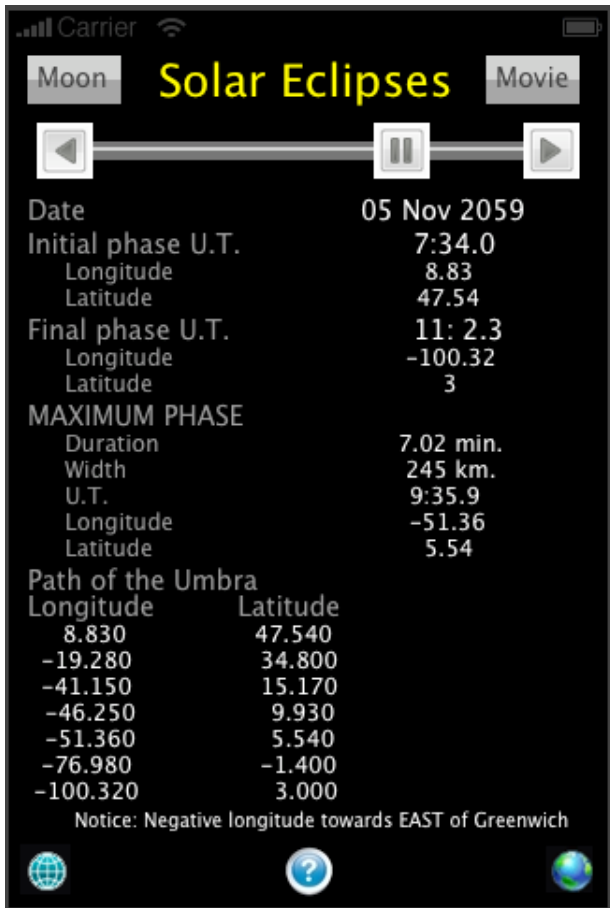


TOTAL SOLAR ECLIPSES & Lunar Eclipses – Version 1.2 for iPhone

By P.Massimino – © 2009

Description



Total and Total-annular solar eclipses processed by the program are comprised between 1900 and 2100, exactly 287 eclipses from 28th May 1900 to 4th September 2100 . For Lunar eclipses read below.

The program gives the times in Universal Time of the Solar eclipses phases (initial, central and final) and the geographical coordinates where it is possible to observe those circumstances of the eclipse. It also gives maximum duration and the width of the lunar umbra. The date is that of the initial phase of the eclipse.

Below *Path of the Umbra* are listed Longitude and Latitude of seven point of the lunar umbra path on the Earth surface. The program has a few functions: Earth Map, Movie and Google Map visualization. The first allows seeing a few points of the path of the lunar umbra on Earth surface;








the second creates an animation: the user will see the eclipse from one hour before up to one hour after its maximum phase with step of 2 minutes; the third function allows to visualize Google Map of the area around the point where the eclipse reaches the maximum.

Moreover it is possible to change geographical coordinates of the observer. This allows knowing if and how the eclipse will be seen from other points of the Earth surface (e.g. it is possible to know if the eclipse will be partial or it does not occur for those coordinates).

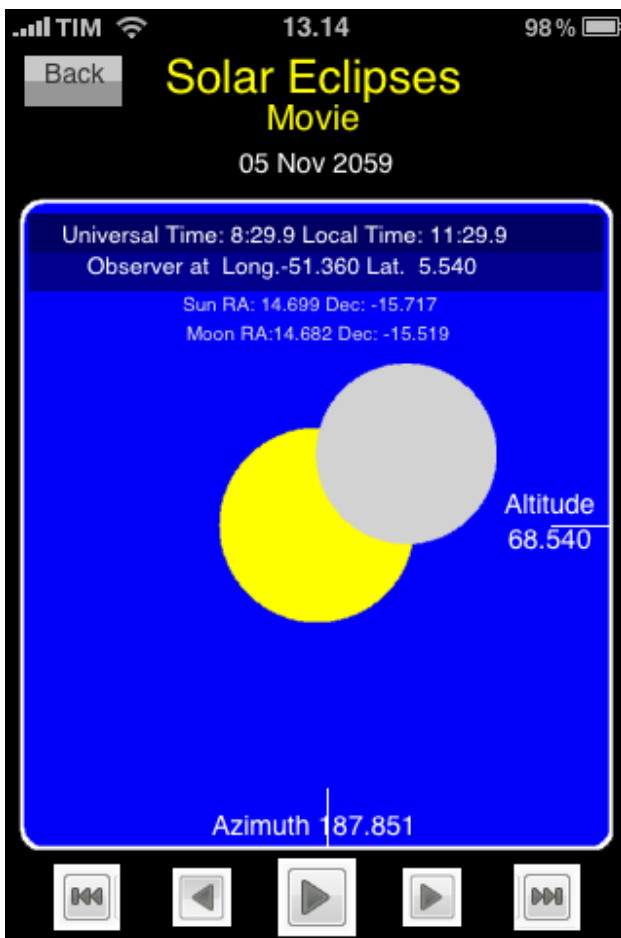
The user interface supports both English and Italian language.

Use of the program

DATE AND CIRCUMSTANCES OF THE SOLAR ECLIPSES





Horizontal scroll bar (see above figure) allows to change date (   middle button for fast movement, left or right buttons for single step movement, *movie* button  to see animation of selected eclipse, left bottom icon  to change observer geographical coordinates; middle bottom icon  to see a digest part of this information: in this phase, the bottom left button, allows to change language of the user interface: the modification will be applied at next start of the program. Right bottom icon  to see a few points of the path of the lunar umbra on Earth surface.


MOVIE




They are displayed: the Universal Time (U.T. – time of Greenwich meridian), the Local Time of the observer, the Right Ascension (R.A.) and Declination of the Sun and of the Moon.

In the bottom middle of the blue square we have the Sun azimuth and in the right middle the Sun altitude above the horizon. All these data will change during the eclipse evolution.

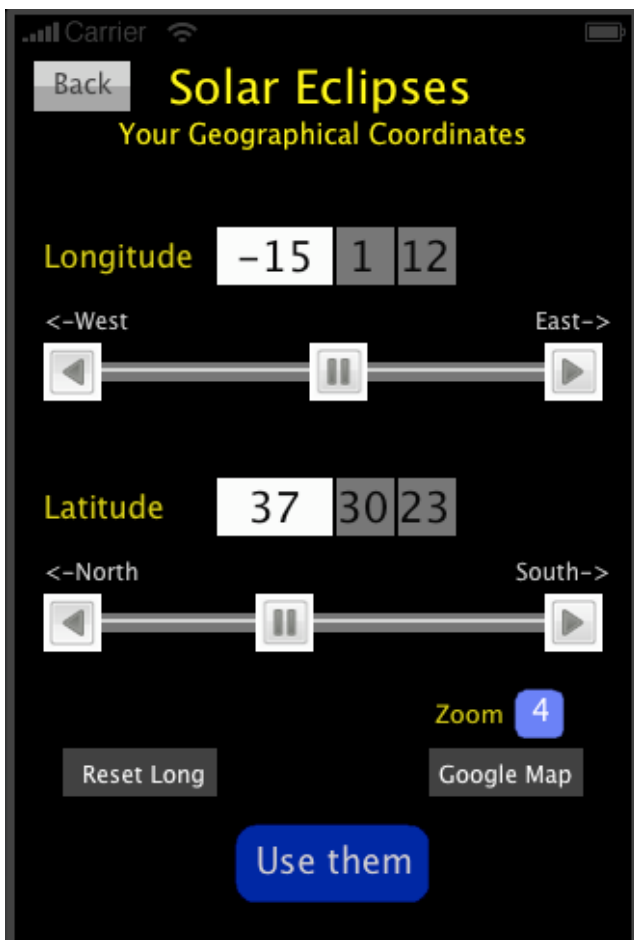
At the bottom of the screen we have five buttons that have these functions: play  the movie (when the evolution ended, the movie will play in reverse direction), pause  the movie, change direction (rewind  or forward ).

Smaller buttons allow to see single step (of 2 minutes everyone) of the eclipse:  for




previous step and  for next step. When the Sun is below the horizon its color will be gray.

Lunar and solar disk diameters are displayed proportionally. This means that it is possible to notice the difference between total and annular solar eclipses: when lunar disk is smaller than sun disk the eclipse will be annular.

CHANGE COORDINATES

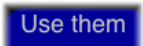


Tap on one of the Longitude or Latitude coordinate components (degrees, arc minutes or arc seconds): the selected one will show its background in white color.


Use buttons    to change its value (middle button for fast movements).

East Longitude and South Latitude are towards the right of the screen.

By using *Zoom* value (from 2 to 12) and *Google Map* button you can see map around geographical coordinates of the observer. In this case the program launches Safari that opens Google Map. When the program will be restarted, it will open "Geographical Coordinates" page.

Use them button  allows to use the selected coordinates that will be the new position of the observer. The

program will store these values and they will also be used at the next launch of the program.

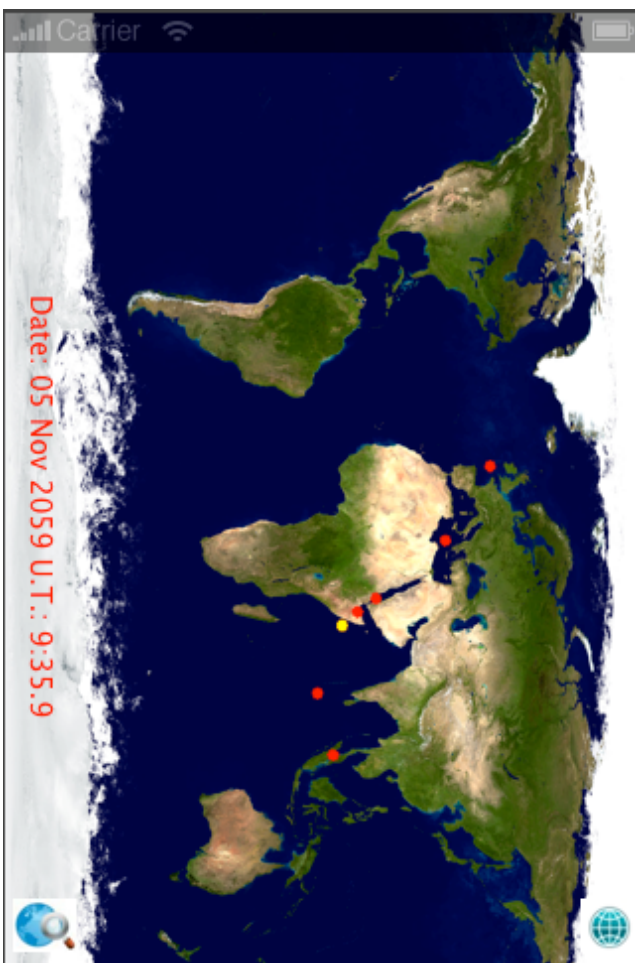
Back button  will reset observer coordinates to the point, on Earth surface, where it is possible to see maximum phase of the eclipse then the values fixed in *Your Geographical Coordinates* will not change and they will appear in the next page open.

If you want change them you have to use *Reset Long*: coordinate components will change based on the longitude and latitude of the site where it is possible to observe maximum phase of the eclipse.

Sometime, when the Moon and the Sun are enough near, you can observe celestial configuration also if the eclipse does not occur. In this case you will see to transit the Moon inside the blue square but it does not cross the solar disk.


If from those coordinates the eclipse does not occur and the two disks are not near, the program will show a message.

MAP



It is displayed Earth surface and on it the path of the lunar umbra by small red circles (yellow circle represents the geographical site where the eclipse will reach the maximum); their coordinates are the same displayed in Date window, below *Path of the Umbra*.

Right bottom icon  to back in the previous phase of the program.

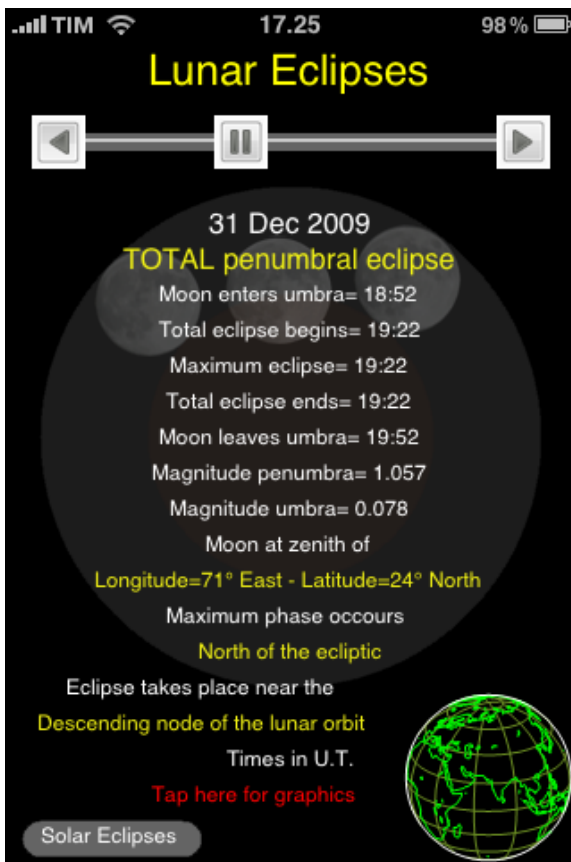
Left bottom icon  allows to see a more detailed map of the event (see figure in the next page).



In this map we see the complete path of the lunar umbra on Earth surface and the areas from where it is possible to observe the eclipse as partial.

The icons at the bottom allow to return in the previous phases of the program.

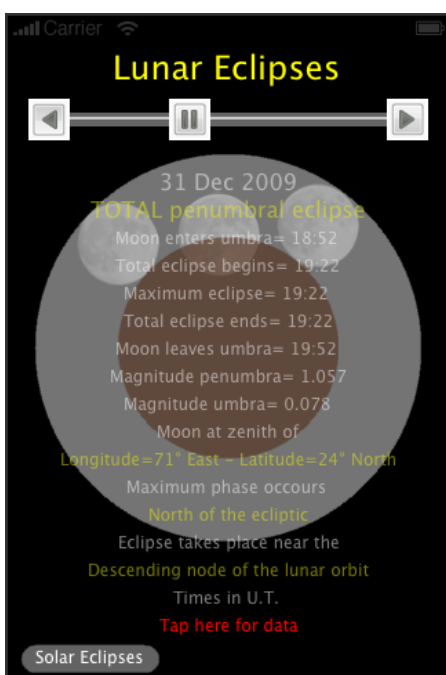
Lunar Eclipses



The program takes in account the lunar eclipses included between 1999 and 2030. For each eclipse we can see the main data of the event: initial, final and maximum phases, Moon position respect on both the ecliptic and the Earth surface, magnitude of the eclipse.

At the right bottom is displayed the Earth hemisphere from where is possible to observe the eclipse.

To observe better the graphic representation of the lunar eclipse it is possible to tap on the red text.



In this way we will be able to see the areas both of the umbra (magenta circle) and of the penumbra (gray circle) that our planet projects on the sky. Remember: lunar eclipse occurs when the Earth is between the Sun and the Moon, on the same line.

The types of the Lunar eclipse are: Total umbra, Total penumbral, Partial penumbral.

When the type of the eclipse is Total umbra or Total penumbral, the graphic will show three small Moons: on the right we have the first contact of the Moon with the umbra (*Moon enters umbra*), on the center we have maximum phase of the eclipse, on the left the last

contact of the Moon with the umbra (*Moon leaves umbra*). In the other cases it will be only displayed a small Moon, at the moment of the maximum phase of the eclipse.

Program developed by P.Massimino (C) 2009 by using Corona - ANSCA

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In the next release:

The user will be able to chose the date of the observation, in the far past or in the far future, to see historical events, medieval or Chinese solar eclipses.