SatSeries User's Guide

(ProSat, HamSat, ISS)

October 2010

Version 1.0

VosWorx LLC

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Table of Contents

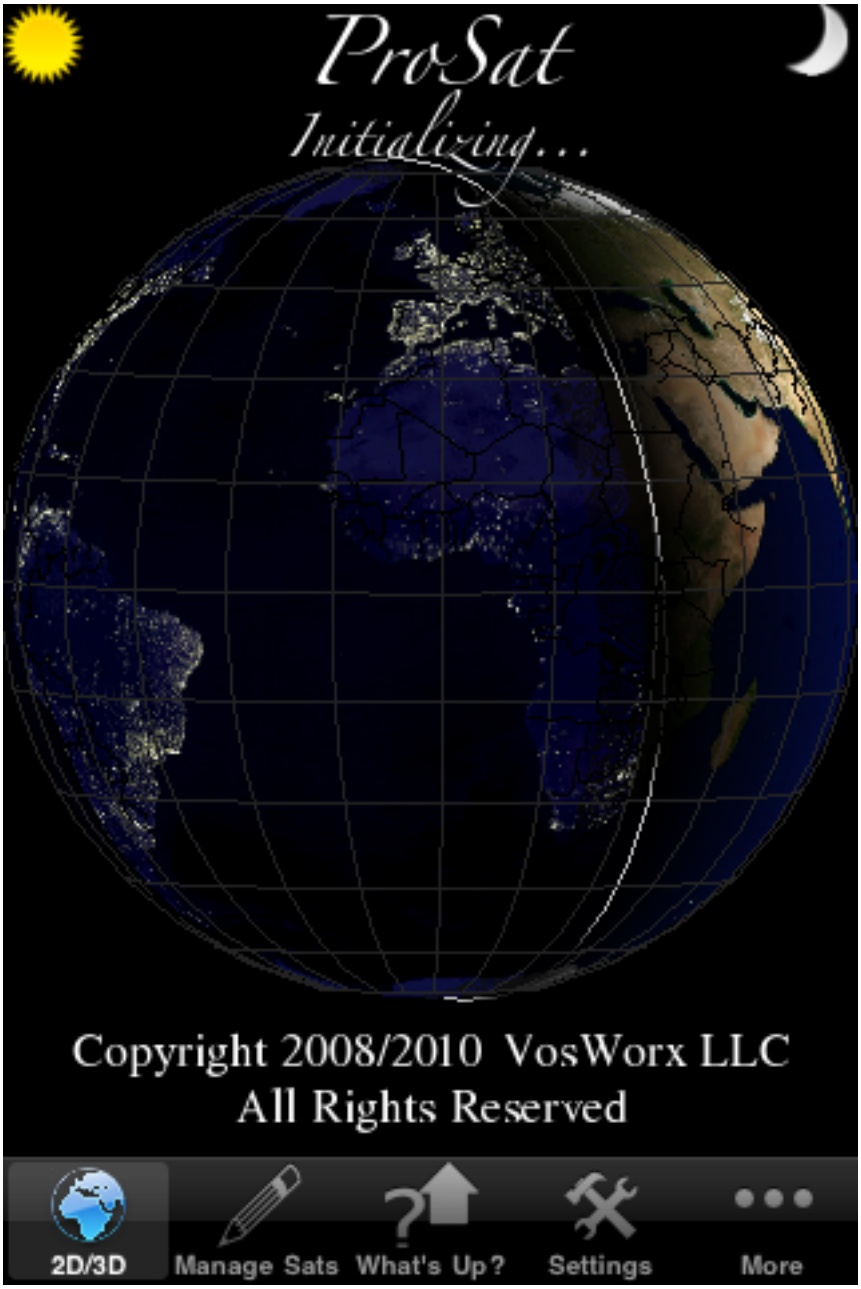
Introduction

There are three versions in the Sat series of applications for the iPhone (ProSat, HamSat and ISS.) The only differences between the versions are the satellite databases that the applications have access to (ProSat has all databases, HamSat has the HamSat specific databases and ISS only has access to the space station elements.)

As a result of the commonality, this document uses ProSat as the example application for introduction to the concepts and features provided. If you have HamSat or ISS, the only difference is in the available satellite databases.

Initial Setup

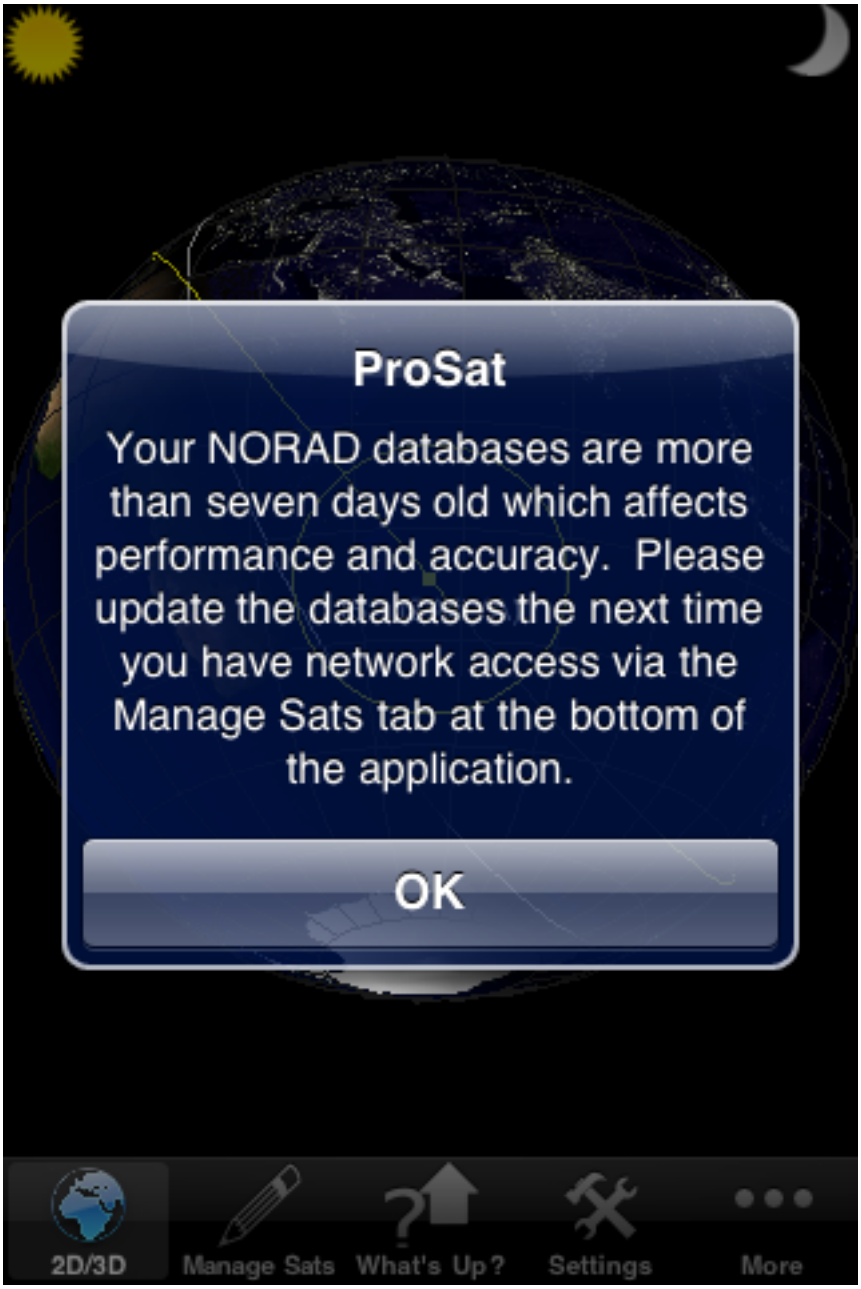
Upon startup, the following splash page is displayed while the application loads the various databases, propagates the satellite states to the current time and generates the day/night images for presenting the shaded Earth.



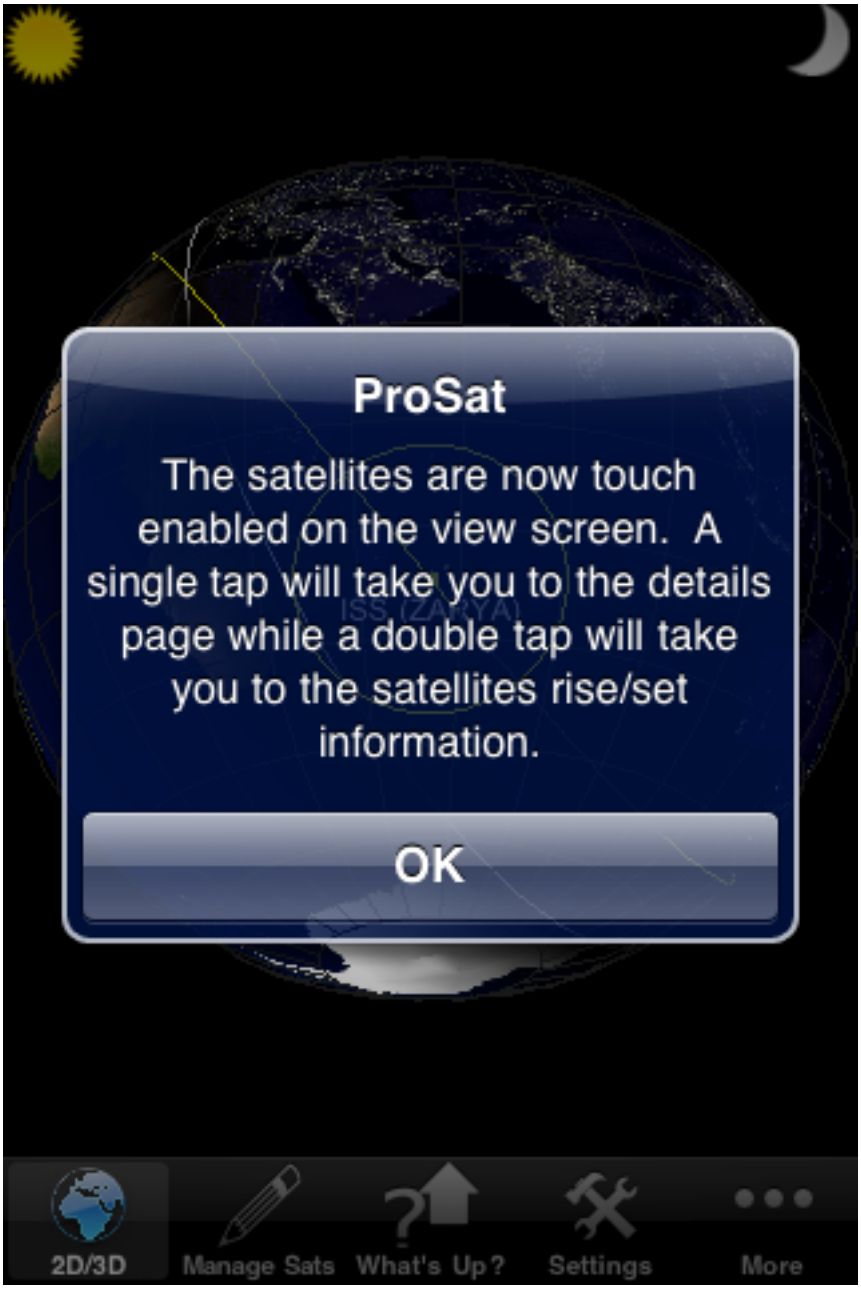
This splash screen will be displayed for five and fifteen seconds depending on the speed of the device you are using (newer devices have substantially faster CPU's)

On the first startup of the application (or anytime your local cached database is more than seven days old) you will see the following dialog screen reminding you that your databases are out of date and that you need to update them when possible.

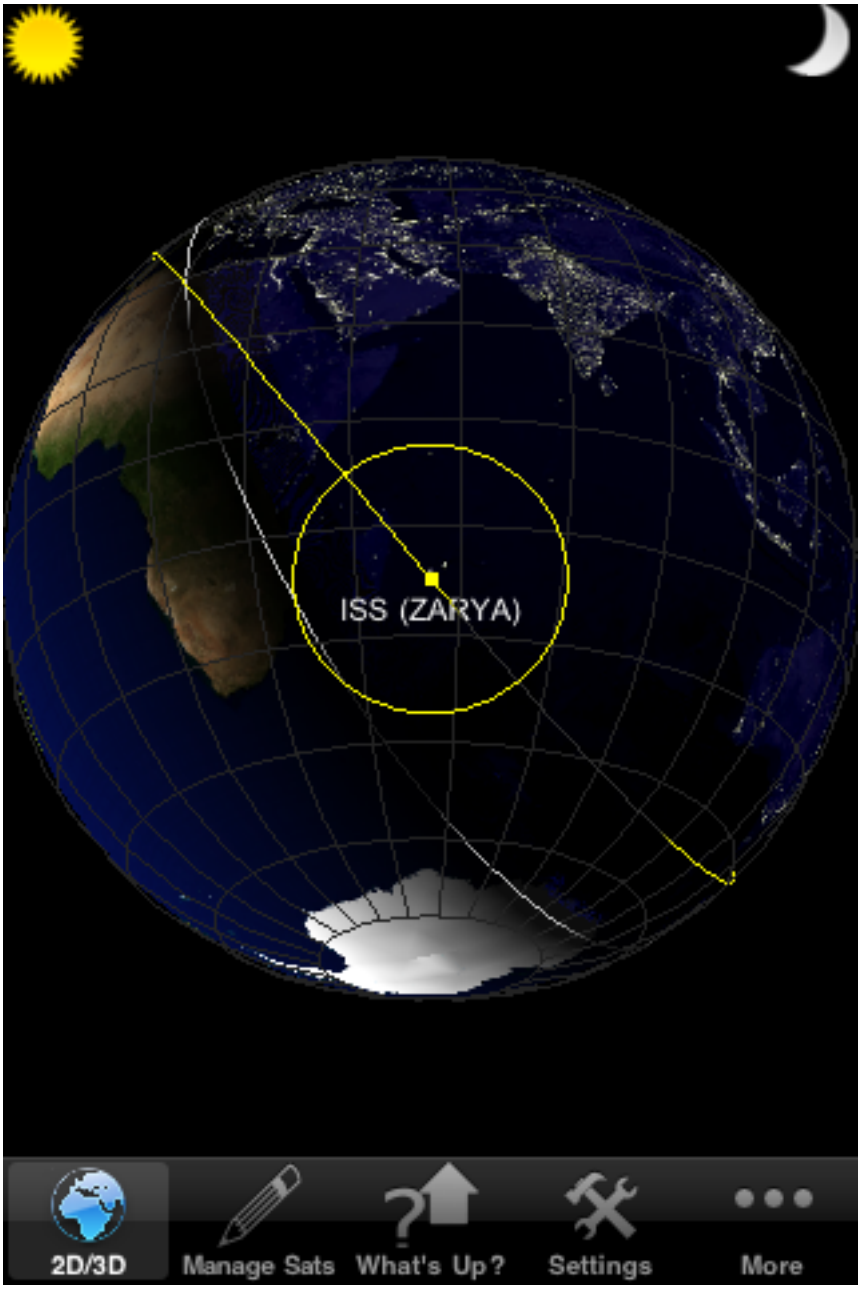
I'll show you below how to update the local databases so for now simply click OK to dismiss.



On the first startup of the application after initial install you will be given the dialog below. This dialog is to just inform users that they can select details about the satellites by single and double tapping the satellite of interest on the map. I'll go into more detail below on what a single tap and double tap get you so again, just click to dismiss.



You should now be looking at the main screen of the application (see below for the 3D portrait view.)



What we need to do now is some one time configuration updates to download the current versions of satellite databases as well as set your specific location and viewing preferences. These updates are necessary to allow the application to correctly display the various screens of information regarding the selected satellite(s), Sun and Moon.

The first thing we are going to do is update the local copies of the satellite databases from the Internet. The application keeps a local copy of the databases so that you can operate the application when not connected to the Internet (I initially wrote the iPhone version of this application so that I could go satellite watching when I was

camping with my kids so I didn't want to require having an Internet connection for the application to work as I'm typically out of cell coverage)

Update Satellite Databases

To get started, click on the "Manage Sats" button at the bottom of the screen and you should be presented with the following screen.

As you can see on the bottom status bar, the application is telling you that the local copies of the satellite databases are more than seven days old. As a rule of thumb, you should try to keep the databases less than seven days old. The issue is that the application must propagate the satellite's state vector (it's position and velocity at

the time stored in the database) to the current time for presentation on the various displays. The older the database elements, the longer it takes to get them propagated to the current time and the more error that is introduced during that propagation (as math models are used to propagate and they do not perfectly model the environment of the satellite.)

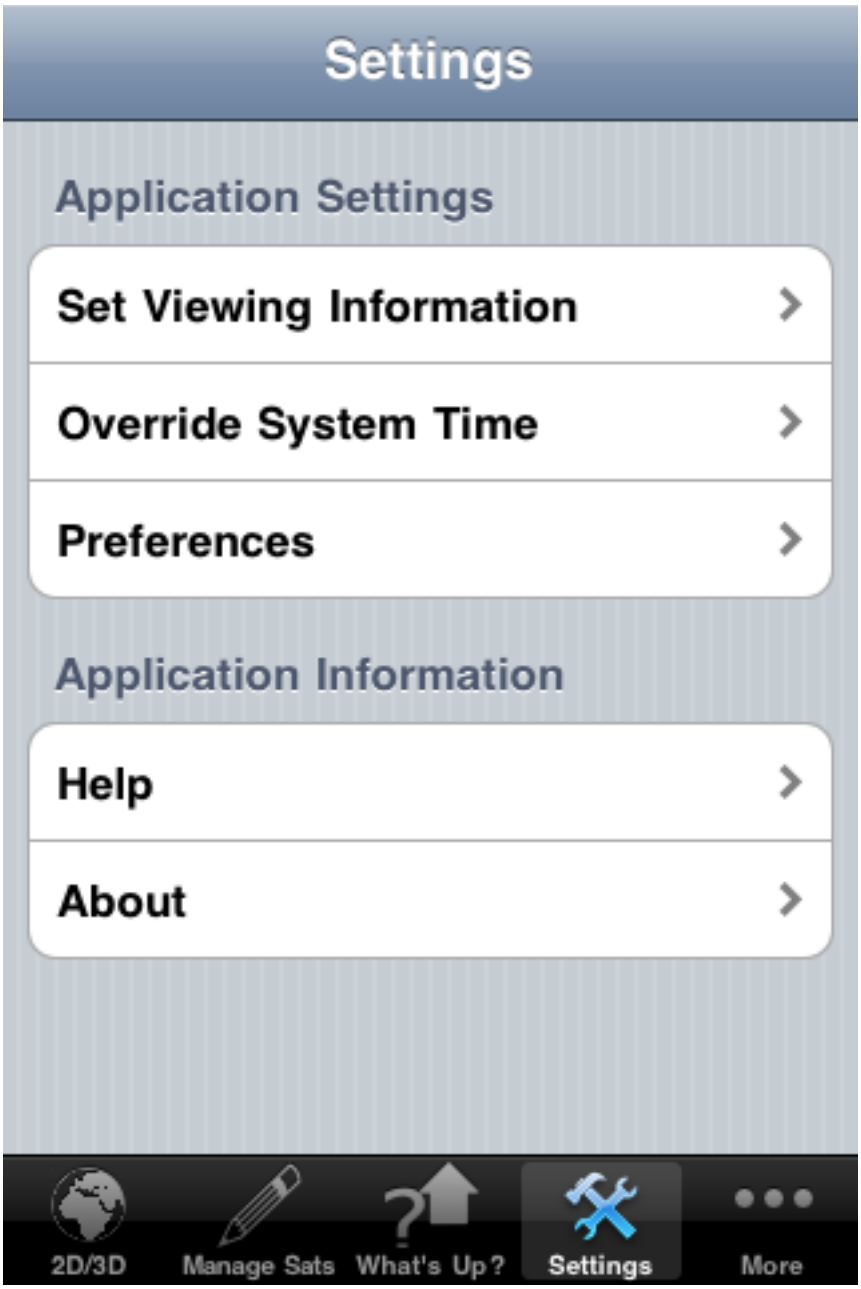
Ok, enough with the rational of why you need to update. To update, just make sure you are around an Internet connection (either 3G or WiFi) and click the Update Now button. The app will spin through each database (look at the status bar in the next screen shot) and will download the latest version of the database.

Once everything is downloaded, the status bar will show the age of the current databases (it will say 0.0 days right after a successful update and will then age from there so that you at a glance can always see how old your databases are)

Configure Viewing Information

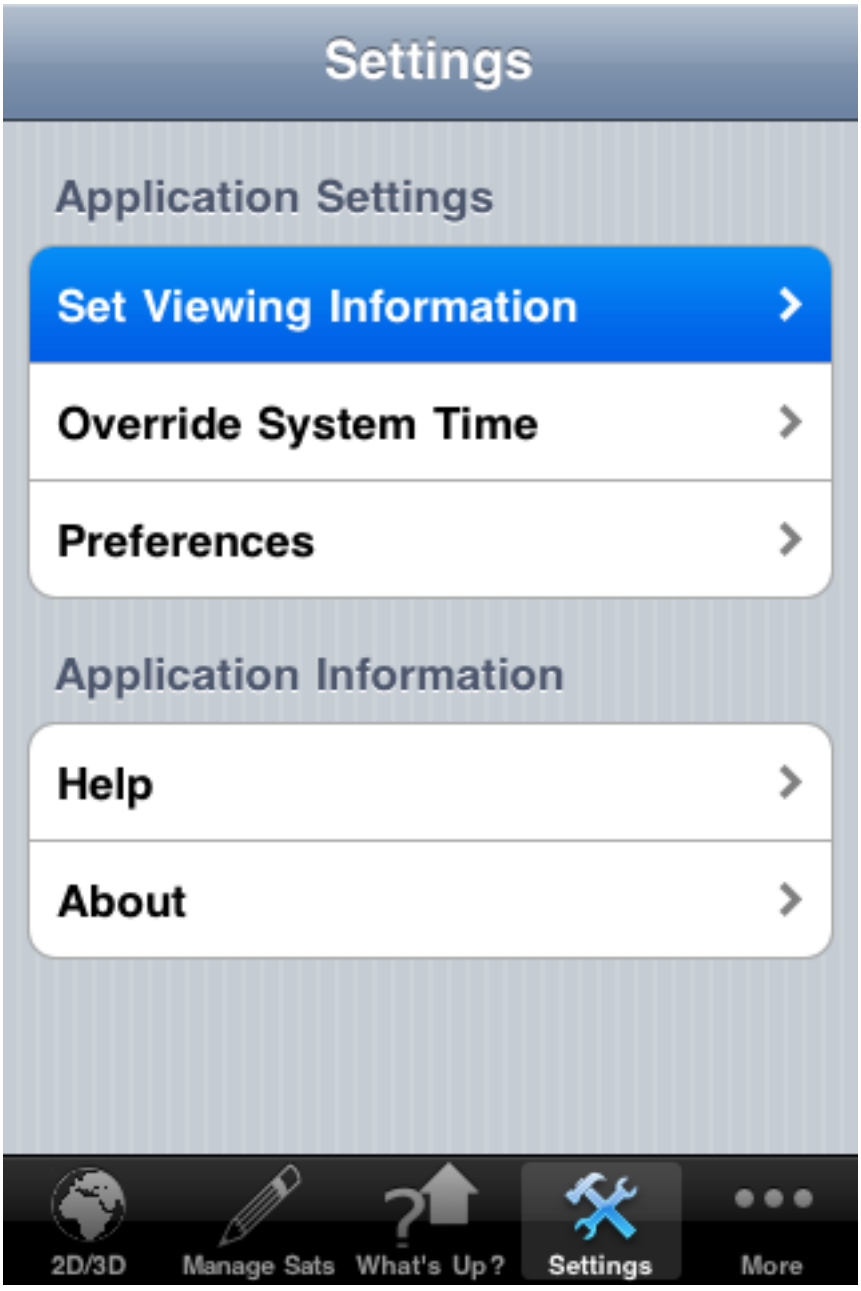
The other item you need to do before you start exploring the rest of the application is configure the viewing information that you'd like the application to use for the various viewing calculations that are performed.

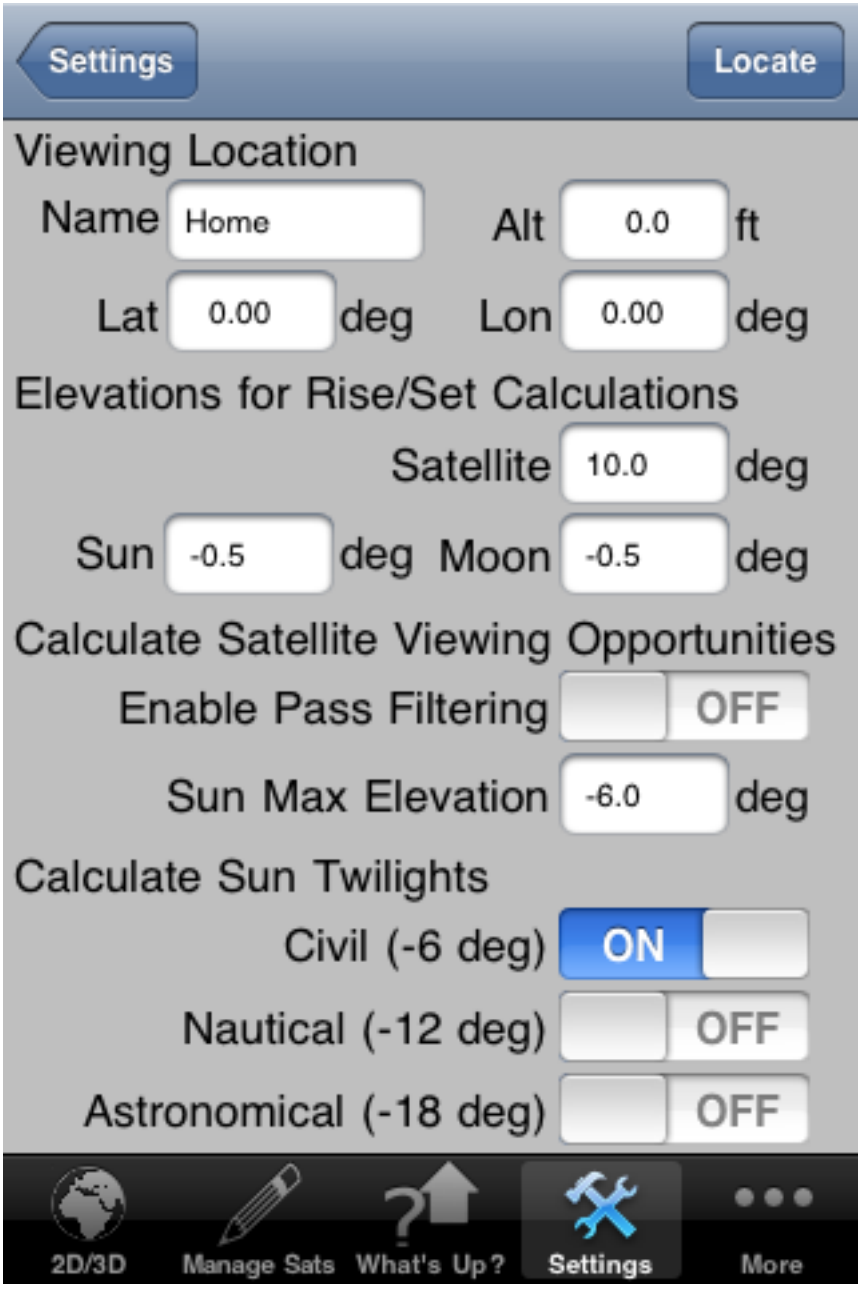
Start by clicking the Settings button at the bottom of the screen (the right most button at the bottom.) That should take you to the following screen.



This screen allows you to set various system wide aspects of the application. For now we are only interested in configuring the viewing information so click on the Set Viewing Information table entry to bring up the following screen.

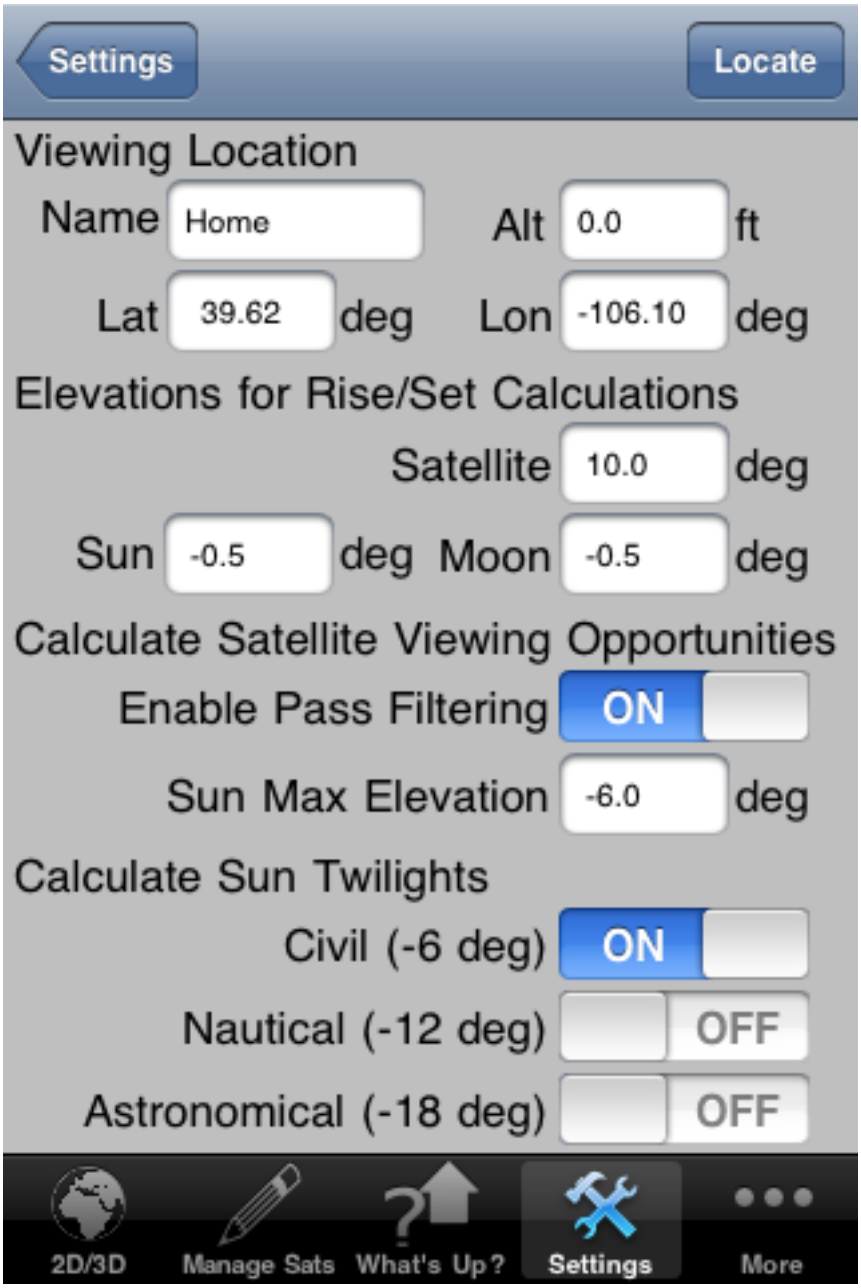
Don’t worry, we’ll come back and describe the other setting later in the doc.





This screen allows you to set a variety of system wide viewing parameters used by the application. The first thing we need to do is update you're current viewing location (latitude, longitude and altitude.) You can either enter the values by hand by clicking on the respective fields at the top of the screen or you can let the devices location services fill them in for you. For this example, I'm opting for using location services so click on the Locate button at the upper right corner of the screen.

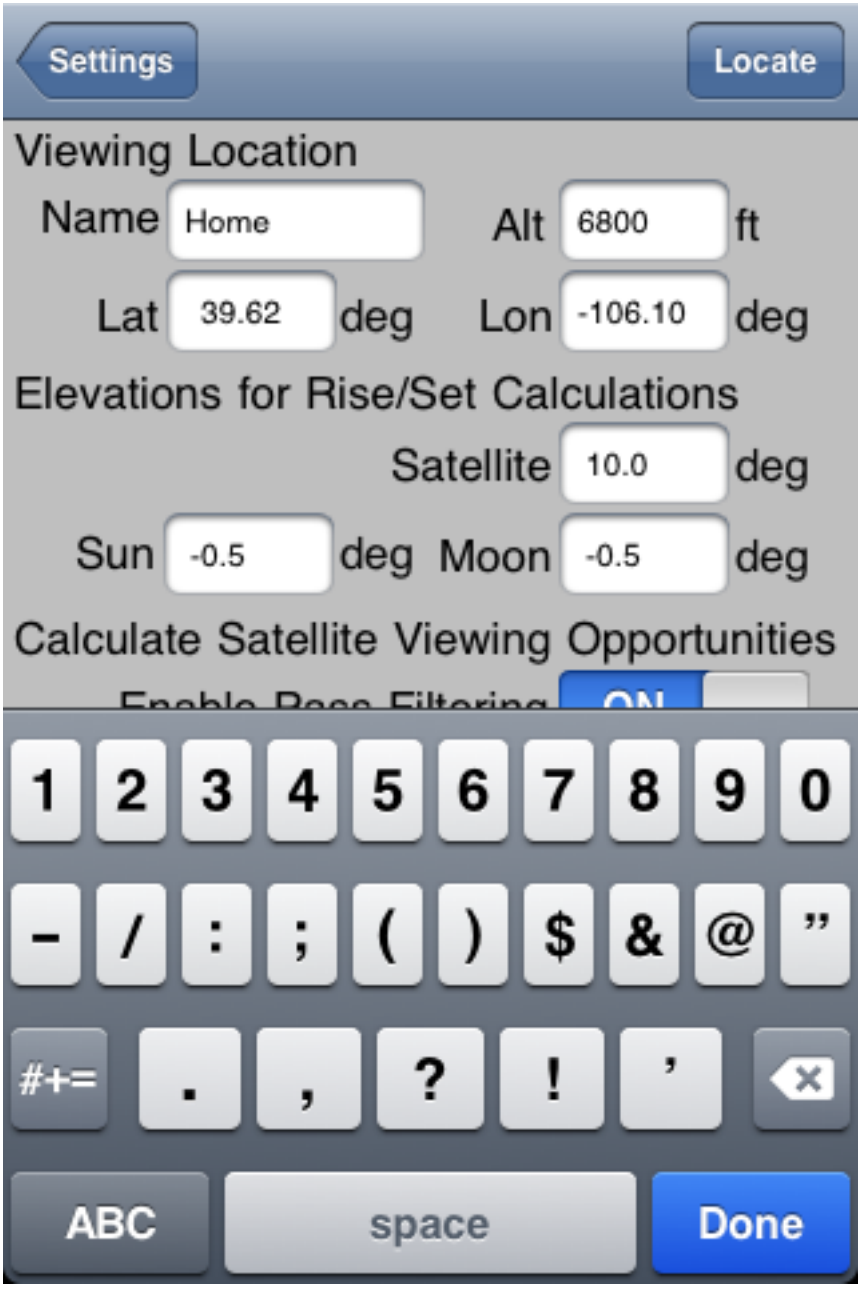
This will cause the application to think for a second or two while it fires up the location services. Once completed, it should populate the latitude and longitude fields automatically (see below)

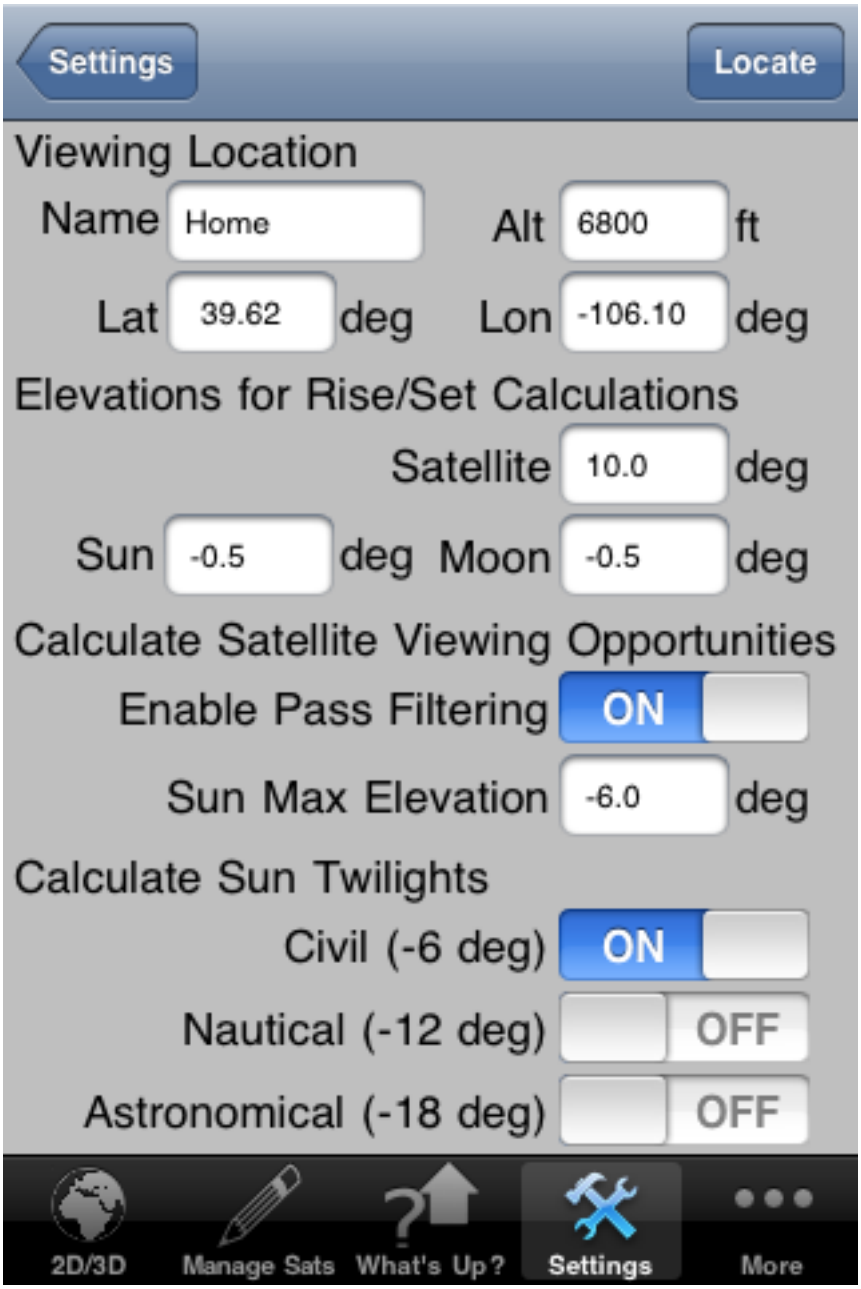


As can be seen, the application has automatically put in the latitude and longitude for my current location (I'm in Colorado Springs.) The altitude may or may not be populated depending on the level of accuracy that the Location Services is capable of determining (Location Services uses a combination of WiFi hotspot information, GPS

and cell tower locations to determine your current location and depending on what source is available will drive whether the altitude can be pre-populated.)

If the altitude is not pre-populated (or Location Services can not determine you location) then you can always enter the data manually into the fields. I usually just Google my location name (ie. Colorado Springs Lat Lon) and it will bring you back the needed info. Just click on the field you want to edit and the keyboard will pop up to allow you to enter the info you want to use (see below)





NOTE: The Lat/Lon fields are in decimal degrees (not degrees, hours, minutes, seconds format) Also, South Latitude and West Longitude are reflected by adding a minus sign to the front of the respective field (not by putting S or W into the field)

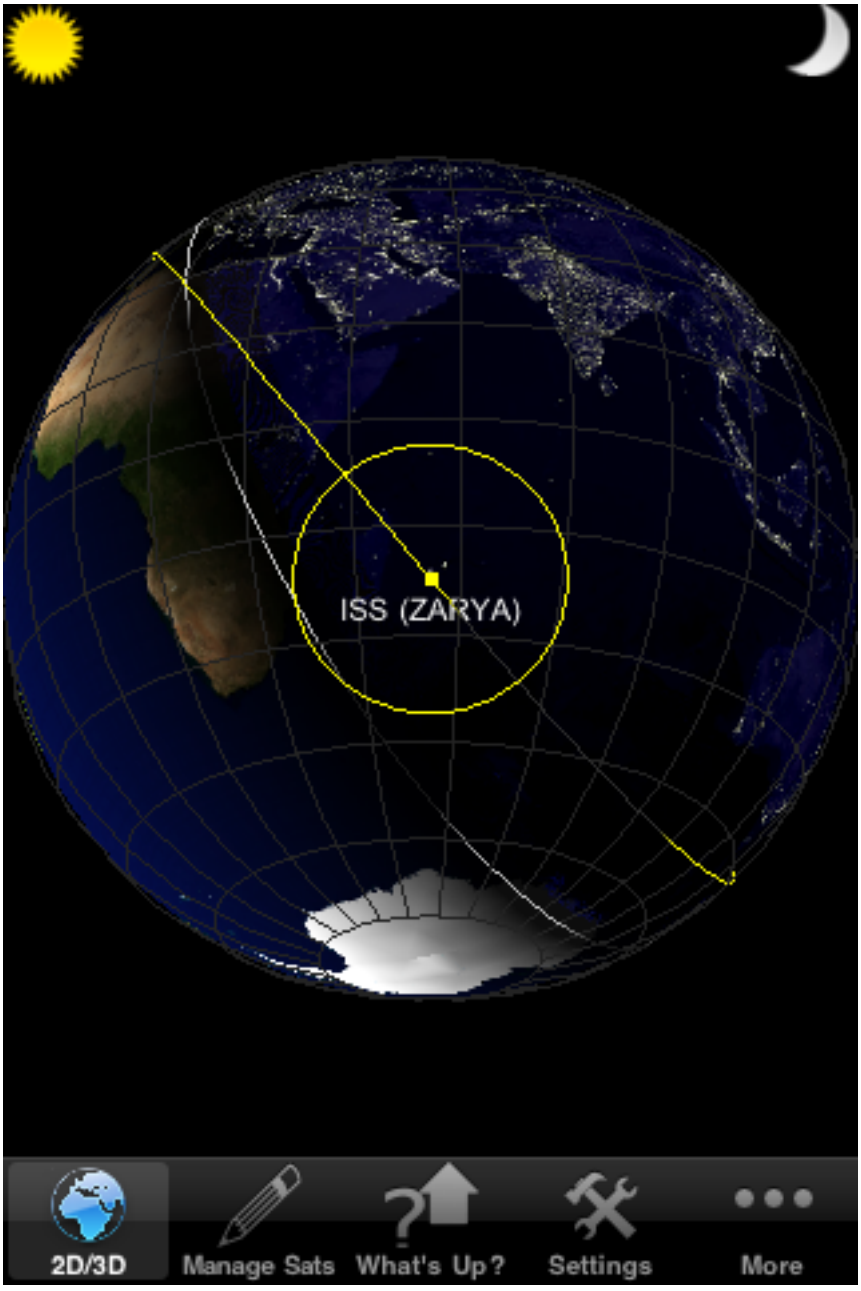
With the viewing location configured we've got enough info to get going with the rest of the application. The other values on this screen are defaulted to reasonable value and the details of each will be discussed later in this document. So, go ahead and click the Setting back button at the upper left corner of the screen to go back to the main Settings screen and then click on the Map button at the bottom (the left most button) to get to the main screen (see below.)

Main Display

The primary display for the application is the map display (both 3D and 2D views are provided depending on the orientation of the device.)

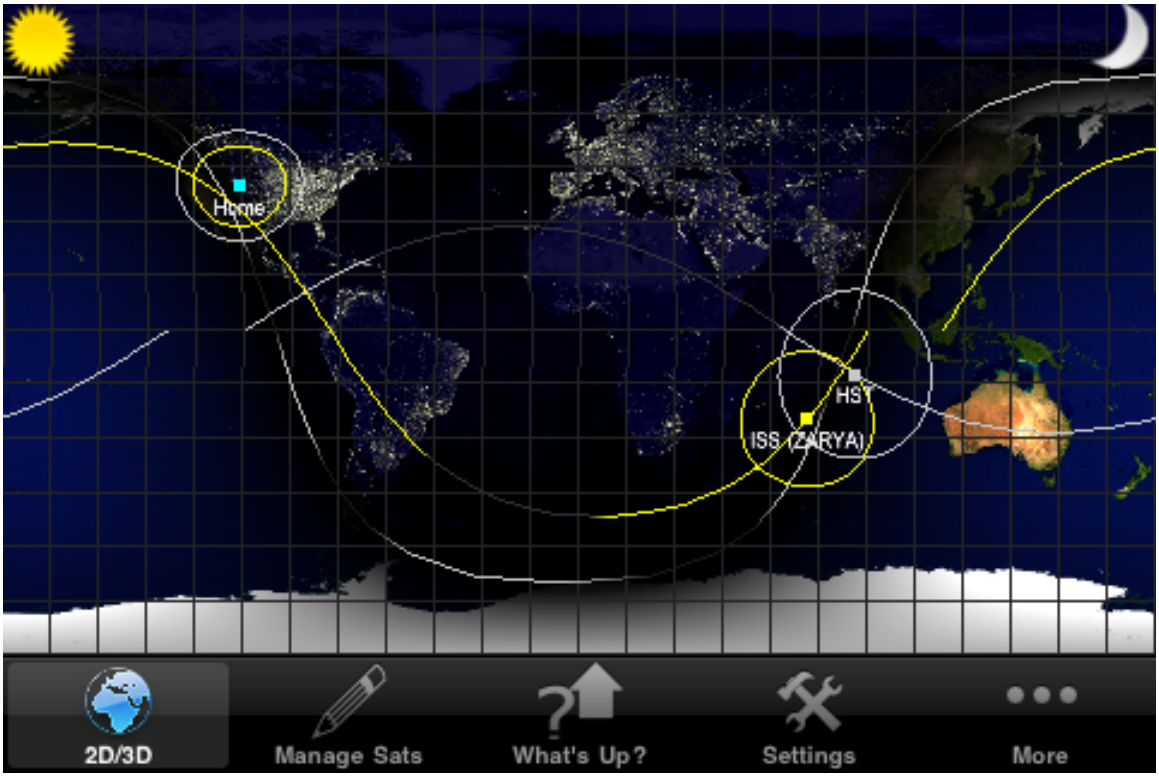
3D Globe

When the device is held upright (Portrait) a 3D globe is presented in the map view (see below.)



2D Map

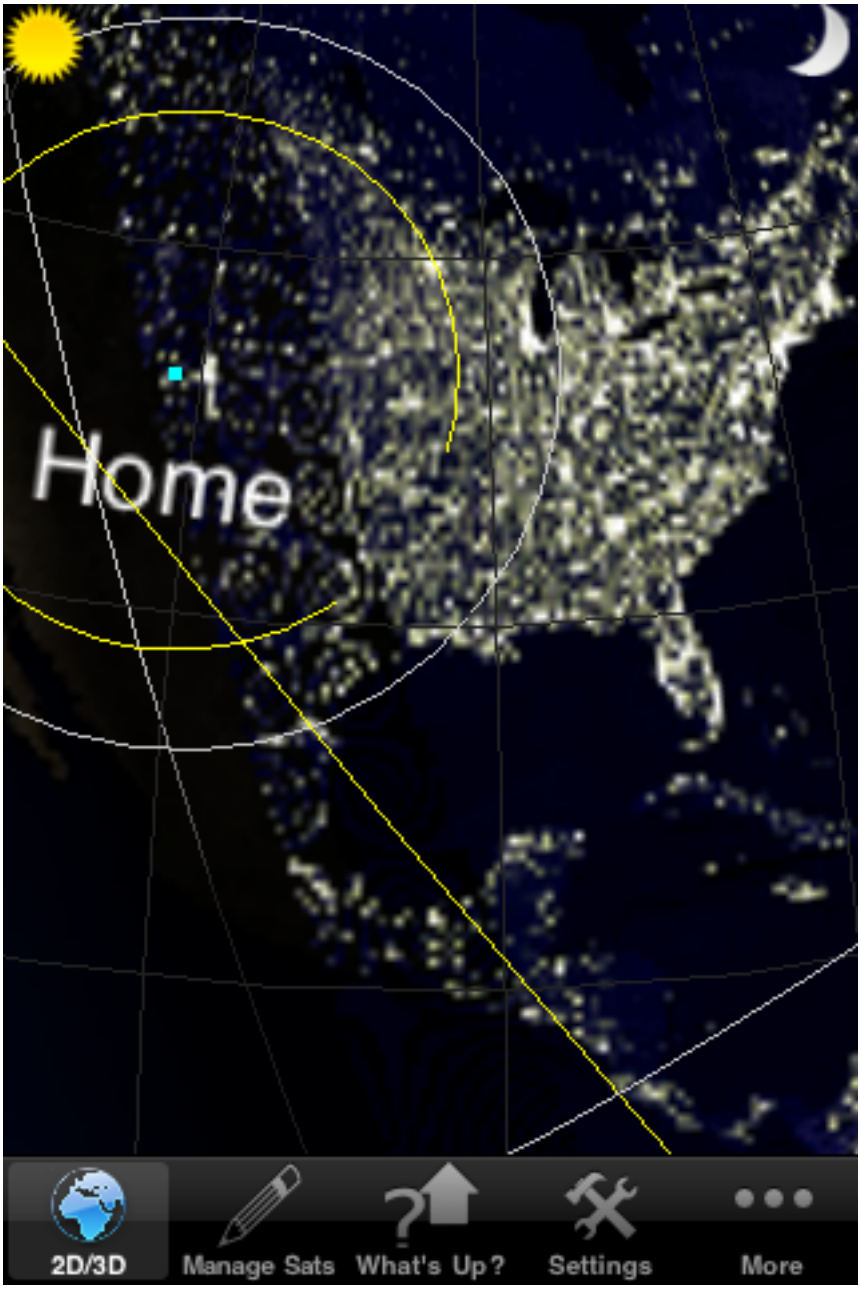
To access the 2D map mode, you simply need to rotate the device horizontally (landscape). The application will automatically sense the change and will rotate the map view accordingly (see below.)



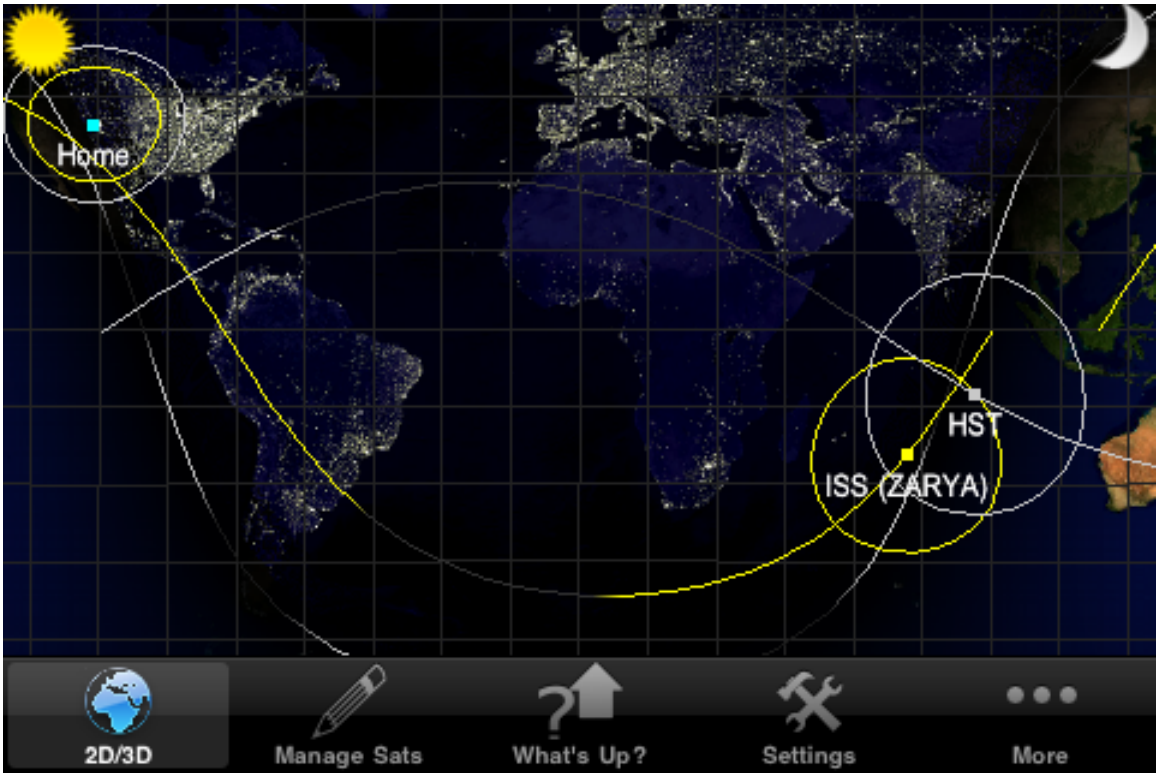
Change View Point & Zoom

The application is fully touch and multi-touch enable. To move the view around simply single touch the screen and while holding move your finger. The map will move in the direction of your finger. Note that when on the 2D view (landscape) and fully zoomed out (you can see the entire map) the pan functionality will not work (as there isn't anything to pan around)

To zoom in, perform the typical two finger spread gesture while to zoom out, perform the opposite two finger pinch gesture (see below for an example post a zoom in gesture in the 3D Globe view)

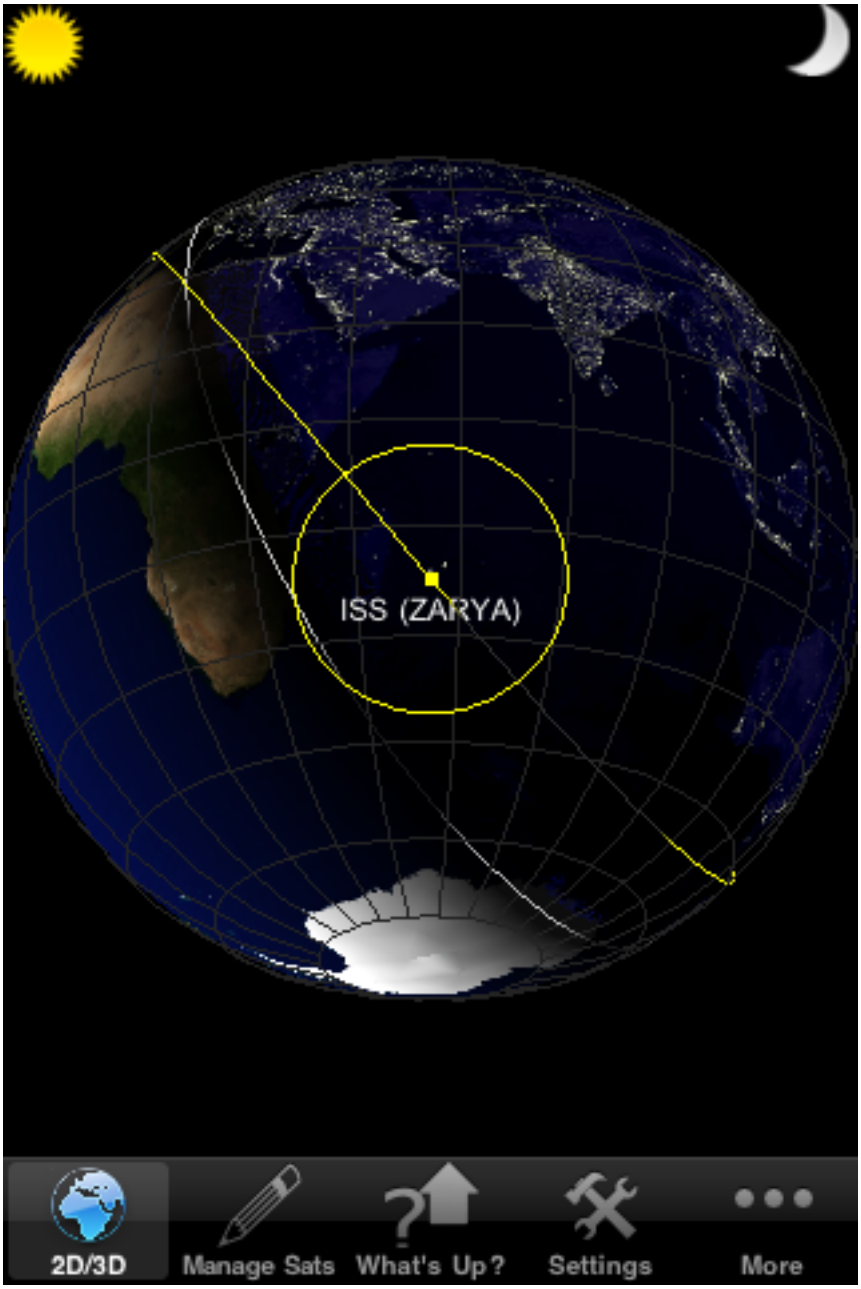


And an example of an equivalent zoom in the 2D map view is below. As an aside, notice how the distortion of the 2D rectangular projection is causing the circular horizon footprint around the Space Station shown above in the 3D view to become flattened as the distortion becomes progressively greater as you approach the poles of the Earth.

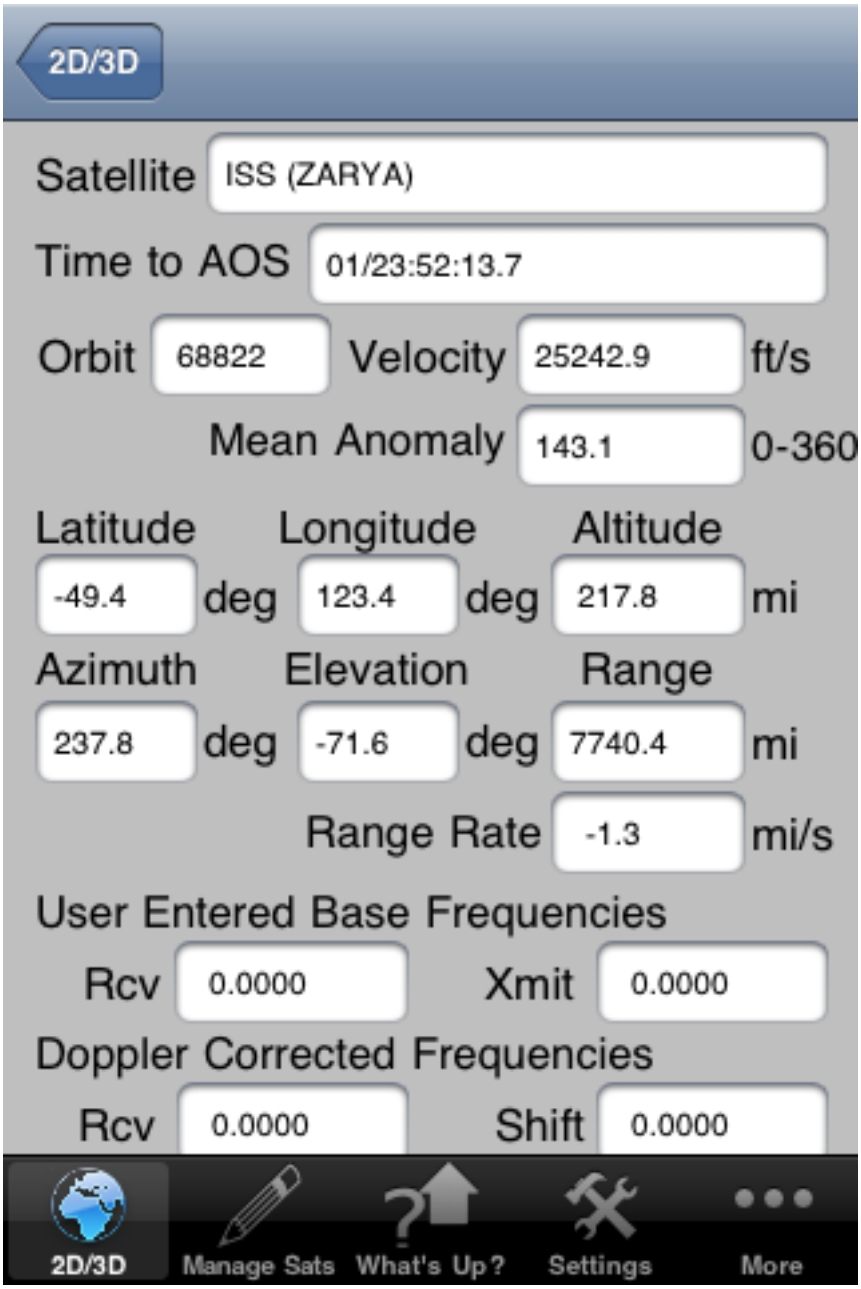


Satellite Details

There are two ways to access a satellite's details page. You can either single tap on the satellite on the map view or you can select the Satellite Details button under the far right More button (the three dots). The reason for providing both access paths is that while the double tap approach is convenient you must dismiss the details to return to the map view. In the case of using the button at the bottom, you can toggle back and forth between the map view and the details without having to constantly reselect the satellite from the map.



To access via the map, simply bring the satellite of interest into view and then single tap the satellite. The following screen will be presented.



The Satellite Details page provides all kinds of specific information about the satellite of interest. To use the Doppler shift calculator (used by Ham Radio operators to automatically compute the required Doppler shifts to communicate with a satellite as it passes over head) you must enter in the desired receive and transmit frequencies (you must enter both as in some cases the frequencies that a satellite operates on varies between transmit and receive)

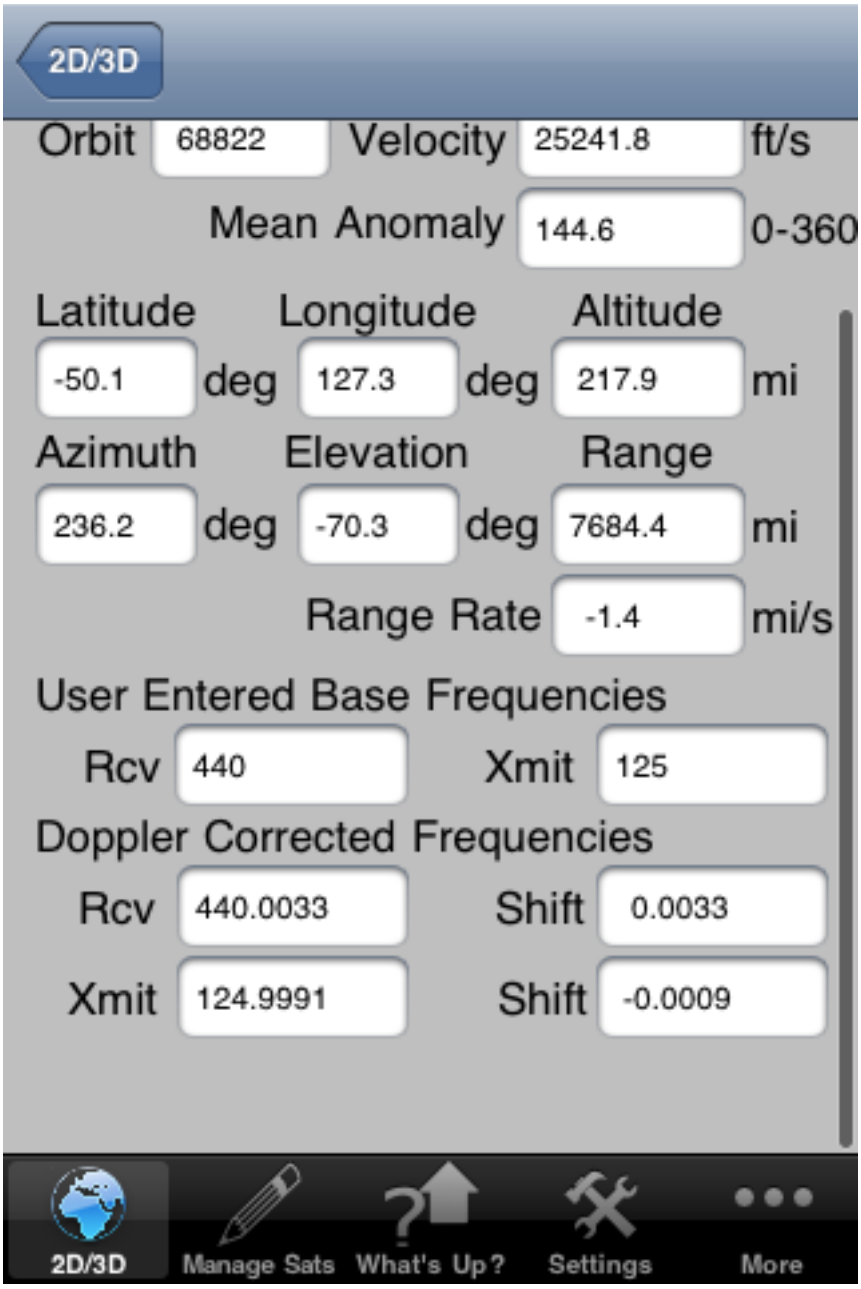
To enter the desired frequencies to use, simply touch in the Rcv or Xmit fields to bring up the keyboard (see below.)

Using the keyboard, enter the desired frequency information into the two fields. In my example, I've entered a 440Mhz frequency for both the receive and transmit values.

As soon as the field data is entered, the calculator automatically starts computing the required Doppler shifts and presents the data into the Doppler Corrected Frequency fields at the bottom of the screen.

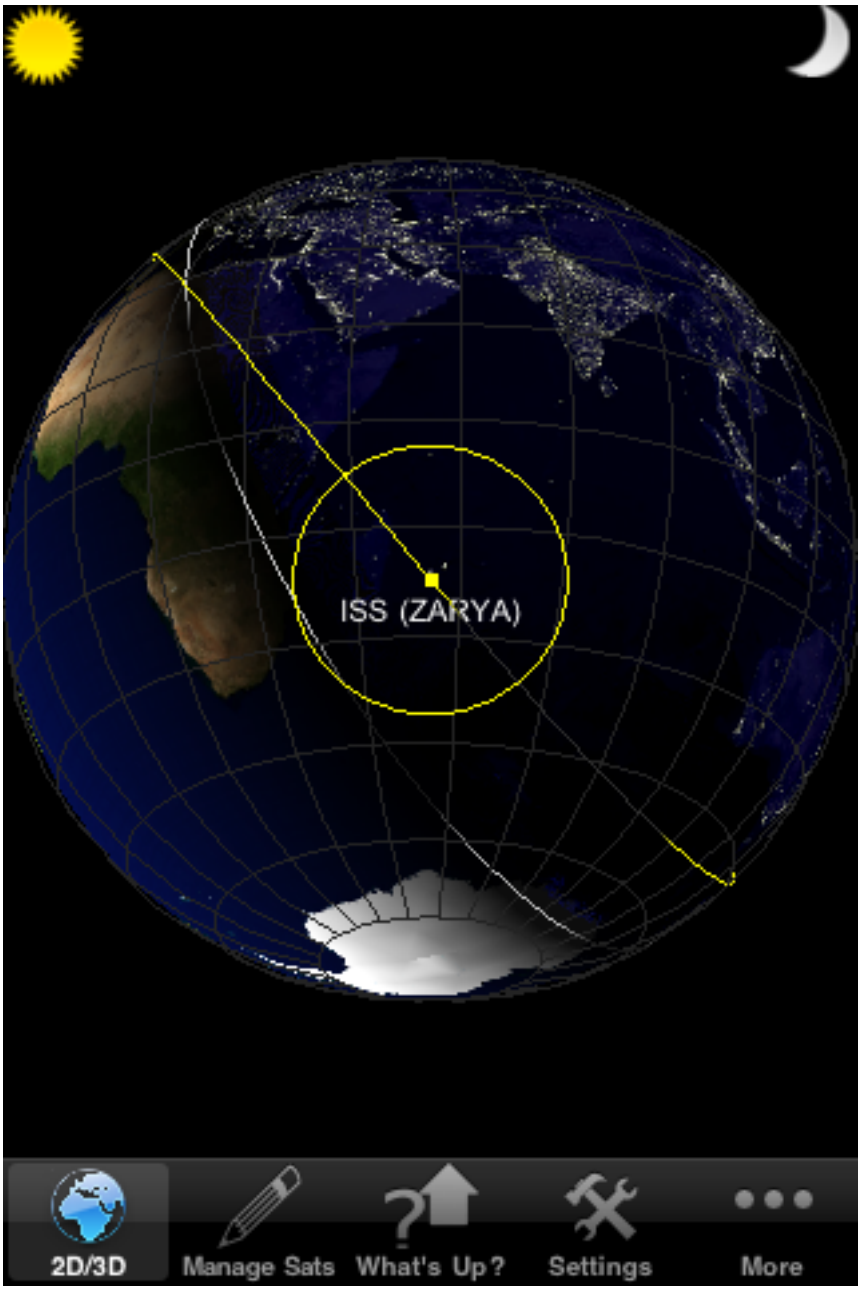
Different values can be entered for each satellite and the values will be automatically saved for that satellite for future use. However, if you delete the satellite from your list of tracked satellites, you will have to re-enter the frequency

information again if you later re-add the satellite (unfortunately the element databases that are available on the Internet do not include the satellite frequency information)



Satellite Rise/Set

As with the Satellite Details page described above, the Satellite Rise/Set page can also be accessed either via the map or via the More button at the bottom far right of the screen.

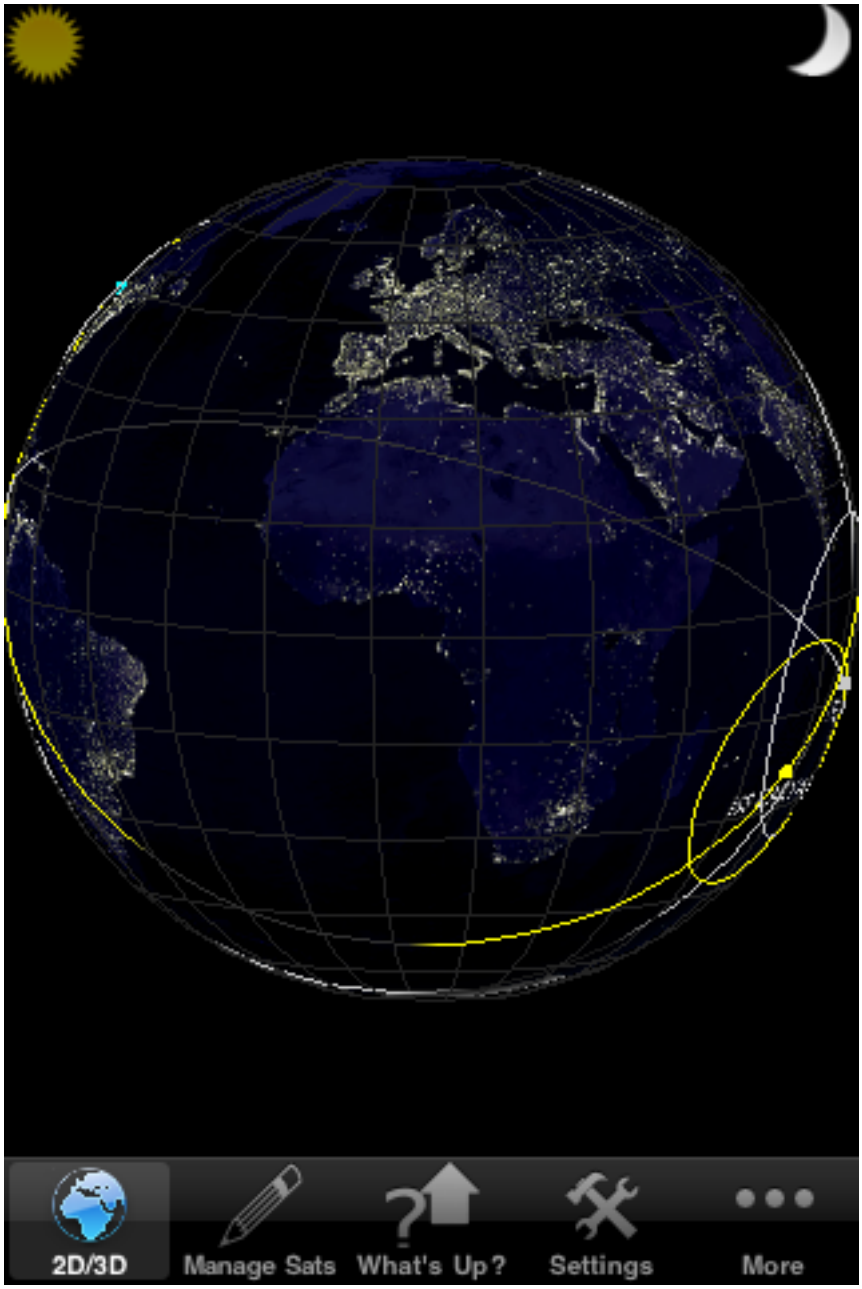


To access via the map, simply bring the satellite of interest into view and then double tap the satellite. The following screen will be presented.

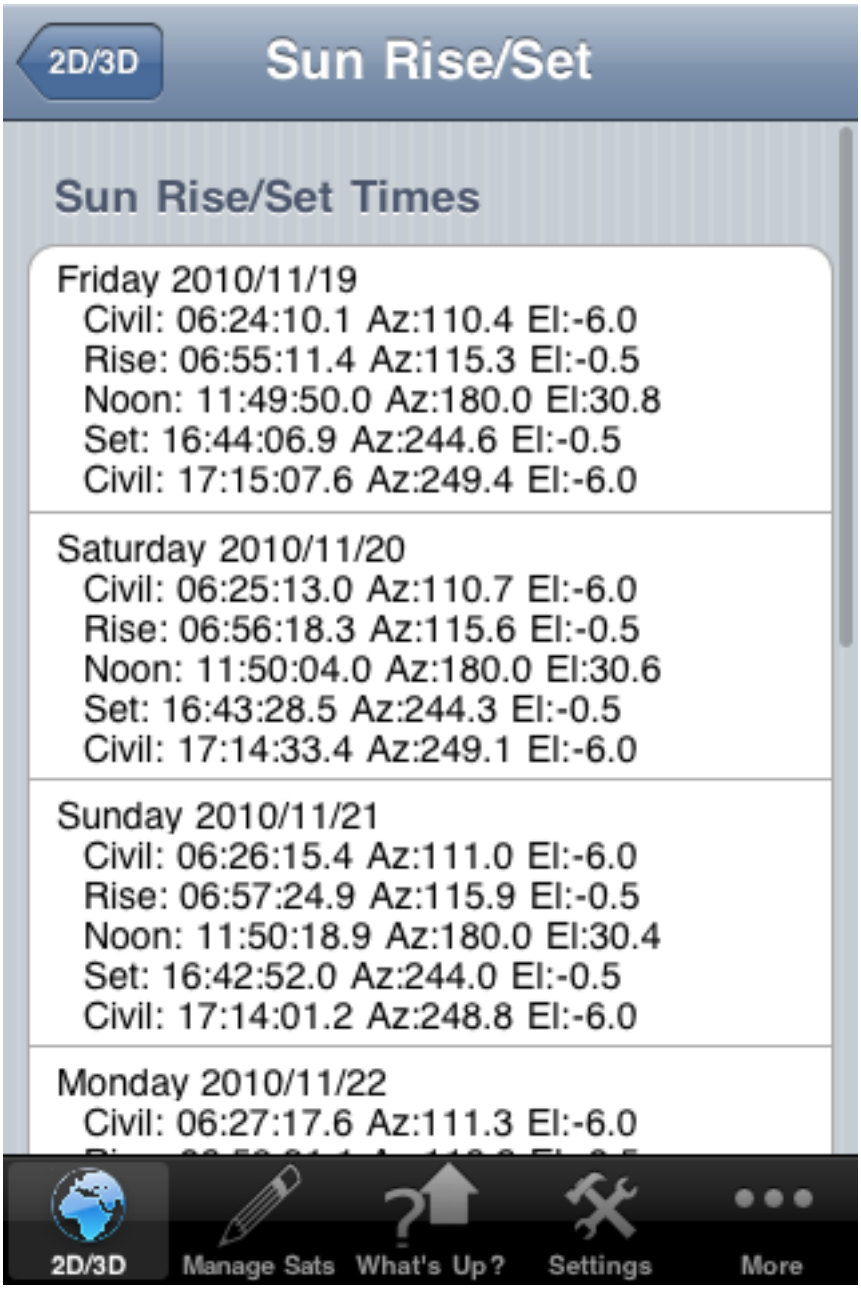
The information used in computing the rise/set times for the selected satellite is pulled from the configuration you completed in the initial setup step. For an indepth discussion of the various pieces of information used in determining a satellite's overflights please see the Set Viewing Information section below.

Sun Rise/Set

To access the Sun Rise/Set information for your specific location simply click on the Sun icon in the upper left of the screen.



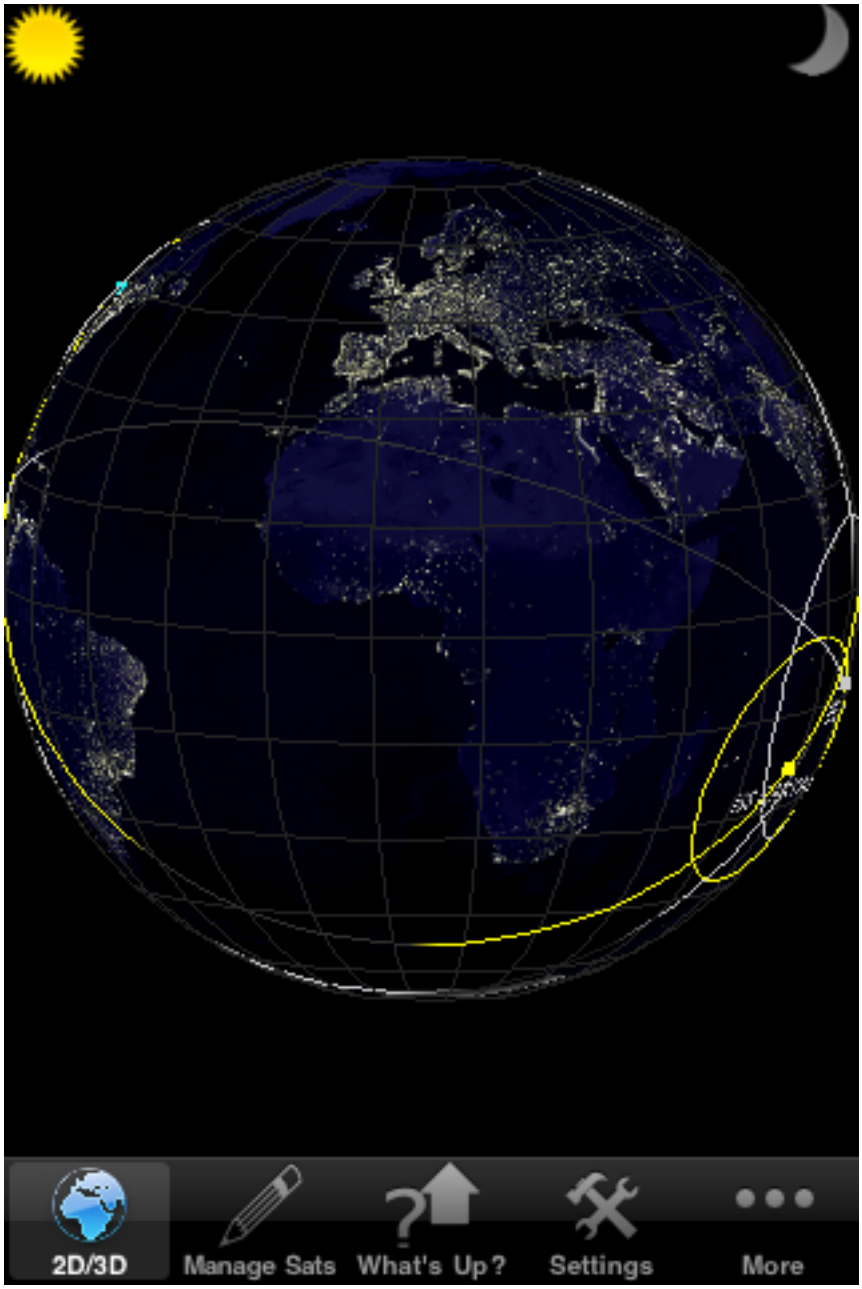
Once selected the rise/set times for your specific location and configuration (the various twilights) will be calculated and presented on the following screen.



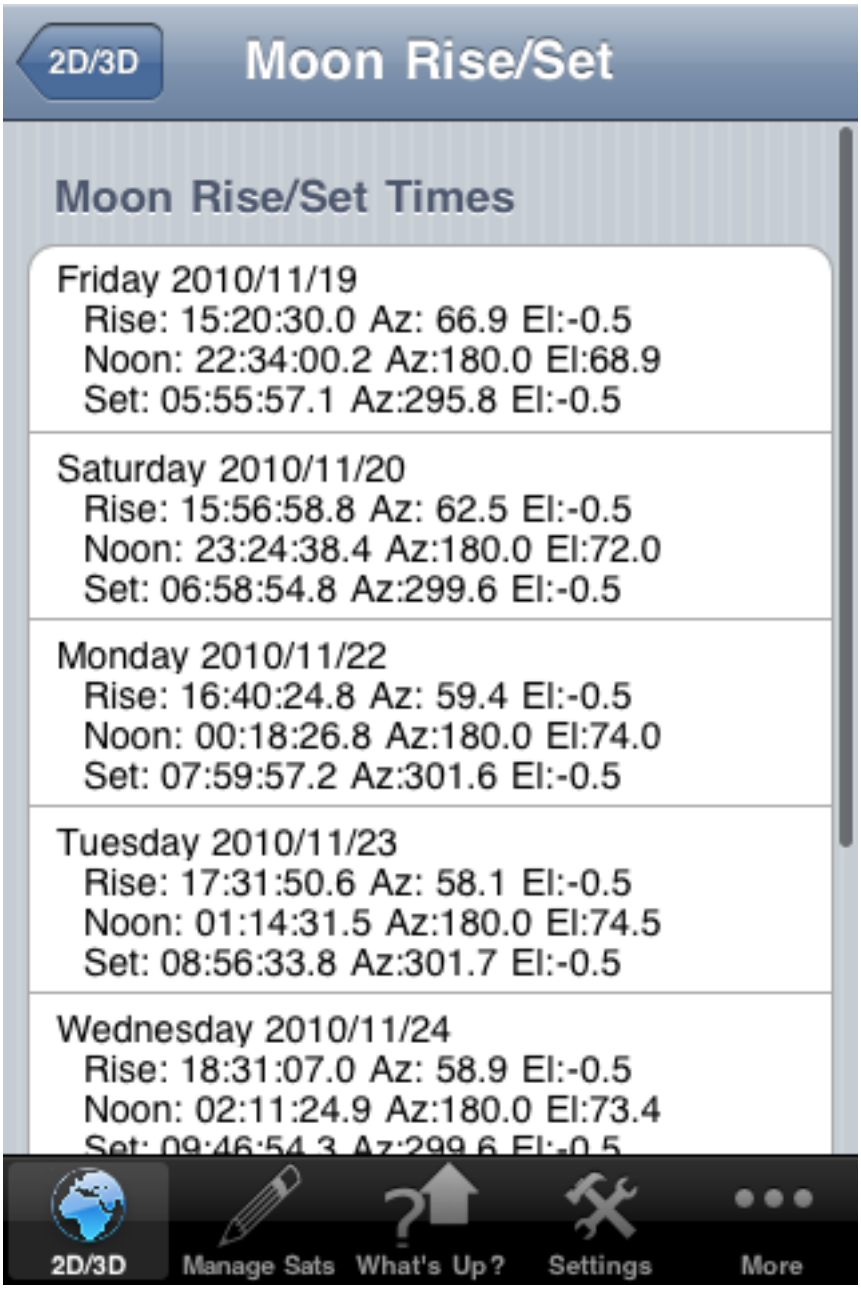
Again, please see the Setting Viewing Information section for details on how to tailor the information to your specific needs.

Moon Rise/Set

To access the Moon Rise/Set information for your specific location simply click on the Moon icon in the upper right of the screen.



Once selected the rise/set times for your specific location will be calculated and presented on the following screen.



Again, please see the Setting Viewing Information section for details on how to tailor the information to your specific needs.

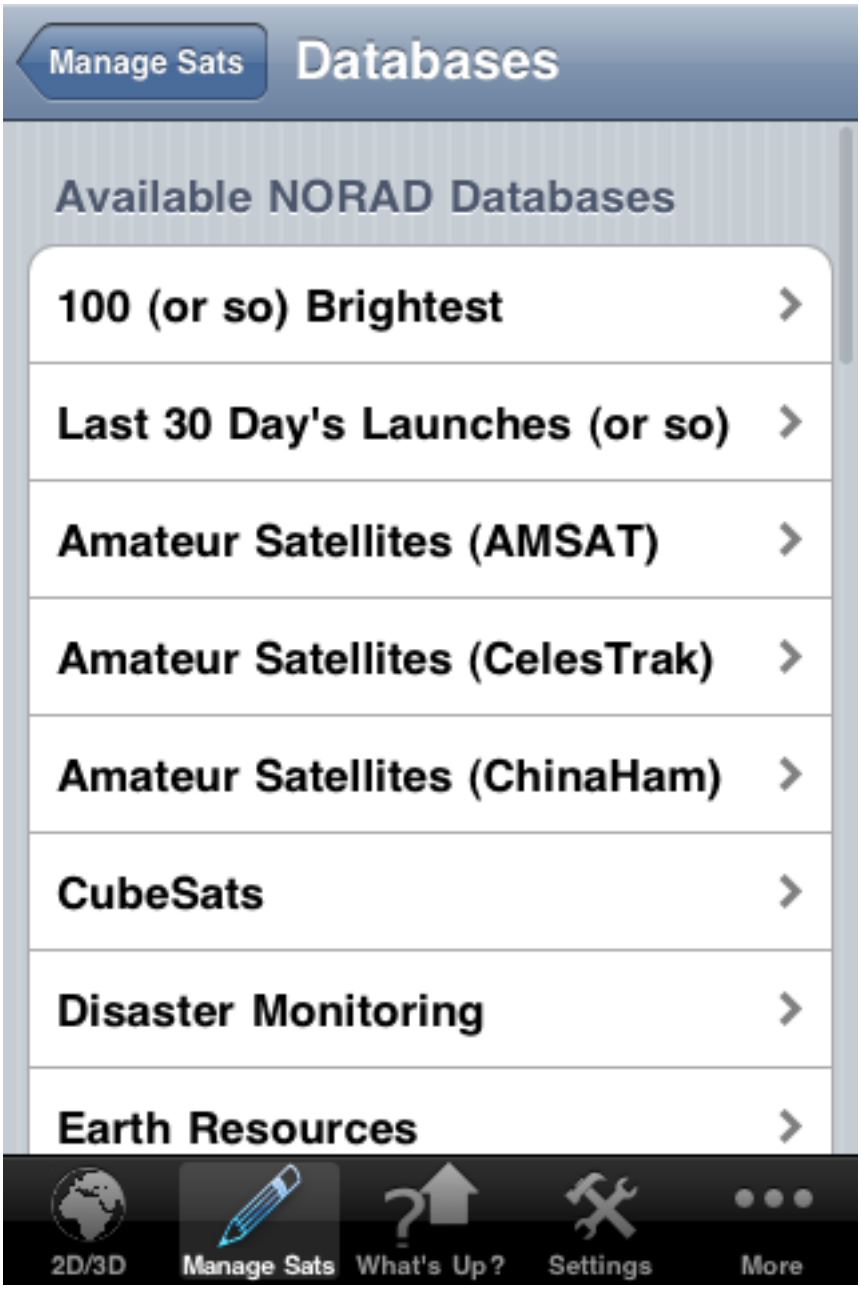
Manage Satellites

In this section we'll discuss how to manage satellites that will be displayed on the map view. The concepts of adding, updating and removing of satellites will be covered.

Add New Satellite

To add a new satellite start by clicking on the Manage Sats tab at the bottom of the Window (second from the left.) This will bring up the following screen which will have listed the current set of satellites that are being displayed on the map (the application has the International Space Station preconfigured)

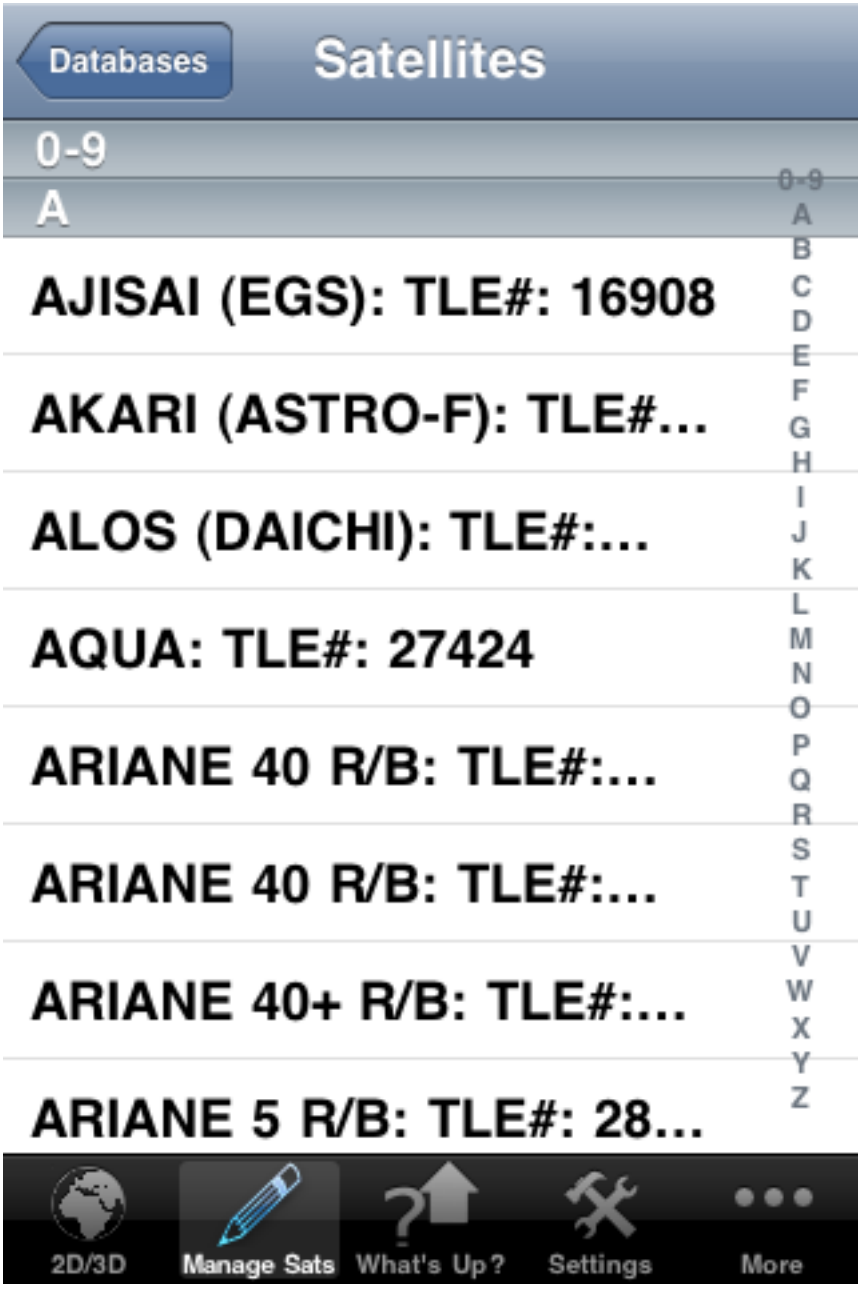
To add a satellite, click on the Add button in the upper left corner to begin the satellite selection process. Once the Add is pressed, the following screen will appear.



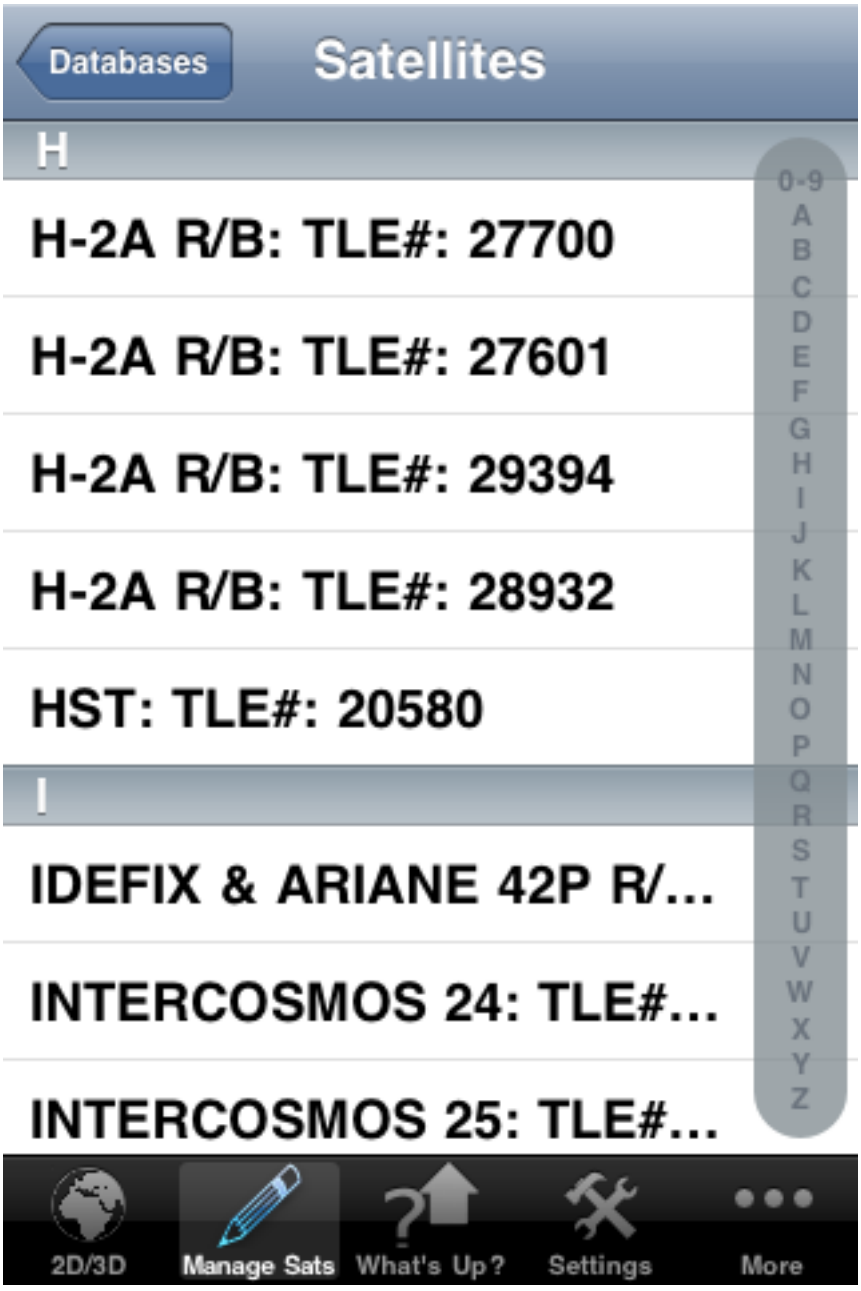
This screen shows all of the satellite databases that are available for usage in the ProSat application. For the most part these databases map directly to those available on Dr. T. S. Kelso's CelesTrak website. The current notable difference is the addition of the AMSAT and ChinaHam satellite ham radio databases that are downloaded from the AMSAT and ChinaHam websites respectively.

In all cases, these databases are updated by clicking the update now button at the bottom of the initial Manage Sats screen (this is the step we did when you first started up the application)

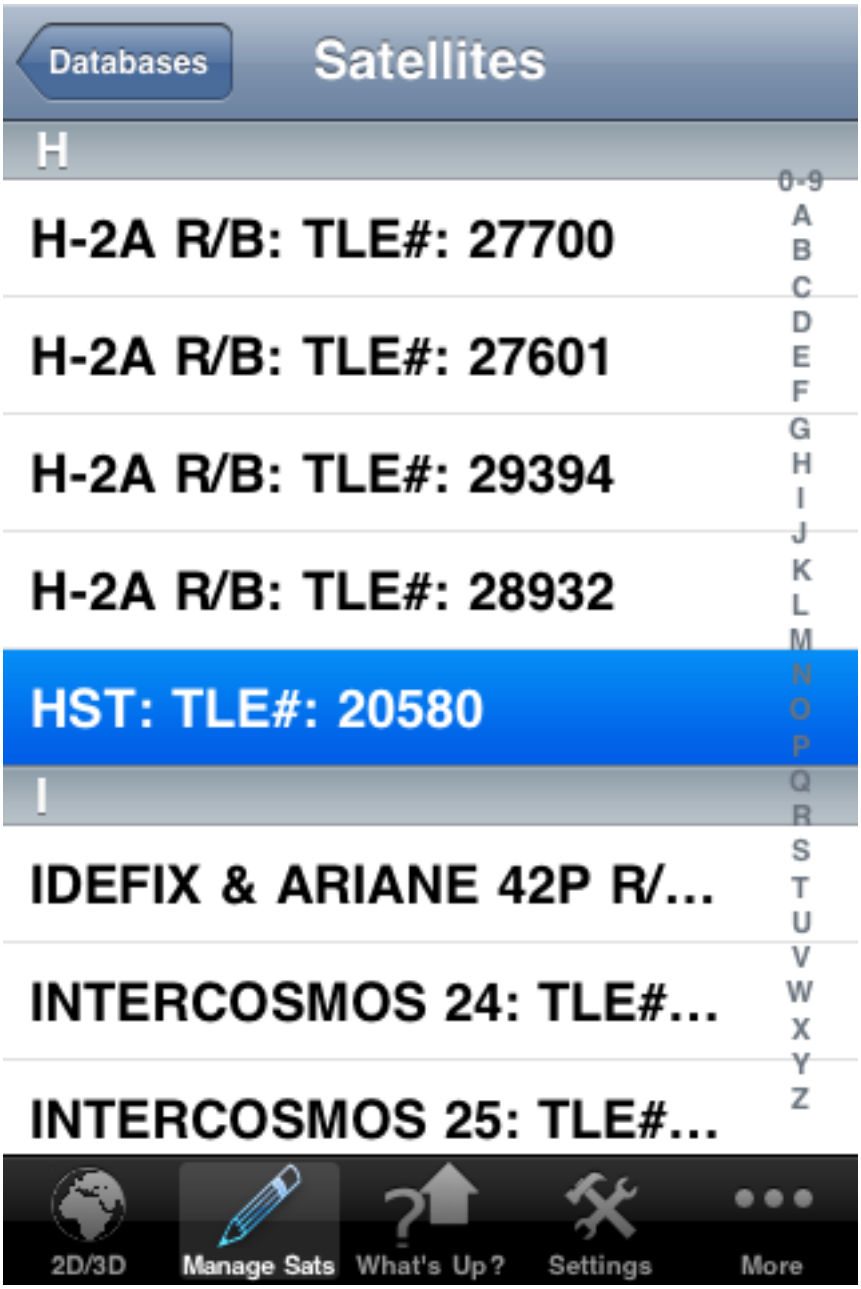
Scroll the list to the satellite database that contains the satellite of interest. In this example I've selected the 100 or so brightest database as I'm interested in adding the Hubble Space Telescope (HST). Selection of that database results in the following screen.



Now that I've selected a specific database this screen is showing me all of the available satellites in that database in alphabetical order. You can either scroll the device to show the satellite you're interested in or you can use the alphabetical listing on the right side to jump to that specific letter. Again in my case I'm adding the HST so I selected the 'H' from the right quick jump index and that took me directly to the beginning of the H's (see below.)



Now select the satellite of interest by touching on the name.



This will take you to the final step of configuring the satellite's display preferences (see below.)

On this screen we are configuring display properties for the specific satellite being added. The configuration parameters affect how the satellite will be displayed on the map. You can initially set the parameters here but you can always come back later and make modifications if necessary (so feel free to experiment a bit if you'd like)

COLOR:

You start by selecting the color that will represent the satellite. As this is the second satellite being added, the second color in the list is pre-selected. You can change to a different color by scrolling the list up or down to the desired color.

DRAW LOCATION FOOTPRINT:

This will toggle on or off the drawing of the satellite's footprint for the location specified in the Settings. A footprint is the horizon line from the satellite's perspective drawn on to the map. There are two types of footprints available in ProSat. The first (which is configured) will put up what the horizon line for this specific satellite will look like for your configured viewing. This is useful when viewing a satellite from that location as it allows you to easily determine if a satellite is currently viewable by simply looking at the map. If a satellite falls within the footprint then that satellite is currently visible.

DRAW TDRS:

TDRS stands for Tracking and Data Relay Satellite and is a geosynchronous satellite communication network that NASA (and others) use to relay communications to other orbiting satellites (like the International Space Station or the Space Shuttle.) If you enable this features, then the footprints for both TDRE (The Eastern TDRS satellite) and TDRW (the Western TDRS satellite) will be drawn on the map. This capability is predominately provided for people working on NASA missions who are using the application to track their vehicle but feel free to experiment with this if you'd like. You can't hurt anything by playing…

DRAW SAA:

SAA stands for South Atlantic Anomaly and is a region over the South Atlantic east of South America where the Earth's magnetic bottle dips closer to the Earth. This area is of interest to manned space flight as any item on the vehicle (ISS or the Shuttle) that is sensitive to increased radiation (like film) must be shielded (put in a lead lined locker or bag) when in this area. In the case of sensitive film (high ISO rating) the failure to bag the film or camera can lead to fogging of the film.

DRAW GROUNDSITES:

NASA uses a network of ground sites to provide communications and tracking for their vehicles. This toggle allows you to turn on/off the drawing of the footprints for those sites. If enabled, you'll notice that some of the sites appear to have irregular footprints (when compared to something like a satellite or location footprint which are smooth.) This is because a terrain mask is applied to the NASA sites which model the specific terrain (mountains, buildings, trees…) that interfere with seeing the physical horizon.

DRAW SATELLITE FOOTPRINT:

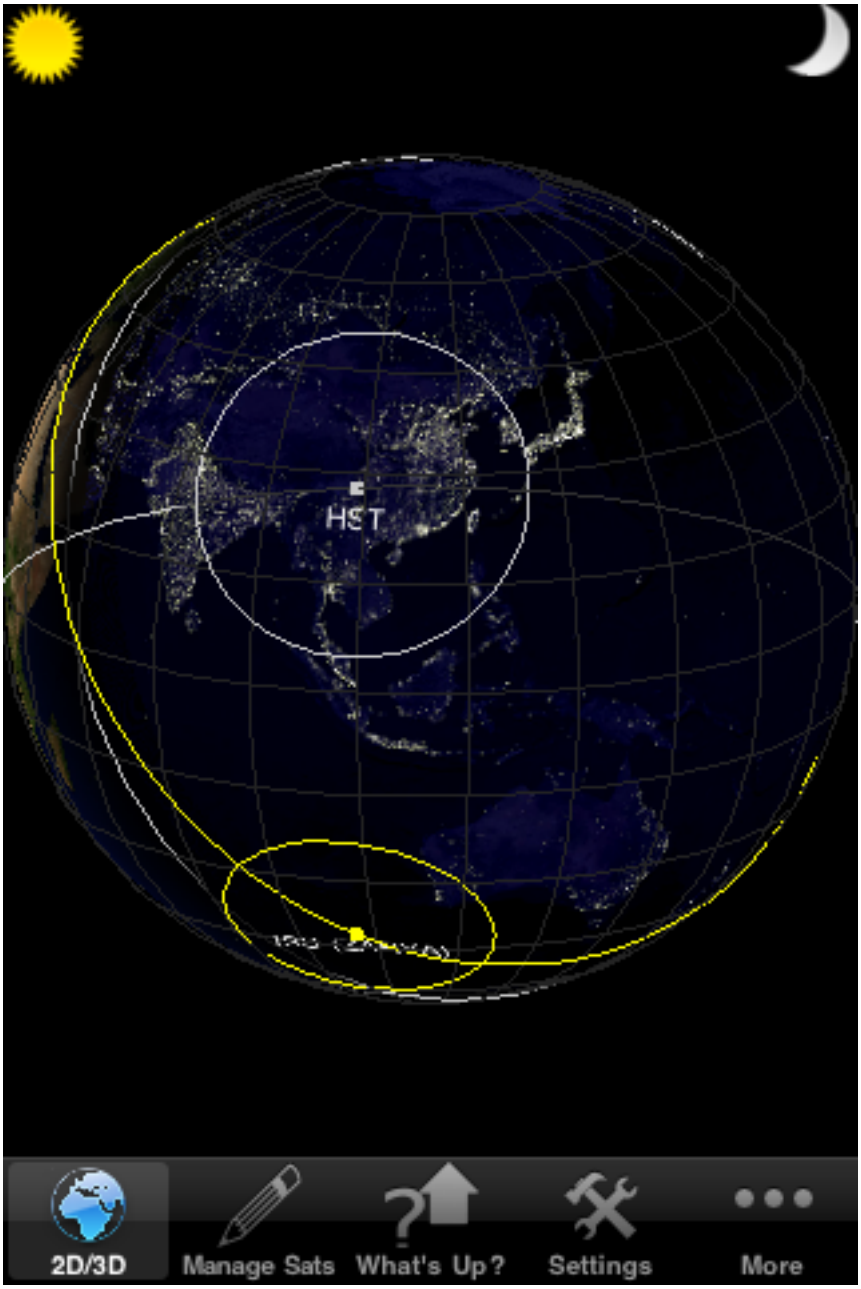
This toggle allows you to put a horizon footprint around the satellite. As mentioned above, this allows at a glance on the map to see what land areas are currently visible to the satellite in question.

NUMBER OF ORBITS TO DRAW:

This field governs the number of satellite orbits to draw on the map. The recommendation is one to three orbits as more clutters the map and slows processing as the satellite's position has to be propagated forward in time for the number of desired orbits on each refresh of the screen (and that's a lot of computations…)

When you are done configuring the preferences the way you want, just click on the done button in the upper right corner to complete the adding the satellite. Once you click the done button, you should land back on the main Manage Sats page and it should now show the satellite you just added in the list (see below.)

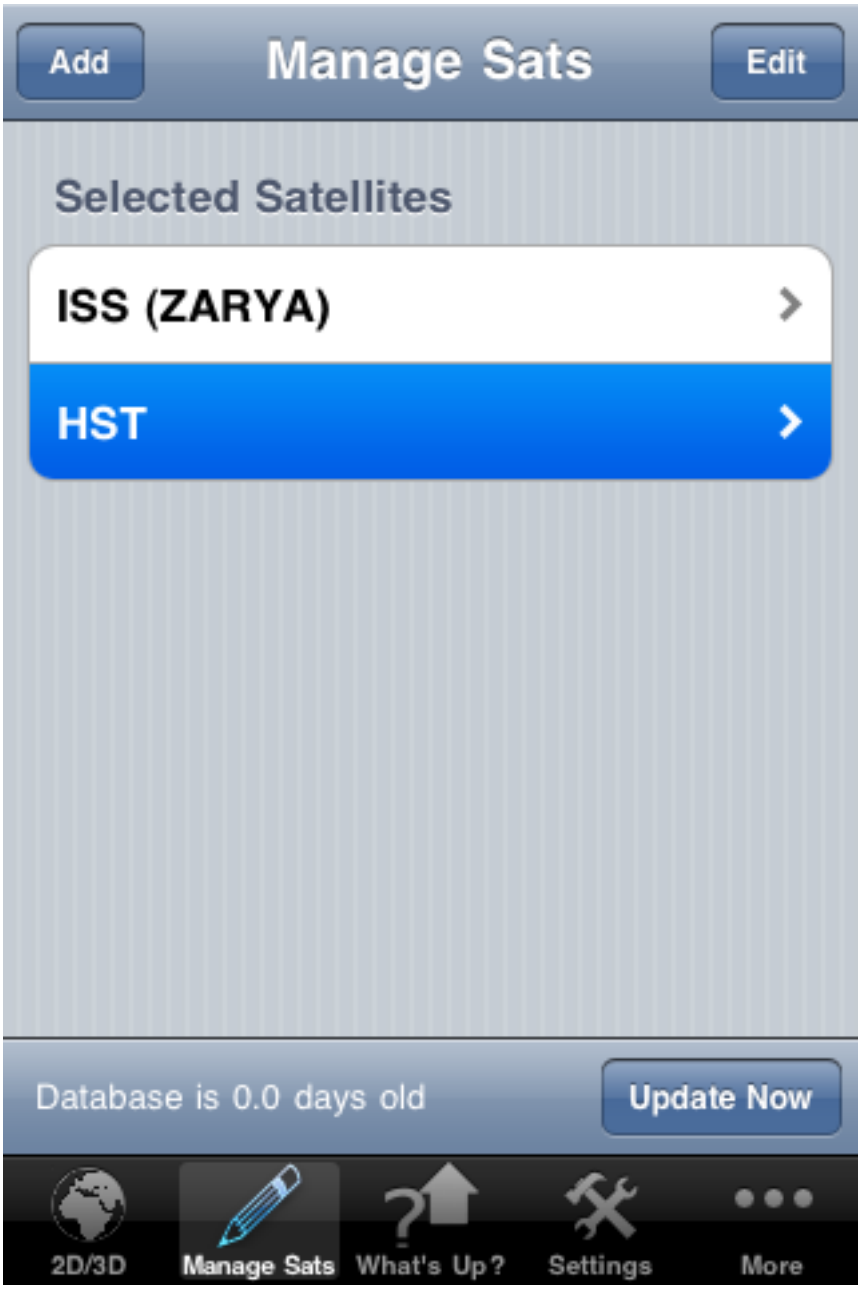
To see the new satellite on the map, just click on the map button at the bottom and it will take you back to the map. Don't forget (if you're in 3D mode) that you may need to pan the map around as the satellite may be on the other side of the Earth. See below for the satellite I added.



Update Satellite

To update the preferences of an existing satellite you again start by click on the Manage Sats button at the bottom of the screen. This will take you the page shown below.

On this page, you simply need to touch the satellite you want to modify from the list.



In my case, I selected HST from the list and that took me to the following preferences page.

This page is exactly the same as the preferences page you filled out when you added the satellite into the system (so see that section above if you've got any questions on what the different preferences mean.) Once you are done, just tap the done button to return to the main Manage Sats page.

NOTE: The saving of the preferences is not tied to hitting the done button (everything is saved automatically when ever you leave this page and go to another.) This means you can experiment with different selections by making changes on this page and then toggling to the Map View. You can then come back to this page by hitting the Manage Sats button again and you'll be right where you left off. This makes it handy when you are learning what different preferences provide.

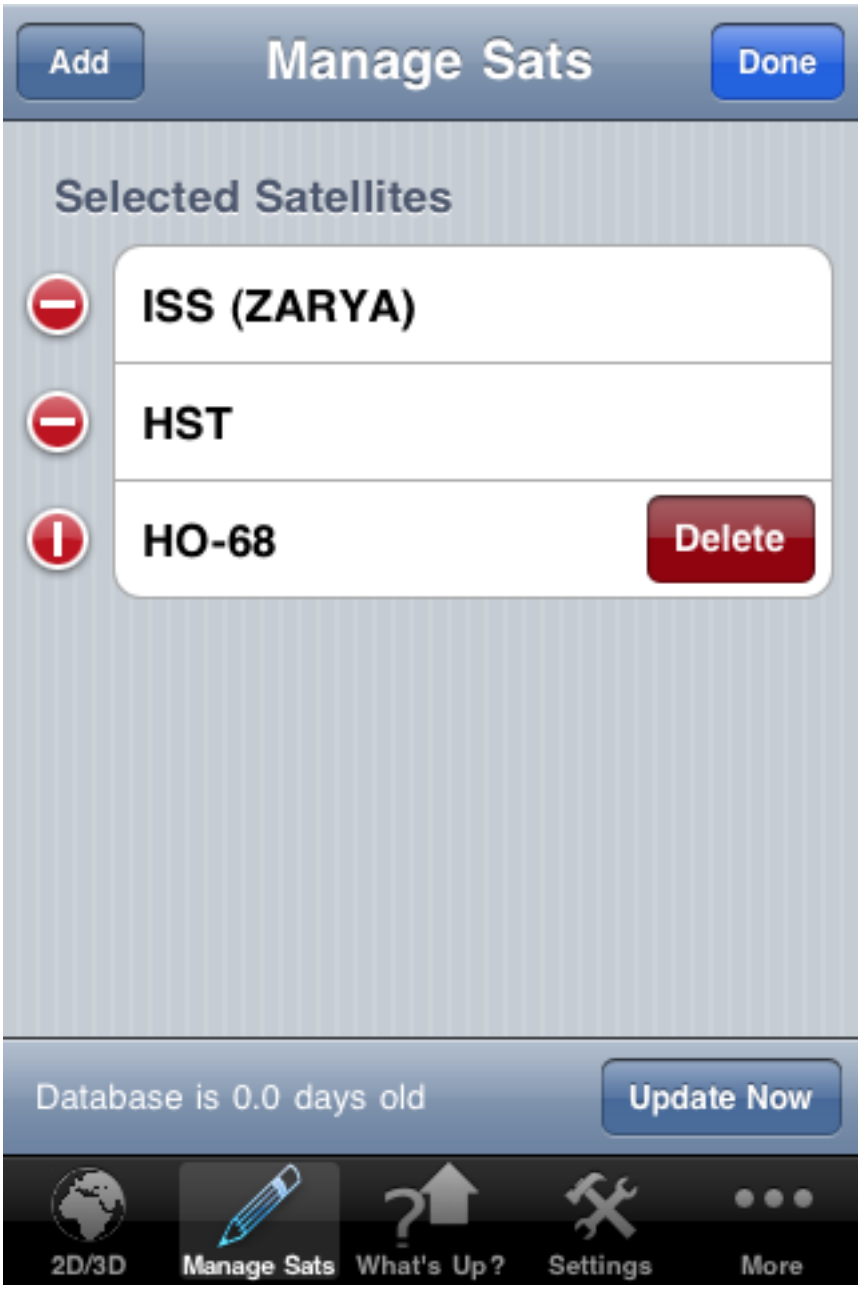
Remove Satellite

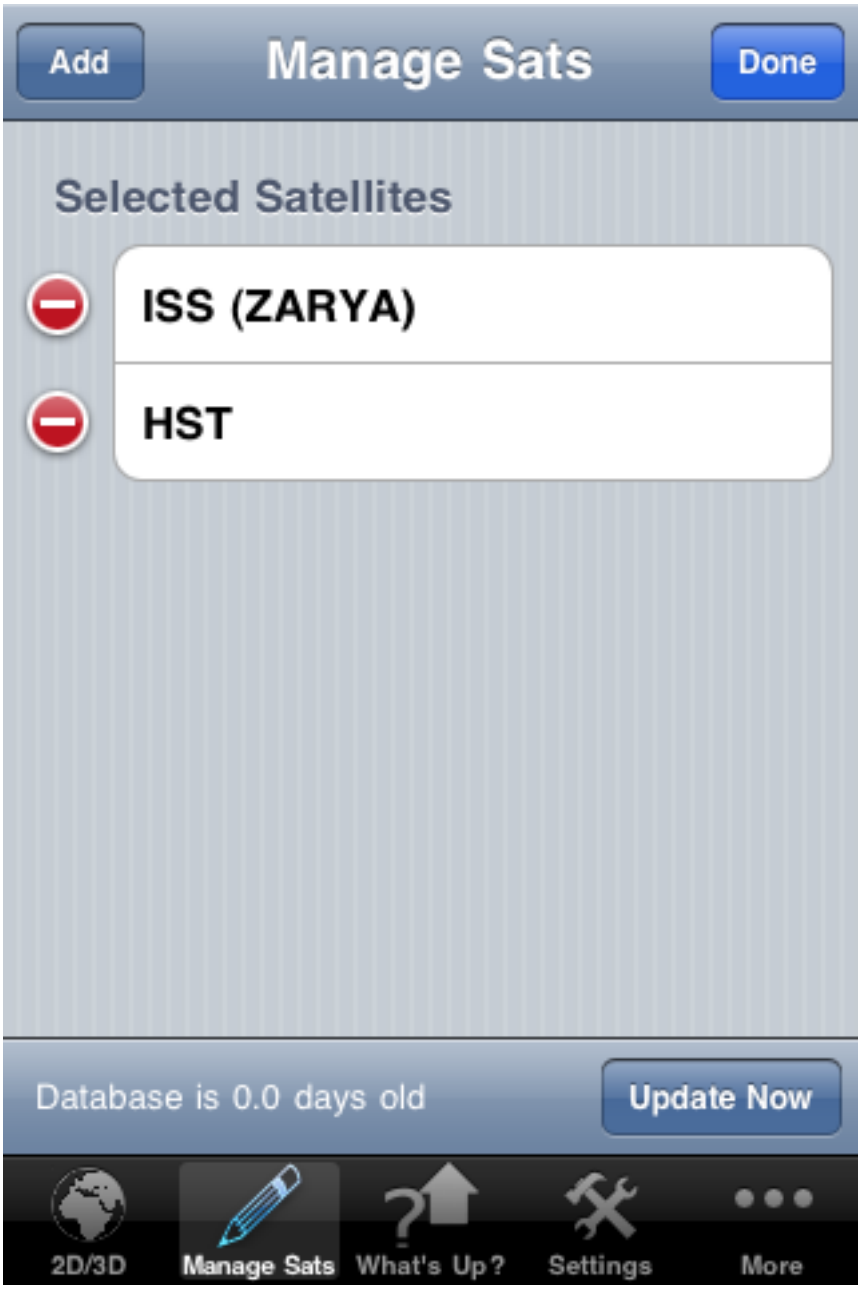
Removing a satellite is easy. As with the other satellite management activities, you start by clicking on the Manage Sats button at the bottom which will bring up the following screen.

Once on this screen click the Edit button at the top right to toggle the page into edit mode (see below.)

Once in edit mode, touch the red circle to the left of the satellite you want to delete and that will present the delete button for that specific satellite.

To complete the delete process, simply hit the Delete button and the satellite will be removed and the list updated to reflect the remaining satellites being managed (see below.)


Add
Manage Sats
Done
Selected Satellites
ISS (ZARYA)
HST
HO-68
Delete
Database is 0.0 days old
Update Now
2D/3D
Manage Sats
What's Up?
Settings
More



Once you are done with your edits, simply click the Done button to exit edit mode.

Whats Up Next?

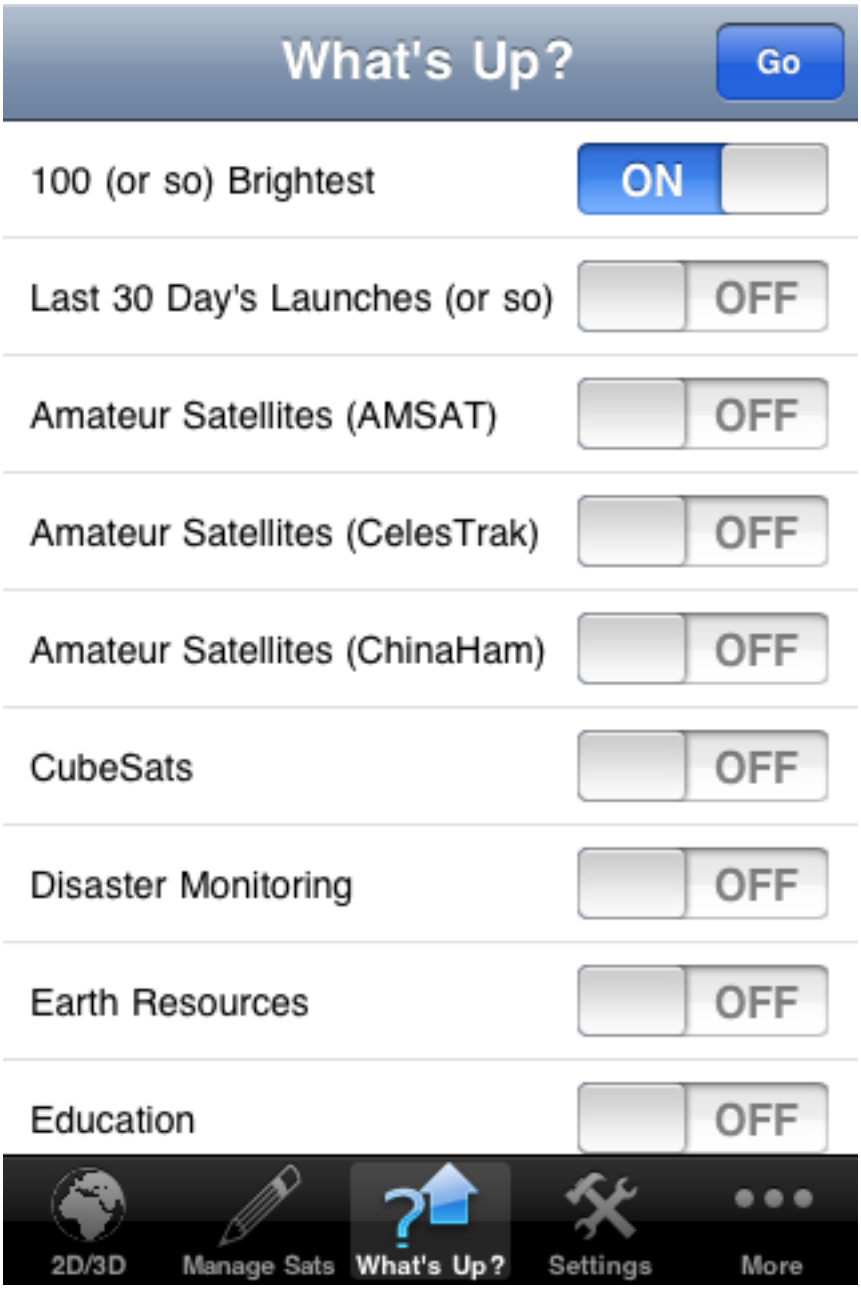
What's up Next mode automatically determines what satellites are available for viewing or radio contact (depending on how you have set up the viewing preferences and what task your are wanting to perform.)

As and example, if I'm interested in going out at night to watch a few satellite passes then I would set the viewing preferences to filter out daylight passes (under Viewing Information in the Settings tab.) This tells the application to filter out all satellite passes for my location where the satellites viewing information is unsuitable for

naked eye viewing. To view a satellite with the naked eye, the satellite must meet three criteria (all of which are automatically applied for you by the application if you turn on the filter daylight passes in the Viewing Information page.) First the satellite must be above my minimum horizon elevation (normally you use a value of 10 degrees to filter out any city light pollution). Second, the satellite must be lit by the Sun (not in the Earth's shadow) so that it can reflect the Sun's light and be visible. Finally, the location on the Earth that you are trying to view from must be in darkness (or like the stars in the daytime they will be washed out by the lit sky.)

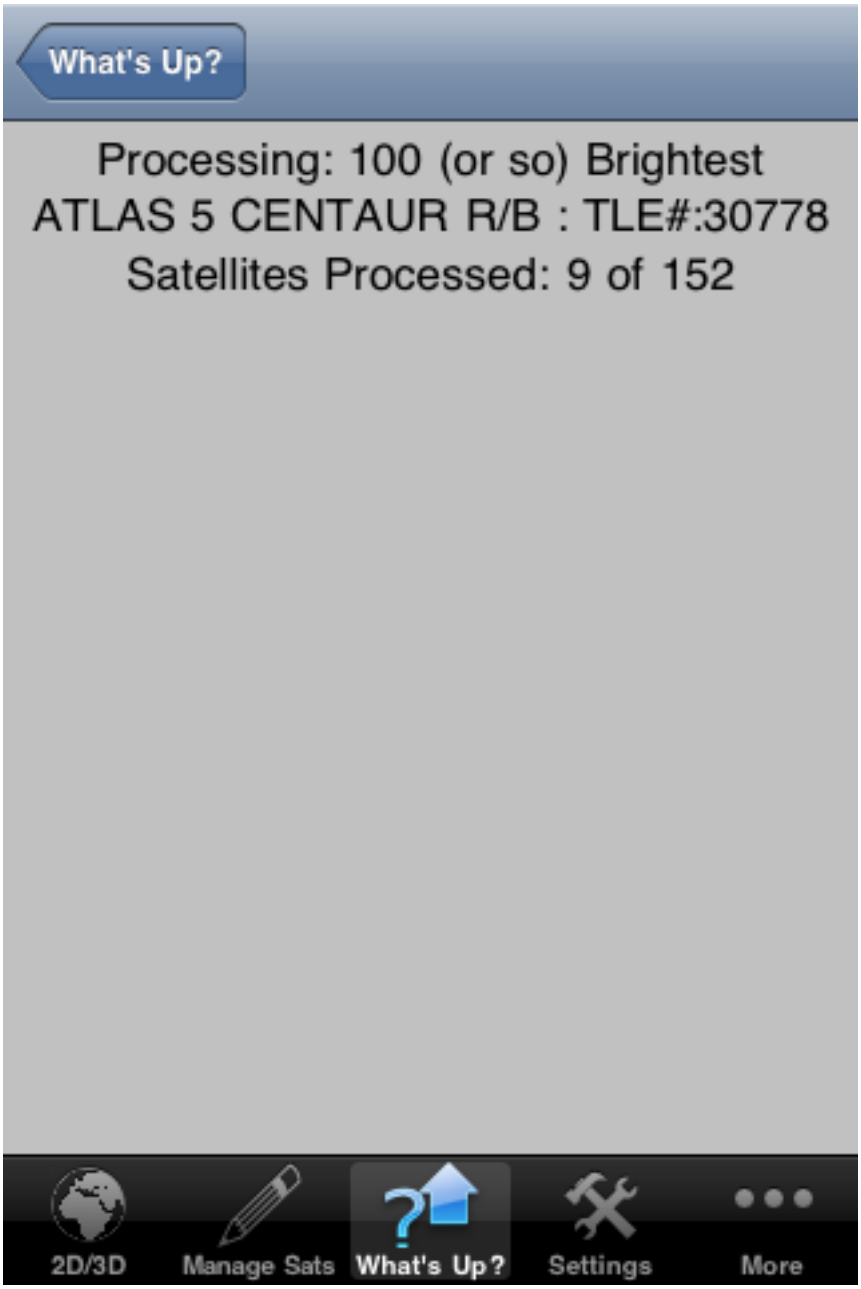
If instead, I'm a Ham Radio operator and want to work available satellites with my rig. I would configure the Viewing Information to not filter daylight passes (as I'm not interested in viewing the satellite with the naked eye) and instead would have it show all satellite passes that meet my configured minimum elevation only.

Once you've configured the viewing mode you are interested in, you need to select the set of databases that you want the application to process by sliding the toggle to "on" (see below.)



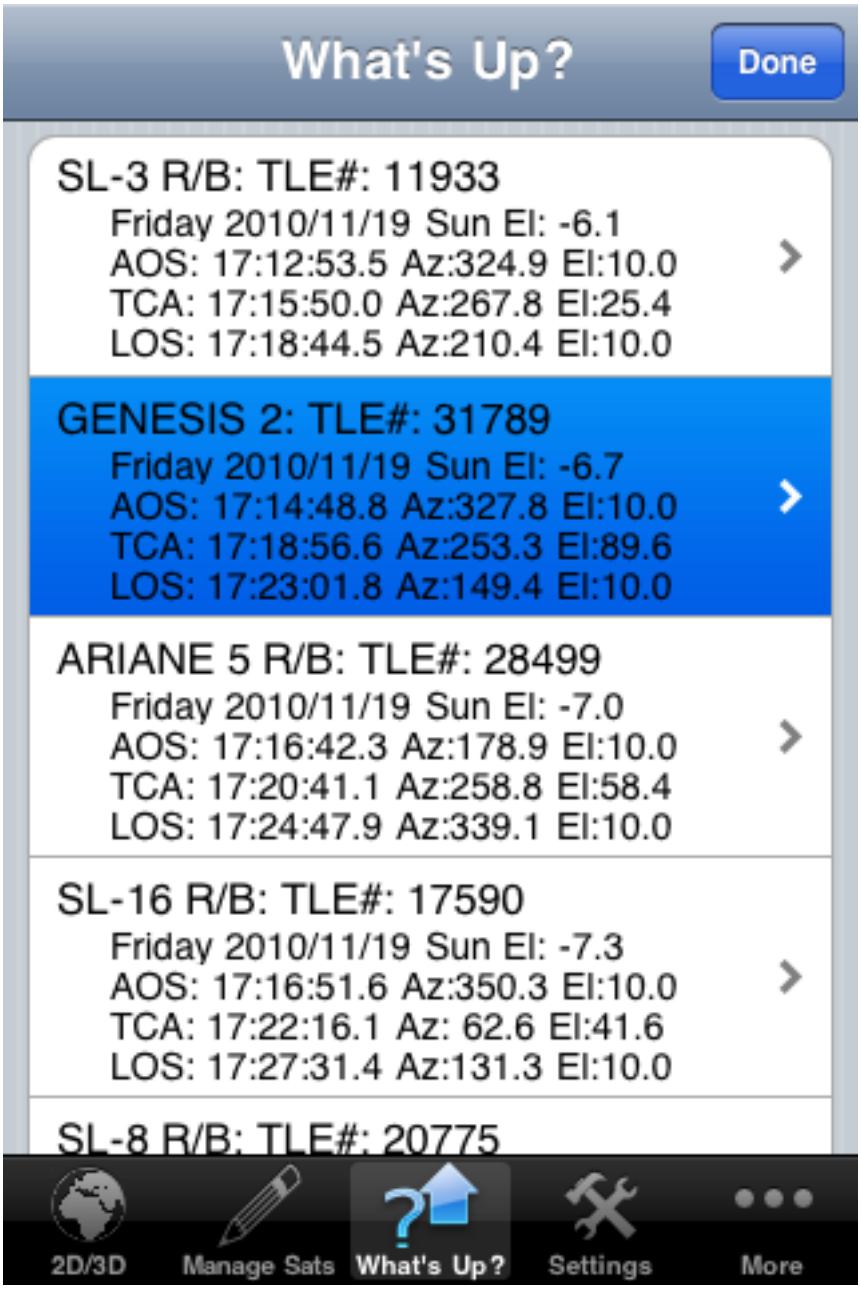
Once the databases are selected, hit the go button in the upper right corner. This will transition you to the following status screen that is displayed while the calculations are being performed.

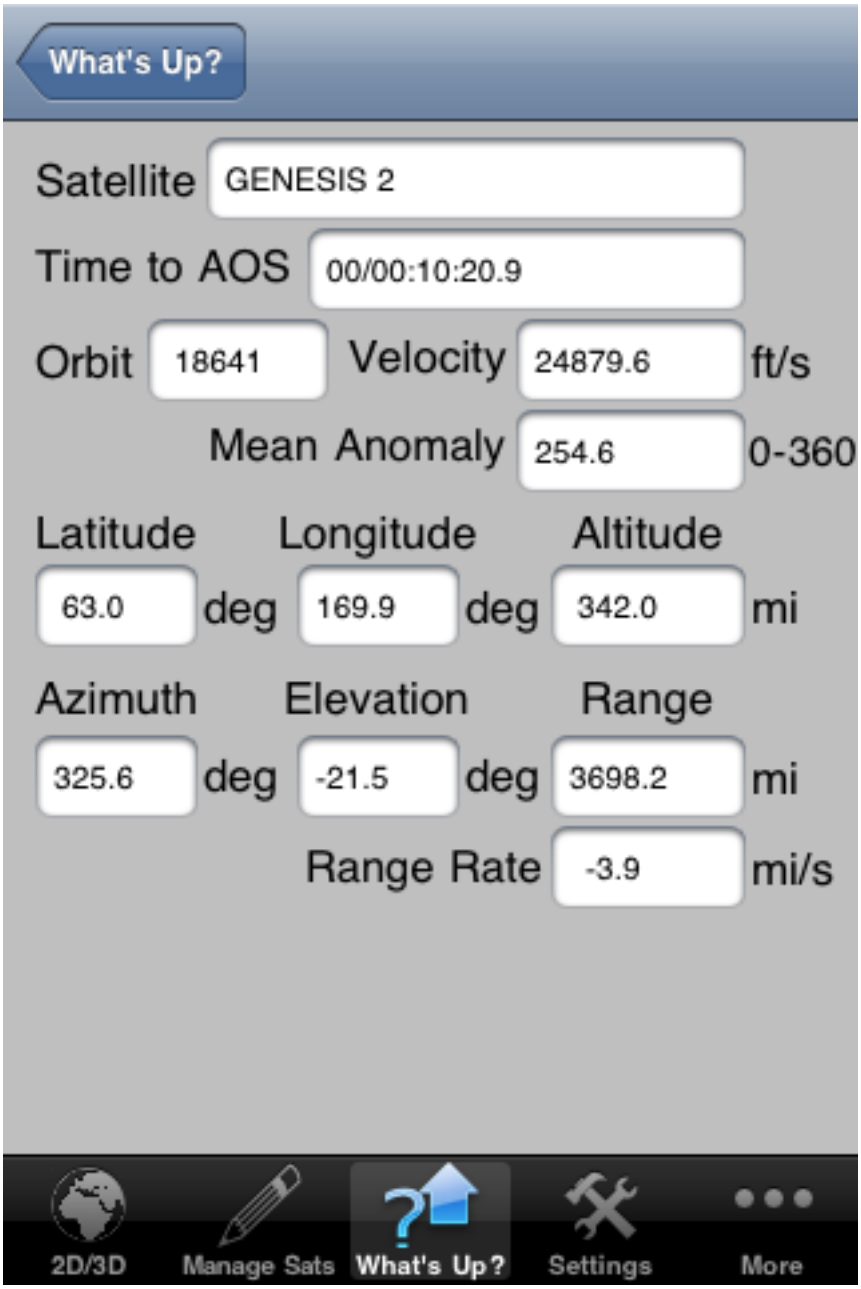
NOTE: if you select all of the databases that are available it can take a few minutes to perform all of the necessary calculations.



Once the processing of the databases completes, the application will transition to the results screen shown below.

The results screen shows all of the satellites sorted chronologically that meet your viewing requirements for the next hour. The list is scrollable and can be quite long depending on how many databases are selected. Each table entry lists the rise/set information for the named satellite and is touch selectable to access the specific satellite's detail information (see below for an example of the satellite details presented upon selection from the table.)

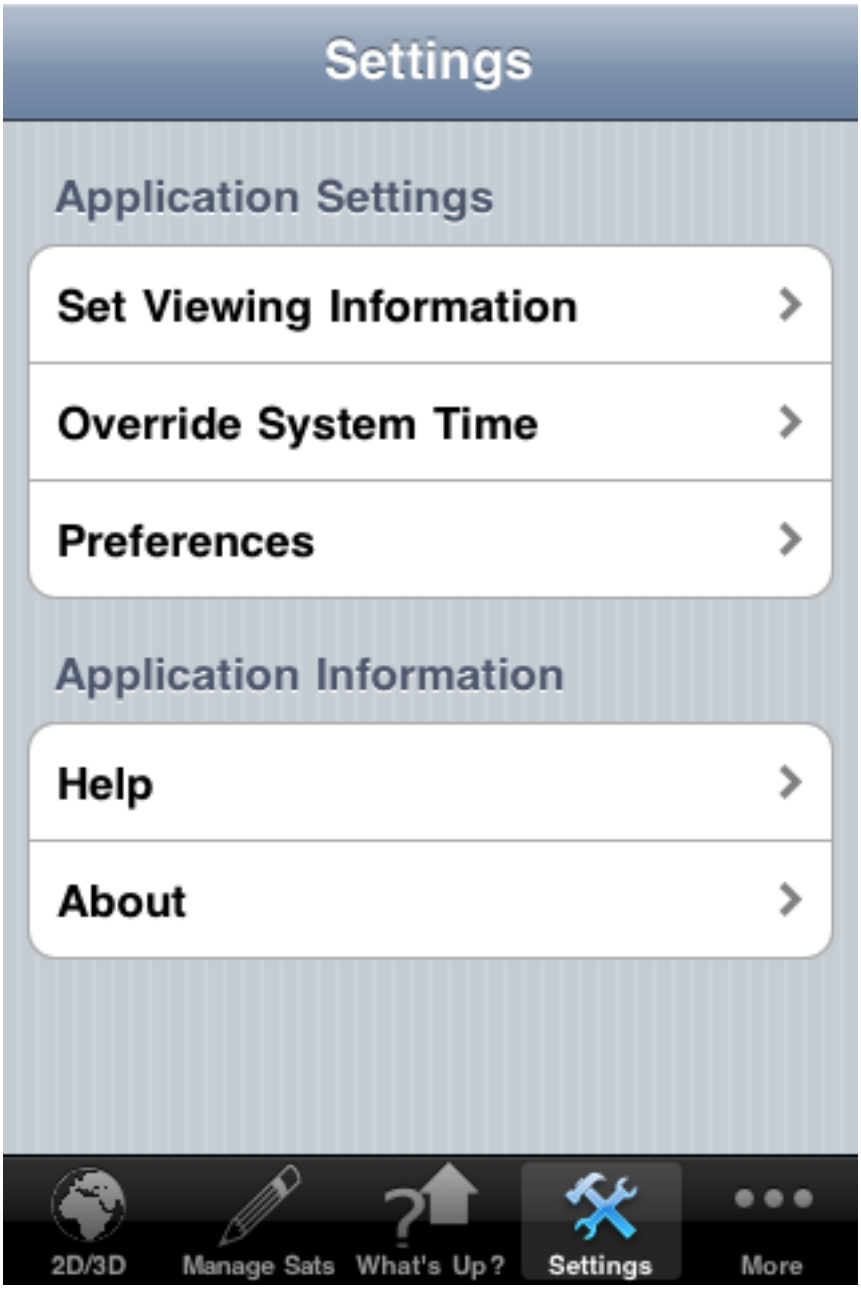

What's Up?
Done
SL-3 R/B: TLE#: 11933
Friday 2010/11/19 Sun El: -6.1
AOS: 17:12:53.5 Az:324.9 El:10.0
TCA: 17:15:50.0 Az:267.8 El:25.4
LOS: 17:18:44.5 Az:210.4 El:10.0
GENESIS 2: TLE#: 31789
Friday 2010/11/19 Sun El: -6.7
AOS: 17:14:48.8 Az:327.8 El:10.0
TCA: 17:18:56.6 Az:253.3 El:89.6
LOS: 17:23:01.8 Az:149.4 El:10.0
ARIANE 5 R/B: TLE#: 28499
Friday 2010/11/19 Sun El: -7.0
AOS: 17:16:42.3 Az:178.9 El:10.0
TCA: 17:20:41.1 Az:258.8 El:58.4
LOS: 17:24:47.9 Az:339.1 El:10.0
SL-16 R/B: TLE#: 17590
Friday 2010/11/19 Sun El: -7.3
AOS: 17:16:51.6 Az:350.3 El:10.0
TCA: 17:22:16.1 Az: 62.6 El:41.6
LOS: 17:27:31.4 Az:131.3 El:10.0
SL-8 R/B: TLE#: 20775
2D/3D
Manage Sats
What's Up?
Settings
More



Settings

There are a variety of settings that you can "tweak" to change how the application works to meet your specific preferences. This section will detail the various configuration preferences that are available.

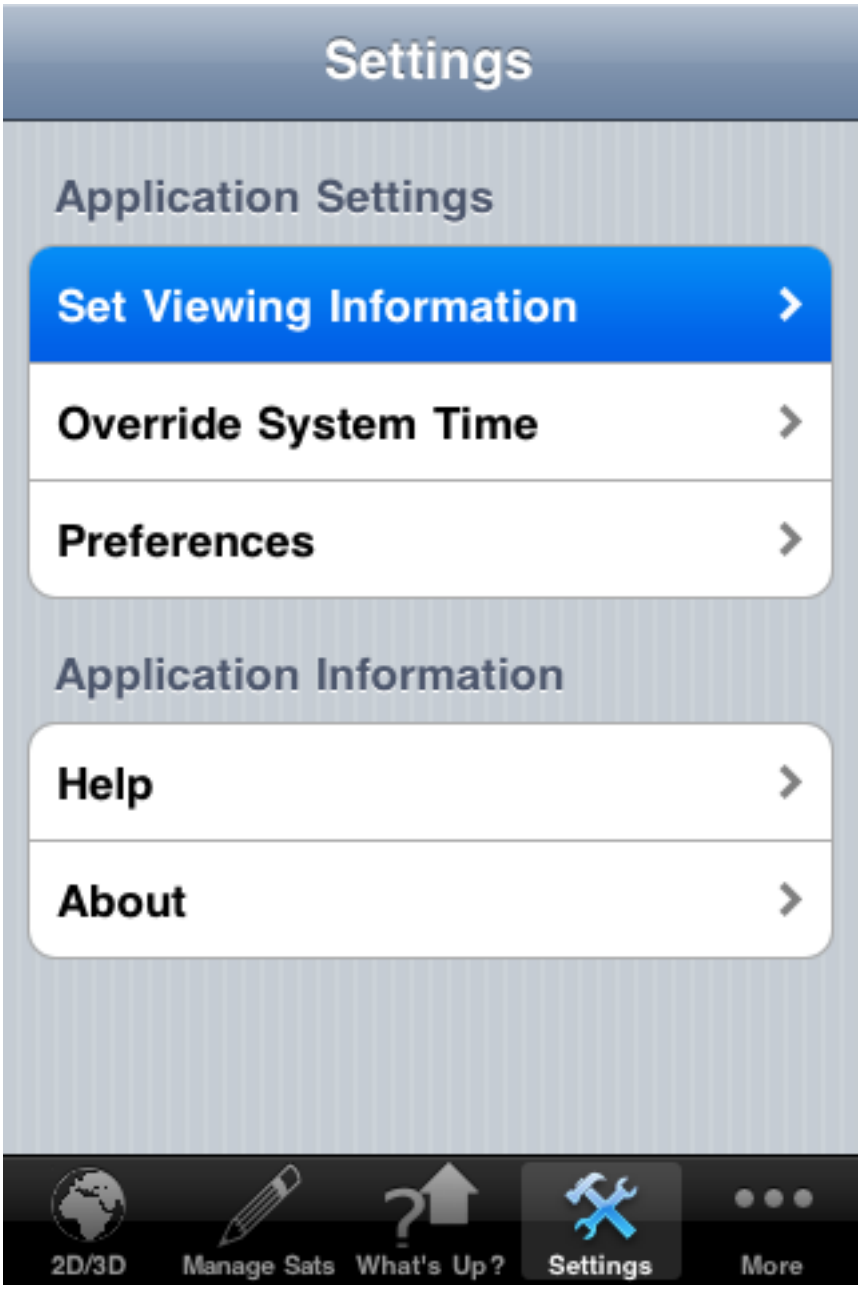
To access the settings pages, start by selecting the Settings button at the bottom of the screen (see below.)

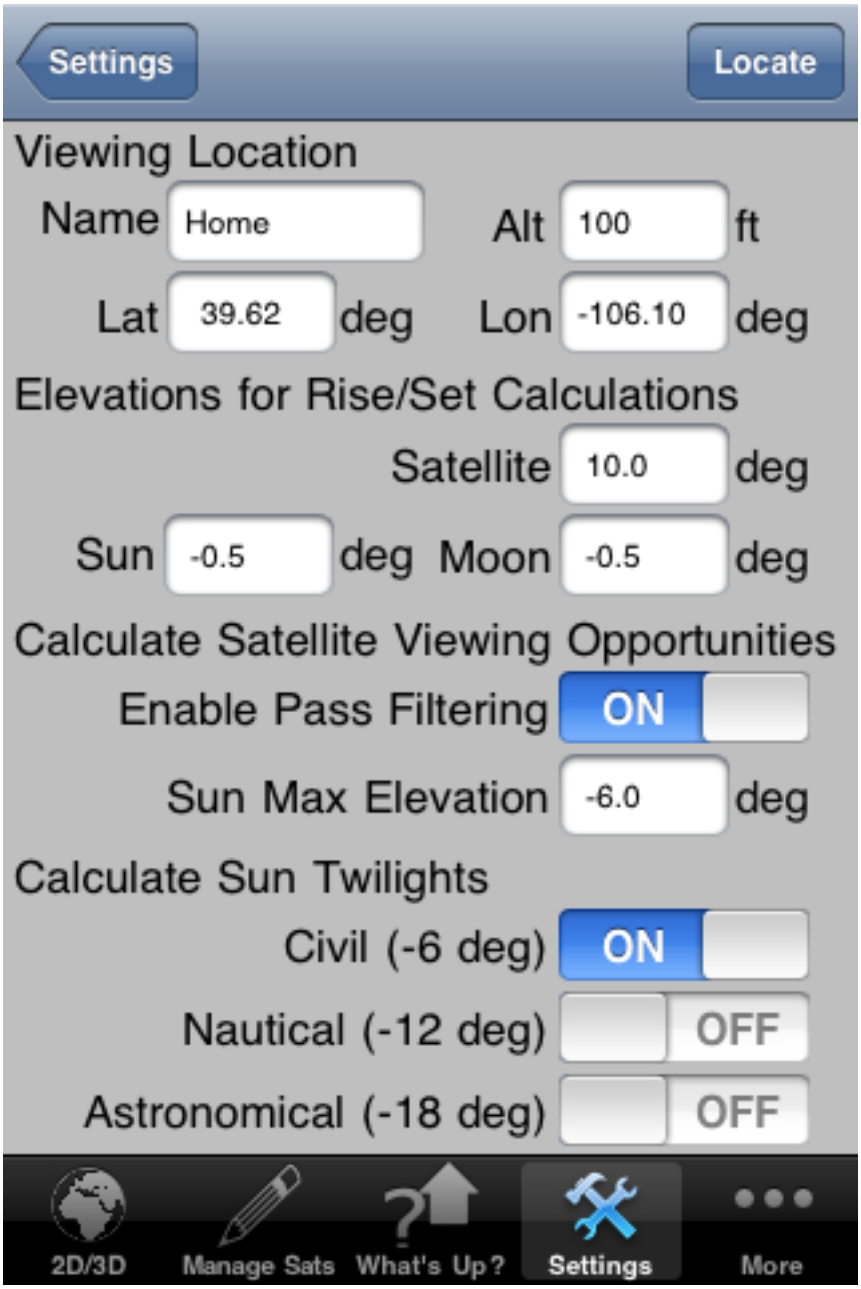


The available settings are broken into three categories that are individually detailed below.

Set Viewing Information

The Set Viewing Information screen allows you to change how the application will compute rise/set information for the various objects of interest (satellites, Sun and Moon.) Once selected you will be presented with the following screen.


Settings
Application Settings
Set Viewing Information
Override System Time
Preferences
Application Information
Help
About
2D/3D
Manage Sats
What's Up?
Settings
More



VIEWING LOCATION

NAME:

The name you want drawn on the map for your location. Note that you can enable/disable the drawing of the name in the Preferences section (discussed later in this document)

LATITUDE:

The latitude of your location in decimal degrees. For south latitudes, use a negative sign rather than the N/S designator (e.g. -39.5 is 39.5 degrees south latitude)

LONGITUDE:

The Longitude of your location in decimal degrees. For west longitudes, use a negative sign rather than the E/W designator (e.g. -104.5 is 104.5 degrees west longitude)

ALT:

The altitude for your location. This field is entered either in feet or meters depending on the units preference selection you make on the preferences page (discussed later in this document.)

ELEVATIONS FOR RISE/SET CALCULATIONS

SATELLITE:

This is the minimum elevation used to filter out satellite passes (in decimal degrees). Any satellite pass that does not meet the minimum elevation set here is discarded. This is typically used to account for ground clutter (trees, buildings, mountains…) in your location as well as light pollution for night passes. A good number to use here is 10degrees but feel free to experiment to get the right values for your specific location and needs.

SUN:

This is the elevation to use in computing the Sun rise/set times (in decimal degrees.) A good default value to use it -.5 degrees which accounts for angular radius of the Sun (.25 degrees) as well as the slight lensing affect the atmosphere has at the horizon (another .25 degrees.) Again experiment to come up with the values that best fit your needs.

MOON:

This is the elevation to use in computing the Moon rise/set times (in decimal degrees.) A good default value to use it -.5 degrees which accounts for angular radius of the Moon (.25 degrees) as well as the slight lensing affect the atmosphere has at the horizon (another .25 degrees.) Again experiment to come up with the values that best fit your needs.

CALCULATE SATELLITE VIEWING OPPORTUNITIES

FILTER DAYLIGHT PASSES:

This toggle controls the two major modes for computing satellite rise/set times within the application. If set to OFF, then the application will only filter the satellite passes against your minimum elevation set above. This mode is best used when working satellites for Ham Radio usage, as it will provide you with all satellite passes for your location.

If set to ON, the satellite rise/set calculations are modified to filter out all passes that are not good candidates for viewing the satellites with the naked eye from your specified location. When daylight passes are filtered, the satellite must still meet your minimum elevation set above but the additional constraints that the satellite must be lit by the Sun (there's got to be a light source to reflect for you to see it on the ground) as well as the viewing location must be in darkness (like viewing stars, it's got to be dark where you are at or the lit sky masks the stars)

SUN MAX ELEVATION:

This allows you to set the maximum Sun elevation you are willing to accept for any filtered pass. A typical value would be -6degrees which represents the definition of Civil Twilight. Anything less than this value and it will likely be too light at your location to see the lit satellite against the sky.

CALCULATE SUN TWILIGHTS:

CIVIL:

This toggle allows you to tell the system whether to compute Civil Twilight (the Sun -6degrees below the horizon) as well as the standard rise/set times determined for the Sun elevation you set above.

NAUTICAL:

This toggle allows you to tell the system whether to compute Nautical Twilight (the Sun -12degrees below the horizon) as well as the standard rise/set times determined for the Sun elevation you set above.

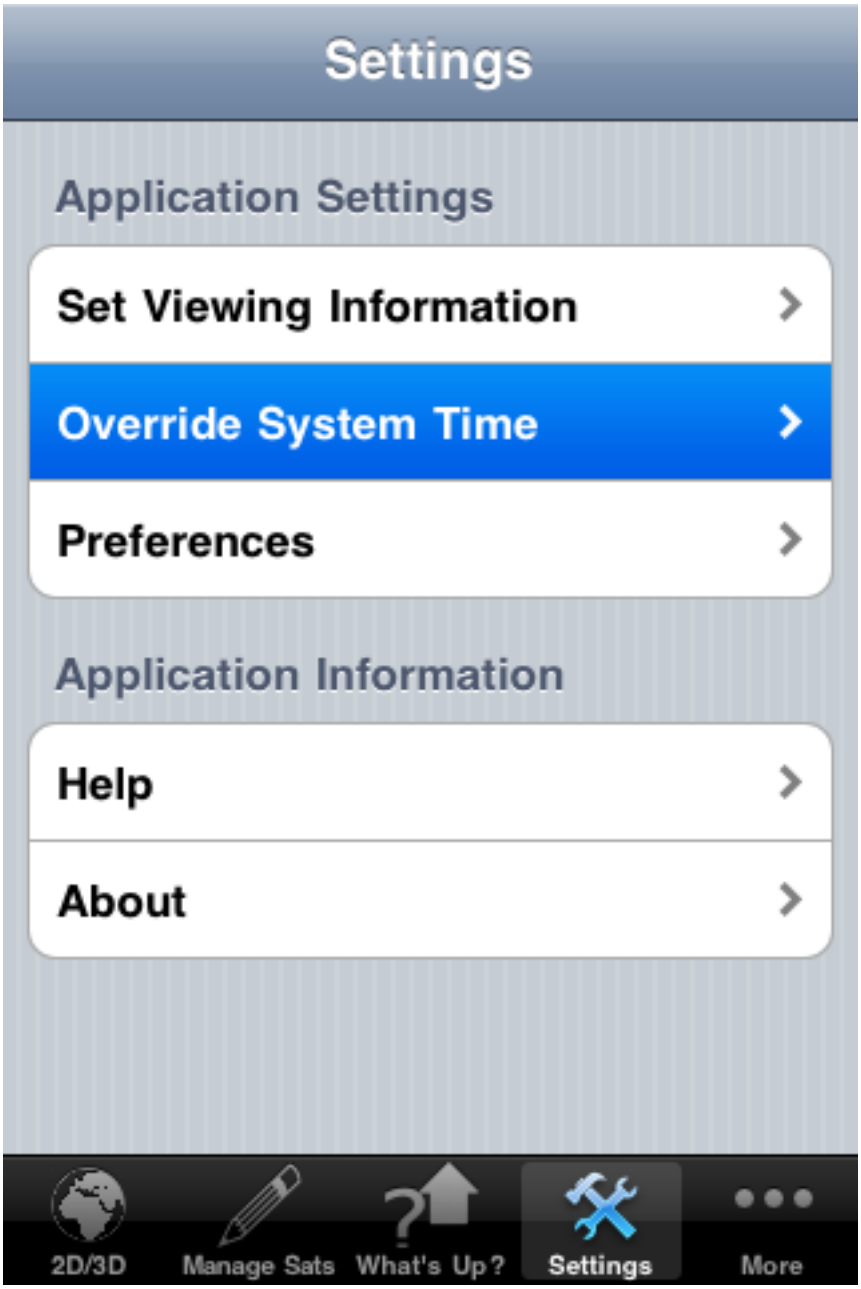
ASTRONOMICAL:

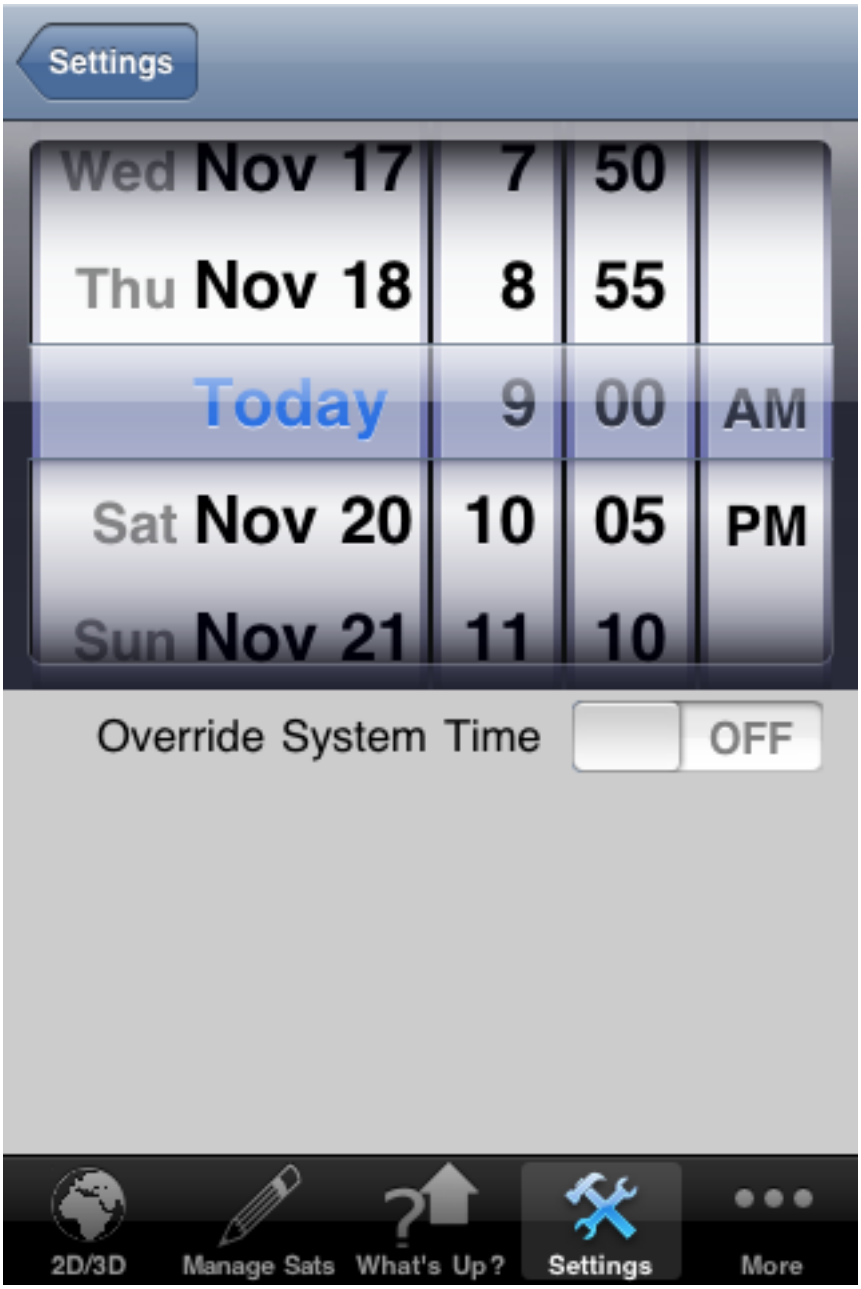
This toggle allows you to tell the system whether to compute Astronomical Twilight (the Sun -18degrees below the horizon) as well as standard the rise/set times determined for the Sun elevation you set above.

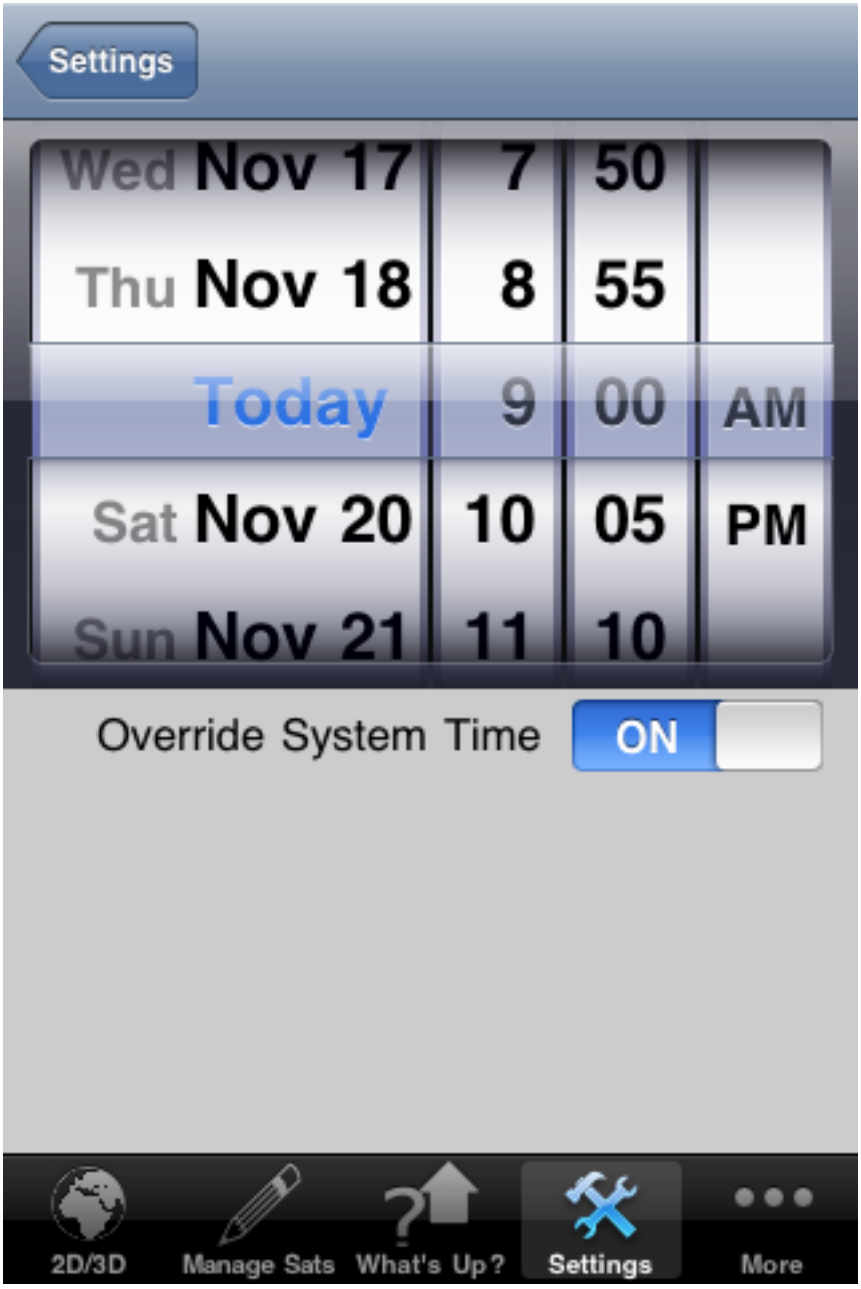
Change Time

This screen allows you to change the current time for the application. To change the current time, toggle the override system time to ON and then spin the various fields to get to the date you are interested in.

NOTE: Don't set the time too far from your current time (a week or two at the most) as the application has to perform progressively more work the farther away from the current time.

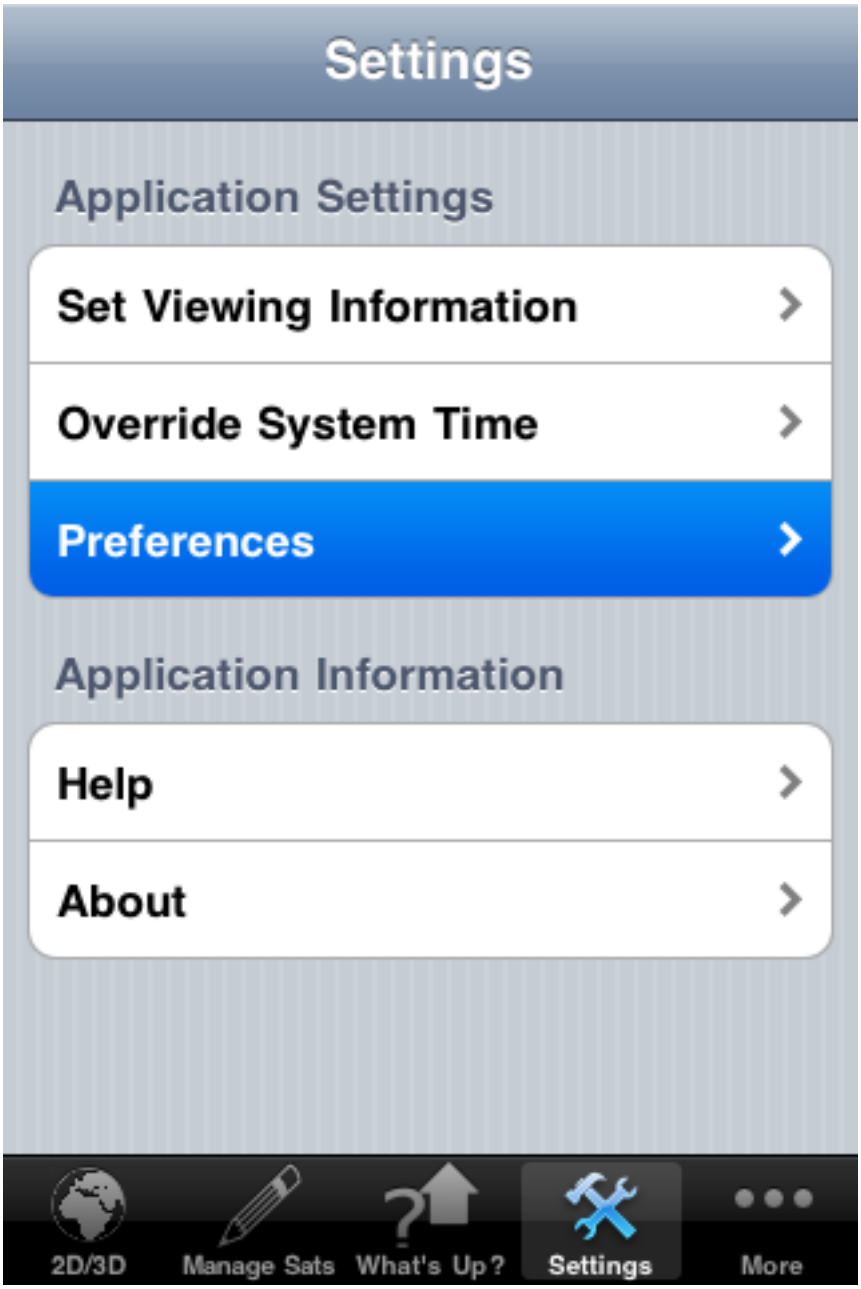

Settings
Application Settings
Set Viewing Information
Override System Time
Preferences
Application Information
Help
About
2D/3D
Manage Sats
What's Up?
Settings
More


Settings
Wed Nov 17
Thu Nov 18
Today
Sat Nov 20
Sun Nov 21
7
8
9
10
11
50
55
00
05
10
AM
PM
Override System Time
OFF
2D/3D
Manage Sats
What's Up?
Settings
More



Preferences

The preferences screen allows you to set numerous global settings for the application.


Settings
Application Settings
Set Viewing Information
Override System Time
Preferences
Application Information
Help
About
2D/3D
Manage Sats
What's Up?
Settings
More

DISABLE SLEEP MODE:

When set to ON, the application will not automatically enter sleep mode. This is good to se when you are working satellites outside at night and you don't want the device going to sleep on you at just the wrong moment.

DISPLAY METRIC UNITS:

When set to ON, all screens will display their data in metric rather than English units.

DRAW GROUNDSITE NAMES:

When set to ON, the names of the groundsites will be drawn on the map.

DRAW SATELLITE NAMES:

When set to ON, the satellite names will be drawn on the map.

DRAW LOCATION NAME:

When set to ON, the location name will be drawn on the map.

USE EARTH NIGTH IMAGE:

When set to ON, the night image of the Earth (the night lights) will be blended with the daylight map to produce a more photorealistic image.

DRAW TERMINATOR:

When set to ON, a line of alternating black and white segments will be drawn on the map that represents the point on the map that is 90degreees from the Sun's location.

DRAW LAT/LON GRID:

When set to ON, a 15degree latitude/longitude grid will be drawn on the map.

DRAW POLITICAL MAP:

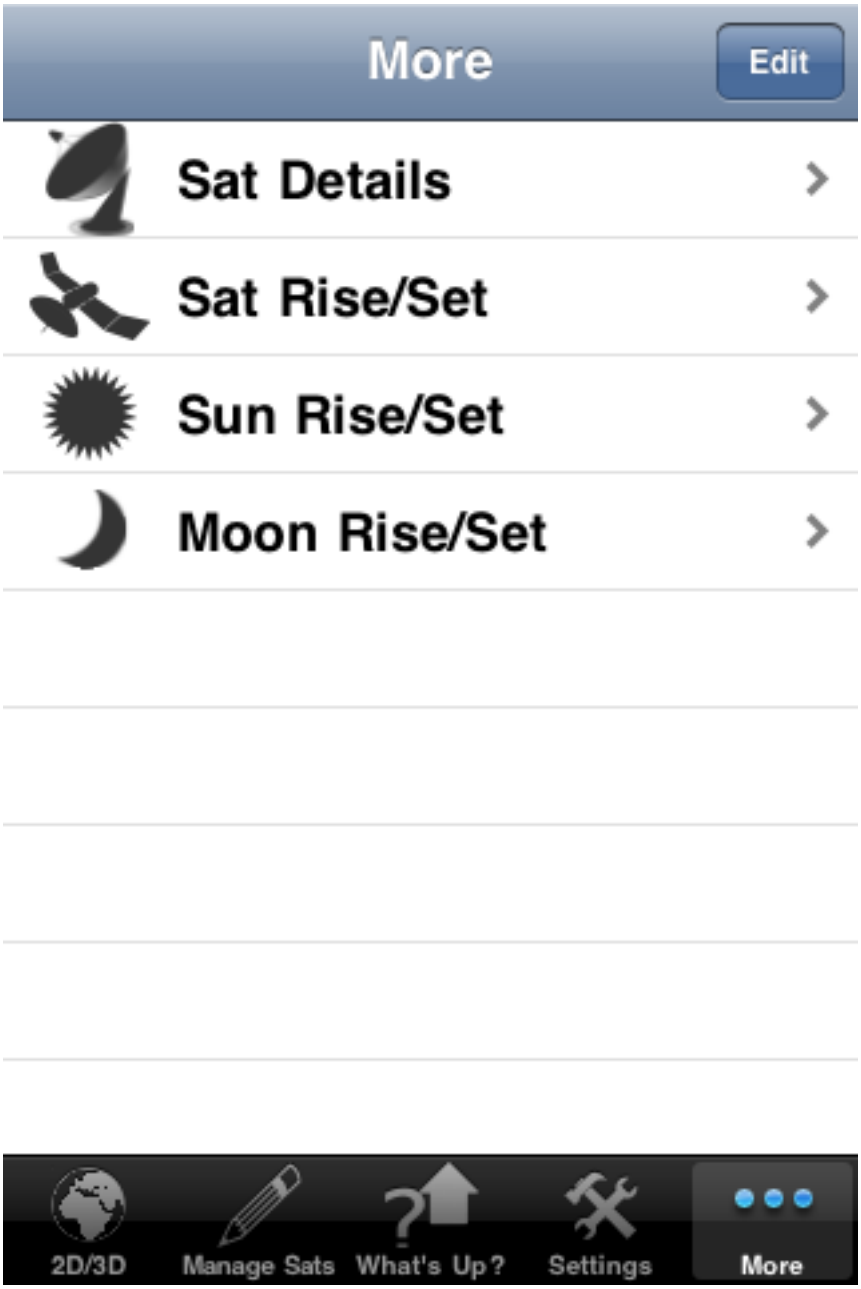
When set to ON, the political boundaries will be drawn on the map.

MEAN ANOMALY (0-255):

When set to ON, the mean anomaly displayed on the satellite detail pages will be range from 0-255 rather than 0-360. This mode is used by Ham Radio operators as a legacy compatibility mode as many older tools only had one byte to represent the mean anomaly so had to normalize from 0-255.

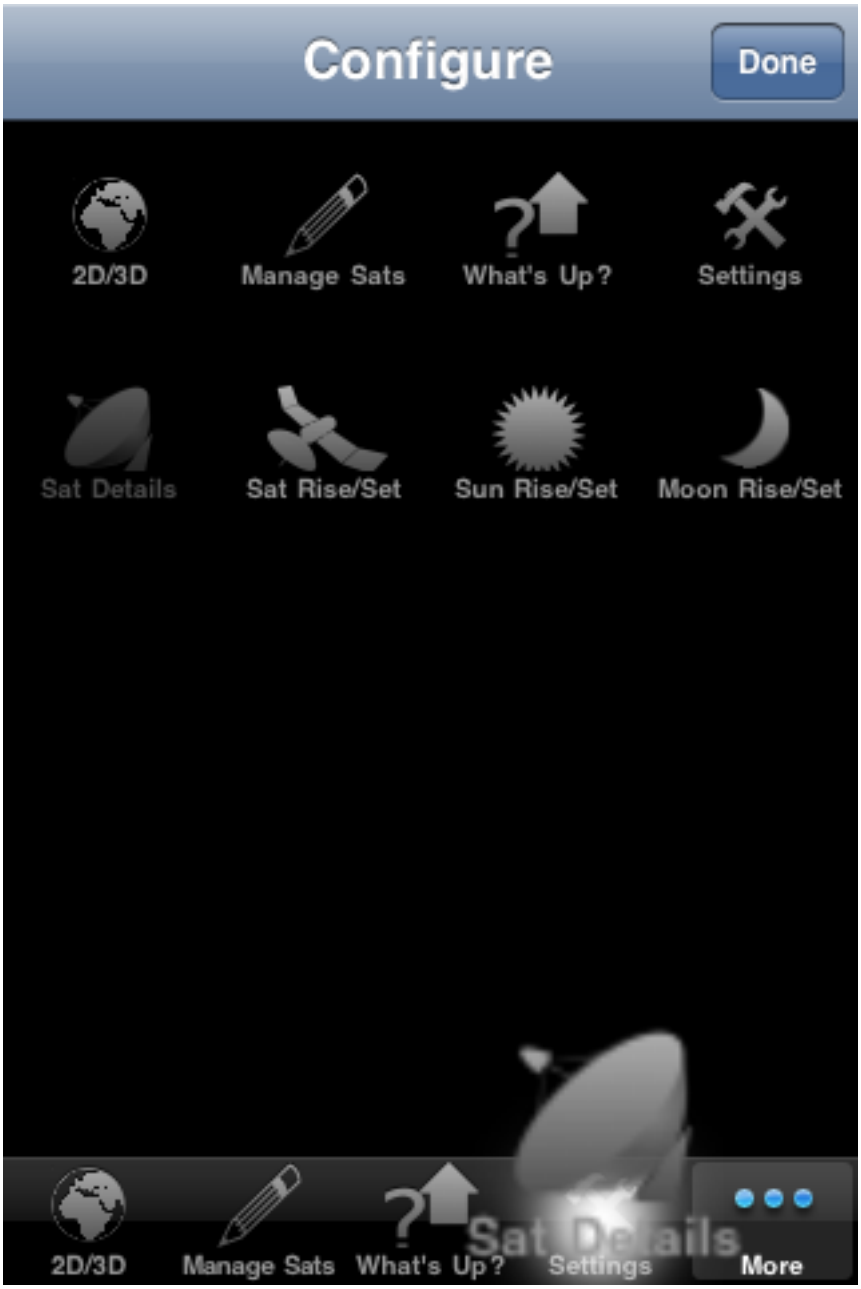
Reconfigure Tab Bar Buttons

The buttons that are displayed on the button bar are completely customizable to meet your needs. To change around the visible buttons first click on the ellipses button (the far right button in the button bar at the bottom that has the three dots)



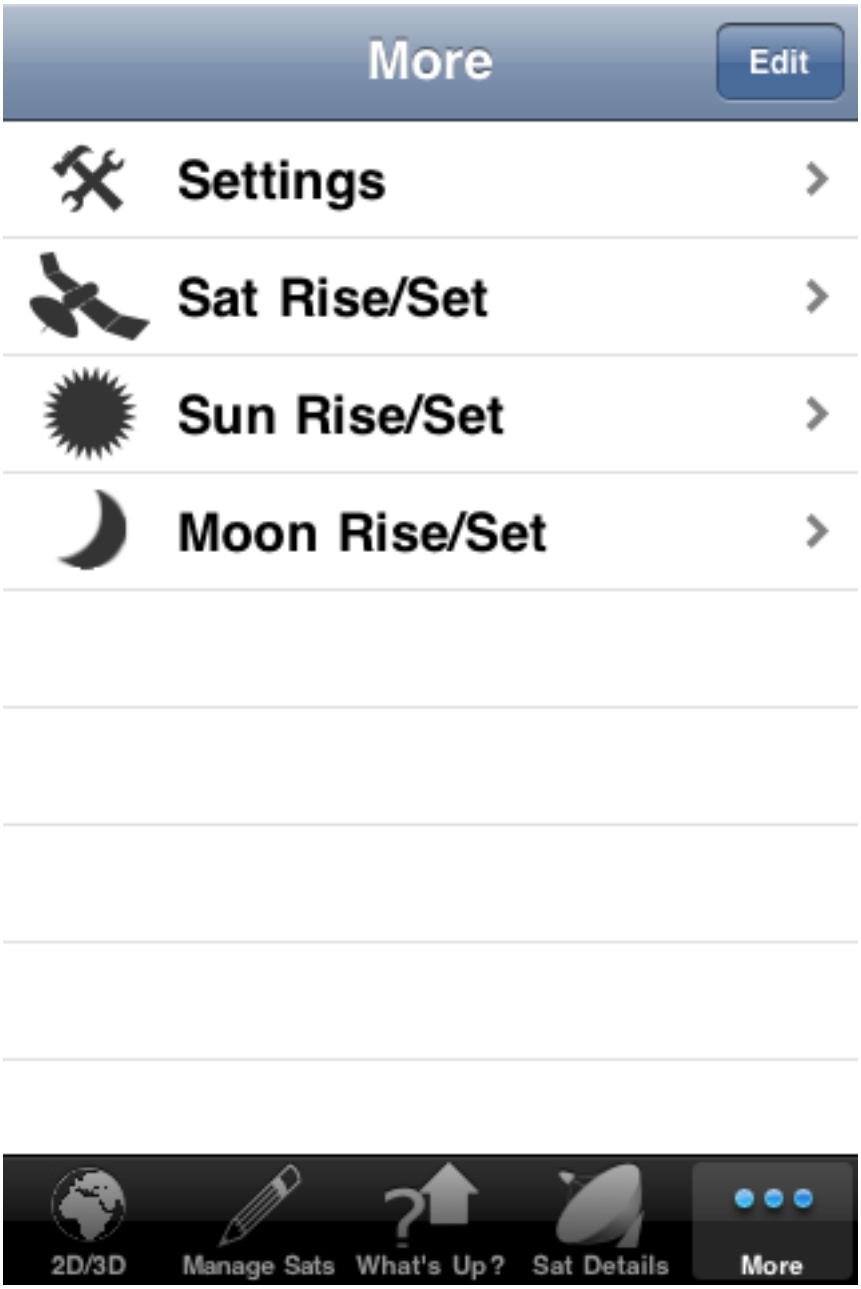
You should now be looking at a screen that resembles the screen above. Next, click on the edit button in the upper right corner to enter configuration mode.

Once in edit mode you should see the screen above that shows the eight possible buttons you can choose from. To change the "docked" buttons is as simple as dragging the button you want to dock from the upper portion of the display onto the dock at the bottom at the location you want the button displayed. Below shows an example of selecting the Satellite Details button and replacing the existing Settings button.



Once you drag the button you are interested in the screen will redisplay with the new configuration (see below)

Once you're done making the changes you want. Simply clock the Done button in the upper right corner to exit edit mode.



As you can see, the Settings button has been replaced with the Satellite Details button on the main dock button. To change back, simply reverse the steps and you should be set.