

## Palm Earth

Version 2.0

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### Introducing Palm Earth

Palm Earth is a powerful PalmOS application that displays an interactive 3D Earth in your palm.

To learn about all the new and enhanced features of Palm Earth, click [here](#).

### Basic Features

- [Display city time and date](#)
- [Display Sunrise/Sunset times for any city](#)
- [Display city's next DST transition](#)
- [Distinct twilight modes: civil, nautical and astronomical](#)
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- [A Fully editable 36000 city database gives users the ability to add modify or delete cities and countries](#)

## System Requirements

This program is designed to be run under PalmOS version 5.0 and higher. Minimum system requirements include:

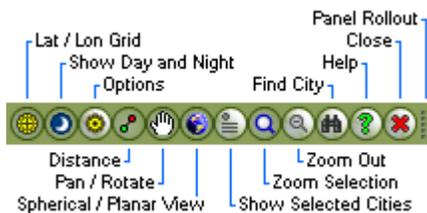
- PalmOS version 5.0
- About 2.0 MB of storage space and 4 MB of available runtime memory

## Description

Palm Earth features two major interactive screens, the Main screen and the Options screen.

### Main Screen

When the program is launched, the user is normally taken to the main display screen where the user can directly interact with the globe. The main screen has a collapsible toolbar panel at the bottom of the screen that consists of the following buttons:



- [Lat/Lon Grid](#) toggles the latitude/longitude grid
- [Show Day and Night](#) toggles earth shadow
- [Options](#) brings up the Options screen
- [Distance](#) allows distance calculations
- [Pan/Rotate](#) enables view to be panned or rotated
- [Spherical/Planar View](#) toggles between 3D and planar modes
- [Point Information](#) enables user selected cities to be displayed
- [Zoom Selection](#) zooms view to user's selection rectangle
- [Zoom Out](#) zooms out of current view
- [Find City](#) dialog allows locating a city by name
- [Help](#) brings up this help
- [Close](#) closes or suspends the application
- [Panel Rollout](#) rolls out or collapses the toolbar panel

### Options Screen

The Options screen presents the user a 'tabbed' view of several options and settings. The following links describe various options available under each tab:

- [General Tab](#)
- [Display Tab](#)
- [Sun/Moon Tab](#)
- [Maps Tab](#)
- [Cities Tab](#)
- [Routes Tab](#)
- [Advanced Tab](#)
- [Colors Tab](#)
- [Appearance Tab](#)

- [About Tab](#)

## General Tab

- [Animated rotation to city](#) brings the located city into view
- [Animation Speed](#) controls the speed of the animated rotation
- [Auto update of Earth's shadow](#) automatically updates Earth's shadow after a specified interval
- [Interval \(mins\)](#) specifies a time interval in minutes for the automatic update of shadow
- [Rotate Globe](#) enables a psuedo rotation of Earth in 3D view
- [Rotation Speed](#) controls the speed of the pseudo rotation
- [Snap to nearest populous place](#) snaps current stylus point to the nearest most populous place or city
- [Snap to nearest known point](#) snaps current stylus point to the nearest known city
- [Snap to nearest displayed point](#) snaps current stylus point to the nearest displayed city
- [Show Country Name at Snap Point](#) displays country names for all displayed cities
- [Snap Radius](#) allows user to adjust snap distance (in nautical miles)

## Display Tab

- [Lat/Lon](#) displays latitude and longitude for the current stylus point
- [Antipodes](#) displays antipodes (diametrically opposite points) for the current stylus point
- [Lat/Lon Format](#) displays latitude and longitude as either decimal degrees or as degrees-minutes
- [City Time](#) shows current time at snapped city
- [City Date](#) shows current date at snapped city (disabled if City Time is unchecked)
- [City's next DST Transition](#) shows when the next Daylight Begin/End transition will occur for the snapped city
- [City Population](#) shows population info for the snapped city
- [Tropic and Polar circles](#) displays tropic circles (cancer and capricorn) and polar circles
- [Show all countries](#) displays the names of all countries
- [Time Format](#) allows time to be displayed in 12hr, 24hr or HHMM formats
- [Grid Step](#) displays latitude-longitude grid in steps of either 10, 15 or 30 degrees
- [Distance](#) allows distance measurement in kilometers(km), statute miles(mi) or [nautical miles](#) (nm)

## Sun/Moon Tab

- [Sun Spot](#) displays point on earth's surface where the sun is directly overhead
- [Sunrise and Sunset Times](#) shows sun's rise/set times for snapped city
- [Sun's Azimuth and Elevation](#) shows sun's azimuth and elevation in degrees at current stylus point
- [Moon Spot](#) displays point on earth's surface where the moon is directly overhead
- [Moonrise and Moonset Times](#) shows moon's rise/set times for snapped city
- [Moon's Azimuth and Elevation](#) shows moon's azimuth and elevation in degrees at current stylus point
- [Show Distinct Twilight](#) shows distinct twilight zone in Earth's shadow
- [Civil, Nautical, Astronomical](#) are the supported twilight modes
- [Specularity](#) allows user to adjust specular level of the bright part
- [Darkness](#) allows user to adjust darkness of Earth's shadow

## Maps Tab

- [Main Map](#) specifies file name for main map (default is "Day.gif")
- [Overlay Map](#) specifies file name for overlay map(default is "Night.gif")
- [Use Overlay Map](#) enables operations with overlay map
- [Overlay Operation](#) performs one of the following operations between main and overlay maps:

- Union: binary OR
- Intersection: binary AND
- Exclusion: binary XOR
- Merge: color averaging
- Overlay: alpha channel
- Day/Night: main map is used as day map and the overlay is shown as night map

### Cities Tab

- [Cityname](#) allows user to select a city by entering the first few characters of its name
- [Country](#) allows user to select a country name to narrow down the list of cities to select from
- [Population](#) allows user to specify a population bracket to narrow down the list of cities to select from
- [Available Cities](#) shows a list of cities that the user can choose from
- [Displayed Cities](#) shows a list of user's selected cities that will be displayed on the globe
- [Add button](#) adds selected cities to the Display box
- [AddAll button](#) adds all cities in the Select box to the Display box
- [Remove button](#) removes selected cities from the Display box
- [RemoveAll button](#) removes all cities from the Display box

### Routes Tab

- [Select Routes/Places to Show](#) displays selected route or points of interest XML files
- [Clear Selection](#) clears current selection in the list

The program comes with a set of Route/Places files encoded as plain XML text. Users can create their own XML files in the supported route format.

### Advanced Tab

- [Distance Arc Smoothing](#) specifies number of intermediate points used during distance measurement in 3D and planar modes
- [Advanced Texture Parameters](#) controls texture brightness and 3D smoothing for better foreground contrast
- [Anti-aliased Lines](#) smoothens out lines drawn on the screen such as distance arc and grid lines
- [Direction Pointers for Distance Arc](#) displays an arrow at the center of the arc to indicate direction
- [Semi-transparent Text Background](#) dims out background under any text for better readability

### Colors Tab

Allows user to specify colors for the following:

- Main screen background
- Distance Arc
- Lat/Lon Grid lines
- Equator and Greenwich meridian lines
- Arctic/Antarctic Circles
- Tropic Circles
- Displayed City names
- City at snap point
- Displayed Countries

### Appearance Tab

- [Select Skin](#) specifies color scheme to use for options screen, dialog boxes and command panel
- [Select Font](#) specifies font used in text drawing
- [Apply](#) updates current scheme using the selected skin and font settings

### About Tab

- Displays product information and other credits

### Usage

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### Interactive 3D earth rotation

To rotate the globe in 3D, ensure that the "Pan/Rotate" button on the [toolbar panel](#) is turned ON. Using the stylus, tap and hold at any point on the globe and move the stylus in the desired direction.

The globe may be rotated 360 degrees in the east-west direction and 90 degrees each in the north and south directions. In planar mode, using the above steps will allow the user to pan the 2D image to any desired location. When the image is panned horizontally, it is allowed a smooth rollover from -180 to +180 longitude.

### Earth Texture Maps

Palm Earth comes with a set of seven 1224x612 texture files in database.

Following is a brief description of the standard supplied maps:

- [Day.gif](#) shows the daytime physical earth (see credits below)
- [Night.gif](#) shows the night time physical earth (see credits below)
- [Political.gif](#) depicts a colored map of the earth with political boundaries
- [Continents.gif](#) depicts the various continents
- [Continents Mask.gif](#) may be used as a texture mask to filter out the continental land mass
- [Oceans Mask.gif](#) may be used as a mask to filter out the oceans
- [Clouds.gif](#) adds realism to the final image when combined with the physical maps (see credits below)

#### Texture map credits:

Day.gif, Night.gif and Clouds.gif have been adapted from the original images available at <http://earthobservatory.nasa.gov> (Courtesy of NASA Goddard Space Flight Center)

### **Dual mapping channels with overlay modes**

Palm Earth allows two channels of texture mapping - main and overlay. To select the main channel specify a main map file from the drop down box under [maps](#) tab in the Options screen. To use dual channels, check the "Use Overlay Map" check box and specify an overlay map file.

The user will need to select from among the several overlay operation radio buttons to produce a specific desired effect. For example, choosing "Day.gif" as main channel and "Clouds.gif" as overlay channel and selecting "overlay" radio button will produce a near photo-realistic image of the earth as viewed from space.

Palm Earth supports a special Day-Night overlay mode. If this mode is selected, the main map becomes the day (bright) portion of earth's surface and the overlay map becomes the night (dark) portion. In all other modes, the night portion of the earth is computed as a darker overtone of the day portion.

### **Dynamic multi-point visual distance measurement tool**

To measure distance across two or more points on the globe, first ensure that the "Distance" button on the [toolbar panel](#) is enabled and the "Pan/Rotate" button is disabled. Then select a starting point by tapping and moving the stylus on the globe. Release the stylus to fix the starting point. Tap again and move to desired end point on the globe. The current running distance will be displayed in the selected measurement units in the upper left portion of the screen. You will also notice the time zone difference (as hrs:mins) between the first and the last cities displayed beneath the distance.

To continue with additional points repeat the last step. To change measurement units, open the [General](#) tab on Options screen. Tapping the "distance" button twice will drop the current distance measurement.

Palm Earth allows you to reposition or delete distance arc points without having to recreate an entirely new distance path. To reposition a point, simply tap and hold the stylus on the point and drag it. To delete a point double tap the point with the stylus. When a point is deleted, the distance arc completes itself between the previous and the next points (if any).

Distances may be measured in kilometers, statute miles or nautical miles. One nautical mile is the distance covered by 1 minute (or 1/60 degree) of latitude on the surface of the earth. It approximately equals 1.15 statute miles or 1.852 kilometers.

The smoothness of the distance arc depends on the "Distance Arc Smoothing" parameters under the [Advanced](#) tab. These parameters specify the number of intermediate points used during distance measurement in 3D and planar modes. Larger values result in smoother arcs. This smoothness indicates the number of straight-line segments that the distance arc is made out of. However, for smoothing out the arc at the pixel level, turn on [Antialiased Lines](#) option under the "Advanced" tab.

To get a visual indication of each arc's start and end points, turn on the option called [Direct Pointers for Distance Arc](#) located under the "Advanced" tab. This will display an arrow that points in the direction the arc has traveled.

In order to measure distances between specific cities, you may use the [Find City](#) dialog. For more information click [here](#).

### **Zoom Control**

Palm Earth allows the globe displayed in both Spherical and Planar modes to be zoomed in and out. Use the "up"

and "right" navigational buttons on your PDA to perform coarse and fine zoom-in operations respectively. Use the "bottom" and "left" navigational buttons to perform coarse and fine zoom-out operations respectively. Pressing the "enter" PDA button will restore the current view to fit-to-screen mode.

There are two buttons on the [toolbar panel](#) that allow you to zoom in to a selected area or zoom out of the current view. To zoom in to a selected area, enable the "Zoom Selection" button, select a rectangular area on the globe by tapping and moving and then release the stylus. To zoom out, simply tap the "Zoom Out" button. Each tap zooms out of the current view one step further.

## Find City Dialog

Palm Earth allows you to locate a specific city on the globe. To use this feature, tap the "Find City" button on the [toolbar panel](#). Make sure the "Distance" button is disabled. A "Find City" dialog pops up on the screen. This dialog is created to occupy just the optimum screen real estate such as not to overly hinder viewability of the globe/map. For this reason this dialog is not resizable.

To obtain a specific city, you could use one of three options:

- Search a city by its name
- Select from a list of cities for a specific country
- select from a list of cities falling under a specific population bracket

To locate a city by its name, select the "City" radio button. Now, tap the edit box just below it to enable the keyboard panel. Use the keyboard to enter the first few letters of the desired city name. As soon as you enter the first letter, you will notice that the list box of the "Find City" dialog fills up with a list of cities beginning with that letter. As you continue typing more letters, the city list starts to narrow down. You may scroll the list box to find your city or continue typing the entire name of the desired city.

To locate a city belonging to a specific country, select the "Country" radio button. The edit box changes to a drop down box which when opened will display a list of countries. As soon as you select a country, the bottom list box fills up with cities belonging to that country.

To locate a city falling under a specific population bracket, select the "Population" radio button. The edit box changes to a drop down box which when opened will display a list of different population brackets. As soon as you select a population bracket, the bottom list box fills up with cities falling under that bracket.

When you click on the desired city in the list box, the city information shows up and the globe rotates to position the city at the center of the screen. In planar mode, the map pans to center the located city. If the "Animated rotation to city" checkbox under [General](#) tab in the options screen is unchecked, the rotation is unanimated and instantaneous. If this checkbox is checked, the rotation is animated and the "Animation Speed" slider control determines the speed of animation.

## Using Find City Dialog to measure distances

You may use the [Find City](#) dialog to measure distances across multiple cities. To use this feature, ensure that the "Distance" button on the [toolbar panel](#) is enabled. Tap the "Find City" button to bring up the dialog. Use the procedure outlined in the [Find City Dialog](#) section to locate and fix the starting city. Use the same procedure to locate and fix the next city.

As you keep locating and fixing the cities on the globe, you will see distance arcs joining each city with the next. The total distance across all fixed cities will be displayed in the upper left portion of the screen. The time zone difference between the first and the last cities as well as the initial bearing from the first to the second city will also be displayed.

## Latitude/Longitude Grid Lines and Polar/Tropic circles

To show or hide the Lat/Lon grid lines tap the "Lat/Lon" button on the [toolbar panel](#). Grid lines may be displayed in steps of 10, 15 or 30 degrees. To change the grid step, use the "Grid Step" radio buttons under [General](#) tab in the Options screen. Equator and Greenwich Meridian lines are displayed in different colors. To display polar circles and the Tropics of Cancer and Capricorn, enable "Tropical and Polar Circles" check box under the [General](#) tab in the Options screen.

To customize colors, use the [Colors](#) tab in the Options screen. For smoother lines, turn on [Antialiased Lines](#) option under the "Advanced" tab.

## Spherical and Planar Views

Palm Earth supports two viewing modes - Spherical (3D) and Planar (2D). To see the globe as a 3D sphere, enable the "Spherical/Planar View" button on the [toolbar panel](#). Disabling this button switches to planar mode where the globe is displayed in equidistant rectangular projection. It is recommended to use the planar mode if display speed becomes a factor.

## Automatic pseudo rotation of the Earth

Palm Earth supports a pseudo rotation of the globe in the west-to-east direction about its polar axis. This is supported only in Spherical mode. The rotational speed is user selectable. This pseudo rotation is not real-time and is provided here only as a visual effect.

To enable this feature, check the "Rotate Globe" checkbox under the [General](#) tab in Options screen. Use the "Rotation Speed" slider control to adjust the speed of rotation

## Displaying City Information

To see lat/lon and other information at current stylus point on the globe, disable "Distance Mode" and "Pan/Rotate" buttons on the [toolbar panel](#). Tap and hold at any point on the globe to see information related to the point. Various options listed under the [Display](#) tab in the Options screen decide what information will be displayed for the current stylus point.

- [Lat/Lon](#) displays latitude and longitude for the snapped city or current stylus point
- [Antipodes](#) displays antipodes (diametrically opposite point) for the snapped city or current stylus point
- [City Time](#) shows current time at snapped city in the time format selected
- [City Date](#) shows current date at snapped city
- [City's next DST Transition](#) shows when the next Daylight Begin/End transition will occur for the snapped city
- [City Population](#) shows population info for the snapped city
- [Sunrise and Sunset Times](#) shows sun's rise/set times for snapped city
- [Sun's Azimuth and Elevation](#) shows sun's azimuth and elevation in degrees at the snapped city or current stylus point
- [Show Country Name at Snap Point](#) displays country names for all displayed cities
- [Sunrise and Sunset Times](#) shows sun's rise/set times for snapped city
- [Sun's Azimuth and Elevation](#) shows sun's azimuth and elevation in degrees at current stylus point
- [Moonrise and Moonset Times](#) shows moon's rise/set times for snapped city
- [Moon's Azimuth and Elevation](#) shows moon's azimuth and elevation in degrees at current stylus point

When the stylus is moved over the globe, if one of the "Snap To..." options under [General](#) tab is selected, the snap distance specified by the "Snap Radius" slider control is used. Snap distance is specified in [nautical miles](#).

The Daylight Saving Time (DST) information that is displayed for a snapped city refers to the next DST transition slated to occur for that city. If the city does not observe DST the information reads "No DST observed". When a DST transition occurs, the city's time is automatically adjusted.

Population data for a snapped city is based on 2003 figures. If a city does not contain associated population data, an "NA" is displayed meaning "Not Available". The following figure describes the icons representing various types of points:



## Using the "Cities" tab

The program allows the user to select and display any number of cities from a database containing over 36,000 cities. To use this feature, enable "Show Selected Cities" button on the [toolbar panel](#) and switch to " [Cities](#)" tab in the Options screen.

To obtain a specific city, you could use one of three options:

- Search a city by its name
- Select from a list of cities for a specific country
- select from a list of cities falling under a specific population bracket

To list cities by name, select the "City Name" radio button. Now, tap the edit box just below it to enable the keyboard panel. Use the keyboard to enter the first few letters of the desired city name. As soon as you enter the first letter, you will notice that the "Available Cities" list box fills up with an alphabetical list of cities beginning with that letter. As you continue typing more letters, the city list starts to narrow down.

To obtain cities belonging to a specific country, select the "Country" radio button. The edit box changes to a drop down box which when opened will display a list of countries. As soon as you select a country, the "Available Cities" list box fills up with cities belonging to that country.

To obtain cities falling under a specific population bracket, select the "Population" radio button. The edit box changes to a drop down box which when opened will display a list of different population brackets. As soon as you select a population bracket, the "Available Cities" list box fills up with cities falling under that bracket.

Select and add cities from the "Available Cities" list box to the "Displayed Cities" list box by using the "Add" button. The "Add All" button adds all cities displayed in the "Available Cities" list box. To remove specific cities from the "Displayed Cities" list box, select those cities and click the "Remove" button. Use "Remove All" button to clear the "Displayed Cities" list box.

## Advanced Texture Options

To adjust brightness of the background globe texture, use the "Brightness" slider under [Advanced](#) tab in the Options screen. The slider value is specified as percentage of original brightness. In the 3D Spherical mode, to reduce "jagged" land boundaries, check the "3D Texture Smoothing" check box under "Advanced" tab in the Options screen.

**Note:** Enabling the "3D Texture Smoothing" affects performance because of the extra computing involved.

## Sun/Moon Spots and Earth Shadow

Palm Earth uses the PDA's system time and regional settings to display the Sun spot, the Moon spot and earth shadow. To see earth shadow, enable the "Show Day and Night" button on the [toolbar panel](#). To show sun spot, check the "Sun Spot" check box under [Sun/Moon](#) tab in the Options screen.

Likewise, to display moon spot, check the "Moon Spot" check box. Each time the moon spot is drawn, calculations are performed and the moon spot image is updated to show the correct moon phase.

To adjust the darkness of earth shadow and the specular level of the bright part on earth's surface, use the "Earth Shadow Parameters" under [Sun/Moon](#) tab. Specular level controls the area on the surface of the earth that receives the maximum brightness. Larger the specular level, larger the area. Specular level selection will be used only if the "Show Distinct Twilight" checkbox is unchecked. For more information on twilight modes supported, see [Distinct Twilight Modes](#).

## Automatic Update of Earth Shadow

Palm Earth can automatically update earth's shadow with respect to the most current position of the sun. To enable this feature, check the "Auto update of Earth's shadow" checkbox under [General](#) tab in the Options screen. You may specify an update interval (in minutes) by using the "Interval" slider control. For example, an interval of 5 indicates that the shadow will be updated every 5 minutes.

When the shadow is being updated, a progress bar will be displayed and all other activity will be suspended until the update is done. Larger maps will usually take several seconds to update.

## Distinct Twilight Modes

Palm Earth allows the user to view the day-night transition portion of the earth's shadow as a distinct twilight zone. Three twilight modes are supported and are listed below (along with the sun's angle below horizon):

- Civil ( $\leq 6^\circ$ )
- Nautical ( $\leq 12^\circ$ )
- Astronomical ( $\leq 18^\circ$ )

To use this feature, navigate to the [Sun/Moon](#) tab in the Options screen and check the "Show Distinct Twilight" checkbox. Select the desired twilight mode by clicking on the appropriate radio button. Ensure that the "Show Day and Night" button on the [toolbar panel](#) is enabled.

## Routes and Points of Interest

Palm Earth can display specific points of interests like historical routes and oceans stored as XML files. Some sample route files come bundled with the product in supplied database.**Appearance - Skins and Fonts**

Palm Earth comes with several different skins that are used to draw controls and background on the options page, dialog boxes and the toolbar panel. To choose a different skin, navigate to the [Appearance](#) and select a skin from the "Select Skins" drop down box.

Palm Earth supports three different fonts to draw textual information. To change the font, select a font from the "Select Font" drop down box. There is an "Apply" button provided to update the scheme using the selected skin and font. Pressing the "OK" button will also update the scheme but will also close the options screen.

## Disclaimer

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