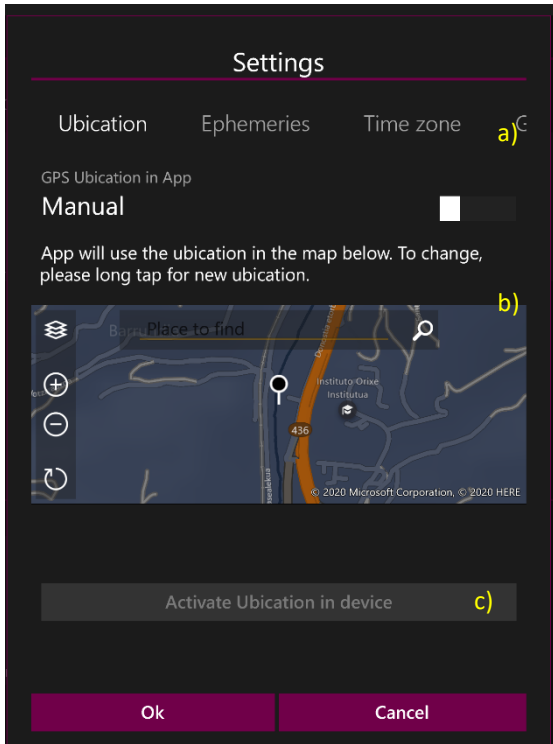
Time zone. As with the location, it allows us to choose the time zone mode: automatic (depending on the location on the map chosen in the location block) or manual (from a list shown).

GENERAL

a) Minimum time to activate stopwatch button (default 10 seconds). We can change the minimum time value with which the stopwatch button that appears in the calculator assistants will be activated.

b) Display controls on the map (default, yes). When you open the Scheduler assistant, depending on the value of this check box, the buttons (see buttons in the Scheduler assistant) are displayed or not.

Default zoom. 1: Furthest zoom, 15: nearest zoom.



c) GPS accuracy (default, mid-level accuracy). The more GPS accuracy, the more accurate our actual location will be compared to the one that returns the GPS, but it will also take the more time.

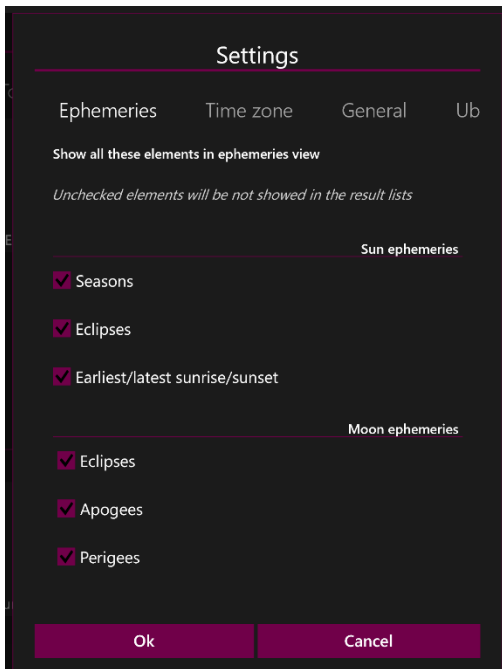
LOCATION

a) Allows us to choose how to locate our default position. All information displayed in the Sun, Moon and Night assistant, such as the response of the Planner's GPS button will be calculated based on the chosen location. If you choose manual mode, you'll have to place your location on the map below. If we select the automatic mode, as long as our device has the capacity to do so, the attendees above will use the GPS to display the information.

b) The map will be activated if we have the manual location mode selected. You can move on the map, zoom in and out, or search by name for the location. To choose the new location, we'll take a long click on the map.

c) If we have a device with GPS sensor, but we don't have it activated, this button will allow us to activate it on the device.

EPHEMERIES



All the options chosen in the list will be displayed in the ephemeris view. If we want one not to show up, we'll leave it unselected.

We can scroll the list up and down.

If you double-click (double-click) on the titles of the ephemeris groups, they will return to their default values.

TIME ZONE

Settings

Time zone General Ubication Ephe

Auto Manual a)

Set below the difference in hours including daylight saving offset.

(UTC+01:00) Brussels, Copenhagen, M... b)

id Romance Standard Time

Name Romance Standard Time c)

Offset base +1h 0m

Is daylight saving time active No

Total offset +1h 0m

Update time zone d)

Ok Cancel

a) Allows us to choose the time zone mode.

Automatic so that the application gets the time zone based on the chosen location.

Manual to choose from the bottom (b).

b) If you have chosen the manual mode, this list is activated and you can select from all possible time zones that correspond to us.

c) Information about the time zone. Name, base time difference, if daylight saving time is active and total time difference over UTC.

d) If using the automatic mode does not update the data, we can update it by clicking on this button.

GLOSSARY

A

AGE (MOON)

The time elapsed since the last new moon. It is calculated in days, hours and minutes.

ALTITUDE

Height of an object or point on Earth measured above sea level.

[Wikipedia.](#)

ANGULAR DIAMETER (SUN, MOON)

The apparent (visual) size of an object measured as an angle from a given position. The angular diameter of the sun and moon are almost identical seen from anywhere on Earth, being of a value close to 0.5° .

[Wikipedia.](#)

ANNULAR SOLAR ECLIPSE

An annular solar eclipse occurs when the moon covers the central part of the sun, with the outer ring or *annulus* being visible around the moon.

Time and date / [Wikipedia](#)

ANTEUMBRA

The lighter part of the shadow that forms some distance from the object that produces the shadow. Occurs in annular solar eclipses.

Time and date / [Wikipedia](#)

ANTI-SUN LIGHT

Also known as *gegenschein* , it is a weak luminosity visible in night skies in the direction of the ecliptic, but in the opposite direction to the sun.

[Wikipedia](#)

APOGEE

The furthest point of orbit of an object measured from the Earth.

[Wikipedia.](#)

ASTEROID

A rocky object orbiting the sun. Its size can vary between a few meters and up to hundreds of kilometers in diameter.

[Time and date / Wikipedia.](#)

ASTRONOMICAL SEASON

An astronomical season is the period of time with beginning and end marked by equinoxes and solstices. The four astronomical seasons in the northern hemisphere are:

Spring: from the March equinox to the June solstice.

Summer: from the June solstice to the September equinox.

Autumn: from the September equinox to the December solstice.

Winter: from the December solstice to the March equinox.

In the southern hemisphere:

Autumn: from the March equinox to the June solstice.

Winter: from the June solstice to the September equinox.

Spring: from the September equinox to the December solstice.

Summer: from the December solstice to the March equinox.

[Time and date / Wikipedia](#)

ASTRONOMICAL TWILIGHT

Solar twilight phase. It is the darkest phase of the three twilight phases that occurs when the sun is between 12° and 18° below the horizon and when it is still dark enough to see at a glance all astronomical observations such as the arc of the Milky Way or the galactic center. It is also the earliest phase of [dawn](#) and the later phase of [dusk](#).

[Time and date / Wikipedia.](#)

ASTRONOMICAL YEAR

Time the Earth needs to complete an orbit around the sun. Its duration varies from year to year, the average is approximately 365 days, 5 hours, 48 minutes and 45 seconds (365.24219 days). Also known as astronomical year, equinoctial year.

[Time and Date](#)

AURORA BOREALIS AND AURORA AUSTRALIS

Also known as Northern Lights in the Northern Hemisphere and Southern Lights in the Southern Hemisphere. They are natural phenomena that create bright colored lights in the sky.

Time and Date

AZIMUTH

Angle measured around the observer's horizon from the geographic north to the celestial body in the direction of the clockwise. A celestial body above the geographical north will have an azimuth of 0° , if it is east 90° , to the South 180° and to the west 270° (or -90°).

Time and Date/ [Wikipedia](#).

B

BLUE HOUR

Twilight period when the sky is a deep blue that occurs when the sun is between 4° and 6° below the horizon, both in the morning and at dusk. Although astronomically part of the civil twilight, for its qualities of light it is highly appreciated in photography and has its own definition.

[Wikipedia](#).

C

CELESTIAL EQUATOR

The projection of the Earth's equator on the sphere of the sky. At the celestial equator, the stars seem to move in straight lines, although seen from different latitudes to the equator, those lines are actually arcs with a small curvature.

Time and Date / [Wikipedia](#).

CELESTIAL POLE

Imaginary points in the sky where the Earth's axis of rotation crosses the celestial sphere. At the geographic poles they will be just above in the sky (elevation of 90°). All objects at the celestial pole will appear not to rotate at all while the other objects, mostly stars, will appear to rotate around these points.

[Wikipedia](#).

CELESTIAL SPHERE

The celestial sphere is an imaginary sphere that extends infinitely into space with the Earth at its center. The equator and the celestial poles coincide with the terrestrials.

Time and Date

CIRCUMPOLAR STARS

Circumpolar stars are stars that never get behind the horizon seen from specific latitudes. These stars are always visible by their proximity to the celestial poles, so visible stars in the northern hemisphere will not be visible in the southern hemisphere and vice versa.

[Wikipedia.](#)

CIVILIAN TWILIGHT

Phase of solar twilight when the sun is just below the horizon (just after sunset and before sunrise) and 6° below the horizon.

[Time and Date](#) / [Wikipedia.](#)

COMETS

Comets are small celestial bodies, usually of dust and ice, orbiting the sun.

[Time and Date](#)

CONSTELLATION

A constellation is an area in the celestial sphere defined by the International Astronomical Union (IAU). Today there are officially 88 constellations.

[Time and Date](#)

D

DAWN

The transition of time between night and sunrise (morning twilight).

[Time and Date](#)

DECLINE

Vertical angular distance between the center of the celestial body and the celestial equator.

[Wikipedia.](#)

DISTANCE TO SUBJECT

Distance between focal point of the target and the subject to be photographed.

DISTANCE TO THE HORIZON

Distance between a point on the surface or place on Earth and the apparent line between the sky and the earth (or body of water).

[Wikipedia.](#)

DURATION OF THE DAY

Number of hours of daylight, measured since the sun begins to peek over the horizon and the moment it disappears from the horizon.

[Wikipedia.](#)

DUSK

The transition of time between sunset and night (afternoon twilight).

[Time and Date](#)

E

EARTHSHINE

It is the light reflected on the surface of the Earth that illuminates the part in the moon's shadow. It usually occurs on dates near the new moon and is especially visible in winter when much of the Earth's surface is covered in snow.

[Time and Date](#)

ECLIPSE

Astronomical event that occurs when the moon stands between the sun and Earth (solar eclipse) or when the Earth stands between the sun and the moon (lunar eclipse).

[Time and Date](#)

ECLIPTIC

See ecliptic plane.

ECLIPTIC PLANE

Also called an orbital plane, it is the imaginary line that apparently traces the sun in the sky or the projection of Earth's orbit into the celestial sphere. All constellations, *including Ophiucus*, are known as zodiacal or zodiac constellations.

ELEVATION

Vertical angle between the object (usually a celestial body such as the sun or moon) and the horizon. Measured at angles in degrees between 0° (on the horizon) and 90° (directly above the observer or zenith) and 0° and -90° (exactly below or nadir)

[Wikipedia / Time and date](#)

EQUINOX

Event that occurs twice a year (March and September equinox) when the Earth's equator is aligned with the center of the sun.

F

FALSE DAWN

See zodiacal light.

FIRST QUARTER

Lunar phase that occurs when the half of the moon is illuminated by the sun on the right side (left in the southern hemisphere). As the illuminated part is increasing, it will increase in size until the full moon phase.

[Wikipedia.](#)

FULL MOON

Lunar phase in which the entire surface of the moon facing earth is illuminated. At this stage, the moon and the sun are in opposite positions in the sky.

[Time and Date/ Wikipedia.](#)

G

GALACTIC CENTRE

Point of the Milky Way where the center of rotation of the Milky Way is located, in the direction of the constellations of *Sagittarius*, *Ophiucus* and *Scorpio*. Very interesting for photographers as it is in appearance the brightest area.

[Wikipedia](#)

GC

See Galactic Center.

GMT

An acronym for Greenwich Mean Time (GMT). It's a time system that refers to solar time at the Royal Observatory in Greenwich, London. For a value of GMT -1 indicates that the time zone is 1 hours later than GMT, which is the time zone of Germany, France, part of Spain, ...

[Wikipedia.](#)

GOLDEN HOUR

Time period of the day that by the qualities of sunlight is photographically appreciated. This type of light is more diffuse than that of the central hours of the day, it is softer and less contrasted and

of a warmer tone. It is considered the golden hour, both dawn and dusk, when the sun is between 6° above and -4° below the horizon.

[Wikipedia.](#)

H

HALOS

Atmospheric phenomena caused by reflected or refracted light in ice particles found in the atmosphere.

[Time and Date](#)

HEMISPHERE

Half of the globe that is divided by the equator.

HORIZON

Apparent line separating the earth (or body of water) and the sky.

[Wikipedia.](#)

HORIZONTAL COORDINATE SYSTEM

It is a method of defining positions of objects in the sky, such as the sun, moon, stars and planets. It is based on elevation and azimuth position angles originating from the observer.

[Time and Date](#)

HYPERFOCAL DISTANCE

The minimum distance at which the target keeps acceptably focused from the half of that distance to the infinite point.

[Wikipedia.](#)

L

LATITUDE

Geographic angular coordinate indicating the north-south position of a point on the Earth's surface to the equator. Its values range from 0° at the equator to $\pm 90^\circ$ at the poles.

[Wikipedia / Time and Date](#)

LENGTH

Geographic angular coordinate indicating the east-west position of a point on the Earth's surface to the meridian in Greenwich, London. Its values range from 0° in the Greenwich meridian to +/- 180°.

[Wikipedia / Time and Date](#)

LOCAL OR SUN MIDNIGHT

The moment of day when the sun crosses the meridian opposite that of the observer. In places where the midnight sun occurs, it will be the lowest point the sun will pass through in the sky.

[Time and Date](#)

LUNAR APOGEE

Point of the moon orbit when it is furthest to the Earth.

[Time and Date](#)

LUNAR ECLIPSE

Astronomical event that occurs when the Earth stands between the sun and the moon, creating a shadow of different depth on the lunar surface. Depending on how the shadow hits the moon, the eclipse will be of different type: penumbral, partial and total or complete. Lunar eclipses only occur on full moons.

[Time and Date](#)

LUNAR MONTH

Time required by the moon to pass through all its phases, measured from the new moon to the next. Also known as lunation, the astronomical term for this period is a synodic month.

[Time and Date](#)

LUNAR PERIGEE

Point of the orbit of the moon when it is nearest to the Earth.

[Time and Date](#)

LUNAR PHASE

The lunar phase is called the moon ratio that is illuminated. This illuminated area changes every moment, even if they are easier to perceive in everyday variations. The lunar month or moon is divided into four primary and four intermediate phases:

1. New Moon
2. Waxing crescent moon
3. First quarter

4. Waxing gibbous moon
5. Full moon
6. Waning gibbous moon
7. Third quarter
8. Waning crescent moon

[Time and Date](#) / [Wikipedia](#)

LUNATION

Time required by the moon to pass through all its phases, measured from the new moon to the next. Also known as lunar month, and the astronomical term for this period is a synodic month. The moons are numbered by different systems, but the most commonly used is Brown's moon numbering system.

[Moon phase pages. Time and Date](#)

M

MAGNETIC DECLINATION

The difference between true or geographic north and magnetic. Currently, this value changes because the magnetic pole is moving.

[Time and Date](#)

MAXIMUM EXPOSURE TIME

Maximum shutter exposure time for stars to appear as dots (and not small traces) or the moon to take an oval shape or lose detail.

METEOR

A celestial object entering the Earth's atmosphere causing a glow by colliding with air particles in the highest parts of the atmosphere. Also known as shooting star.

[Time and Date](#)

METEOR SHOWER

Unusual activity of meteors that glow for brief moments in the night sky for a period of a few days or weeks. Depending on the number of meteors per hour it will be of greater or less activity. According to dates and origin of meteors are known by proper names as Perseids (which are meteors from areas of the constellation Perseus), Draconids (by their origin from the constellation Dragon), ...

[Time and Date](#)

METEORITE

Special rock meteor or meteoroid that survives entry into the atmosphere and lands on the Earth's surface.

[Time and Date](#)

METEOROIDE

Special rock that is composed of dust particles or fragments of comets or asteroids. A meteoroid will become a meteor if it enters Earth's atmosphere causing a visible glow at night and meteorite if it manages to reach the surface.

[Time and Date](#)

MERIDIAN

Imaginary line that goes from the north pole to the south pole connecting all locations of the same length.

Above the observer, it is the moment when the sun or moon is at their maximum height. For the sun it's time for solar noon.

[Time and Date](#)

MICROMOON

Moon that, by its distance to Earth, during the apogee, looks smaller than usual. It is usually only defined during the full moon and new moon phases.

[Time and Date](#)

MIDNIGHT SUN

When at least part of the sun is always visible on the horizon 24 hours a day. Also known as polar day.

[Time and Date](#)

MILKY WAY

Galaxy to which we belong, visible from Earth as a band of light brighter than the rest of the sky that forms an arc.

[Wikipedia.](#)

MINIMUM HYPERFOCAL DISTANCE

Distance to the middle of the hyperfocal. From this distance to infinity will be acceptably focused.

MOON

Earth's natural satellite

[Wikipedia.](#)

MOONBOWS

Rare atmospheric phenomenon caused by reflected and refracted moonlight in water droplets in the air. Moon rainbows that occur in some waterfalls are often highly prized, but can also be seen in sea breaks and during some night drizzle.

[Time and Date](#)

MOONSET

A moment when the moon is no longer visible behind the horizon. Because of refraction in the Earth's atmosphere, this event occurs after it actually disappears on the horizon. During cloudy days and on new moon dates, the moon will not be visible, even if it is on the horizon.

[Time and Date](#)

MOONRISE

A moment when the moon is visible on the horizon. Because of refraction in the Earth's atmosphere, this event occurs before it actually appears on the horizon. During cloudy days and on new moon dates, the moon will not be visible, even if it is on the horizon.

[Time and Date](#)

MW

See Milky Way.

N

NADIR

In the celestial coordinate system, point exactly below the observer (-90° elevation).

[Wikipedia](#)

NAUTICAL TWILIGHT

The nautical twilight is the second phase of twilight, when the horizon and the brightest stars are usually visible at the same time making it possible to navigate the sea (hence the name). The elevation of the sun in this period is between -6° and -12° below the horizon.

[Time and Date/Wikipedia](#).

NEW MOON

Lunar phase in which the illuminated part is not visible from Earth so it leaves the moon in shadow. Sometimes the moon is visible because the brightness of the reflected Earth affects the shadow part.

[Wikipedia](#).

NORTHERN HEMISPHERE

Half of the Earth to the north of the equator.

[Wikipedia](#).

NORTHERN LIGHTS

See auroras.

O

OBSTACLE

Summit, hill, building, forest or anything that can hide the visibility of the sun, moon or galactic center.

ORBIT

Path of an object around a point or other object in space. Although gravitational forces can alter it, they usually repeat the same path.

PARASELENE

Optical light phenomenon caused by the reflection/refraction of moonlight in the ice particles of the cirrus clouds. They manifest themselves at a distance of 22 degrees to the left or right of the moon, as bright and colorful spots.

Those produced by the sun are known as parhelios.

[Wikipedia](#)

PARHELIC CIRCLE

Rare optical-atmospheric phenomenon in which white circles form around the sun or moon.

[Time and Date](#)

PARHELIO

Optical phenomenon caused by reflection/refraction of sunlight in ice particles of cirrus clouds. They are similar to solar halos (and can even occur at the same time). They manifest themselves at a distance of 22 degrees to the left or right of the sun, as bright and colorful spots.

Those produced by the moon are known as paraselenes.

[Time and Date](#)

PARTIAL MOON ECLIPSE

A type of lunar eclipse that occurs when the Earth is between the sun and the moon. The light of the cast shadow strikes a part of the moon, producing a red shadow.

[Time and Date](#)

PARTIAL ECLIPSE OF THE SUN

Type of solar eclipse in which the new moon partially covers the solar disk.

[Time and Date](#)

PENUMBRA

Lighter outer part of the shadow. Partial eclipses of the sun are produced by the penumbra of the moon and the Earth projects its own into penumbral lunar eclipses.

[Time and Date](#)

PENUMBRAL LUNAR ECLIPSE

A lunar eclipse of the penumbral type occurs when the moon, Earth, and sun line up almost in a straight line. The shadow of the Earth occupies the moon entirely or partially, but being penumbral, the shadow will be very weak so it will be difficult to notice the eclipse.

[Time and Date](#)

PERIGEE

Point of the orbit at which the object is closest to Earth.

The days of perigee of the moon are highly appreciated in photography, especially in its full moon phase, also known as supermoons, in which they are especially larger and brighter.

[Wikipedia.](#)

PERIHELION

Point closest to the sun in Earth's orbit.

[Time and Date](#)

PLANETARY TRANSIT

Event that occurs when a planet passes in front of the sun. They are visible from Earth as small black dots on the solar disk. The only planets in transit are Mercury and Venus, as they orbit closer than Earth.

PILLARS OF LIGHT

Atmospheric phenomenon caused by reflected light in the ice crystals of the atmosphere.

[Time and Date](#)

POLAR DAY

See midnight sun.

POLAR NIGHT

It occurs when the sun stays 24 hours a day below the horizon.

[Time and Date](#)

POLARIS

Also known as the polar star or northern star, it is the brightest star in the constellation *Ursa Minor* and remains very close to the north pole of the celestial sphere.

[Wikipedia.](#)

REFLECTION

Reflection is the change in the direction of light that, when coming into contact with the surface of separation between two changing media (such as a mirror, body of water, metal surfaces...), returns to the environment where it originated in the form of reflection.

REFRACTION

Light refraction is the change in the direction of light rays that occurs after passing these from one medium to another in which light propagates at different speed. This effect occurs at the entry of sunlight into the Earth's atmosphere.

[Time and Date](#)

S

SHADOW RATIO

The ratio between the height of an object or surface and the length of its shadow on a plane.

SHOOTING STAR

Popular term for a meteor. See meteor.

SOLAR DAY

Time period that takes place between one solar noon and the next. Although defined as 24 hours, in solar time most days are slightly longer than 24 hours.

[Time and Date](#)

SOLAR NOON

An event that occurs when the sun crosses the meridian of the location and reaches the highest point in the sky. In most places, it doesn't happen at 12 noon.

[Time and Date](#)

SOLAR WIND

Constant flow of high-energy particles (mostly electrons and protons) that come out of the sun at high speed and temperature. The auroras are caused by the interaction of the solar wind and our atmosphere.

[Time and Date](#)

SOLSTICE

Event that occurs twice a year (June and December solstice) when the sun is exactly above the Tropic of Cancer or the Tropic of Capricorn. The winter solstice is the shortest day of the year and traces the lowest arc in the sky, while the summer solstice is the longest, tracing the highest arc.

[Tropic of Cancer](#), [Tropic of Capricorn](#), [Wikipedia](#)

SOUTHERN HEMISPHERE

Half of the Earth that lies south of the equator.

[Wikipedia.](#)

SOUTHERN LIGHTS

See auroras.

STAR TRAIL

Line, arc, or circle that draws a star in the night sky in a photo using a long exposure on a fixed-mount camera, it is caused by the Earth's rotation on its axis in which it appears that it is the stars that slowly rotate in the sky.

[Wikipedia.](#)

SYNODIC MONTH

Time required by the moon to pass through all its phases, measured from the new moon to the next. Also known as lunar month or lunation.

[Time and Date](#)

SUMMER SOLSTICE

Event that marks the beginning of summer, with the longest day of the year and the shortest night. In the northern hemisphere, it occurs in June, while in the southern hemisphere it occurs in December.

[Time and Date](#)

SUN

Star at the center of our Solar System.

[Wikipedia.](#)

SUNRISE

The moment when the sun appears on the horizon.

[Time and Date](#) / [Wikipedia.](#)

SUNSET

The moment when the sun disappears completely behind the horizon.

[Time and Date](#) / [Wikipedia.](#)

SUPERMOON

A full moon that occurs when the moon's orbit is at the near point of the Earth (perigee) producing a moon of greater size and brightness than normal.

[Time and Date](#) / [Wikipedia.](#)

T

THIRD QUARTER

Lunar phase that occurs when the half of the moon is illuminated by the sun on the left side (right in the southern hemisphere). As the illuminated part is waning, it will be decreasing in size until the new moon phase.

[Wikipedia.](#)

TIDES

Periodic change of sea level (height) caused by the gravitational forces of the moon and sun. The moment with the lowest height is known as low tide and with the highest high tide.

[Time and Date / Wikipedia](#)

TOTAL SOLAR ECLIPSE

Type of solar eclipse in which the moon completely hides the solar disk.

[Time and Date](#)

TRANSIT

A time when the sun or moon is at the 180° azimuth and the maximum elevation of the day.

TROPICAL YEAR

See astronomical year.

TWILIGHT

Time period between day and night when there is still natural light, but the sun has already been hidden on the horizon. Photographically it is the period between night and blue hour, between -6° and -18° below the horizon. Astronomically it is divided into three phases; civil, nautical and astronomical twilight.

[Time and Date](#)

U

UMBRA

Darkest part of the shadow. Total eclipses of the sun are caused by the umbra of the moon, while the earth's umbra produces total and partial eclipses of the moon.

[Time and Date](#)

W

WANING CRESCENT

Lunar phase in which less than half of the illuminated part is visible. The illuminated part will decrease day after day.

[Wikipedia.](#)

WANING GIBBOUS

Lunar phase in which more than half of the illuminated part is visible. The illuminated part will decrease day after day.

[Wikipedia.](#)

WAXING CRESCENT

Lunar phase in which less than half of the illuminated part of the moon is visible from Earth. As it grows, the illuminated part will increase day by day.

[Wikipedia.](#)

WAXING GIBBOUS

Lunar phase in which more than half of the illuminated part is visible. The illuminated part will increase to the full moon phase.

[Wikipedia.](#)

Z

ZENITH

In the celestial coordinate system, point directly over the observer (elevation of 90°). Nadir would be the opposite point, exactly below the observer (-90° elevation).

[Time and Date](#)

ZODIACAL CONSTELLATIONS

The zodiac constellations are the 13 constellations on the Earth's ecliptic. The thirteenth constellation, often forgotten, is *Ophiucus*.

ZODIACAL LIGHT

The starlight or false dawn is a rare optical effect that occurs before sunrise or after sunset, usually at the beginning of spring or late autumn and is a triangular-shaped light band that is especially appreciated in the night sky. It extends along the ecliptic plane and in the direction of the sun. Caused by dust particles scattered in the solar system.

[Time and Date](#)