

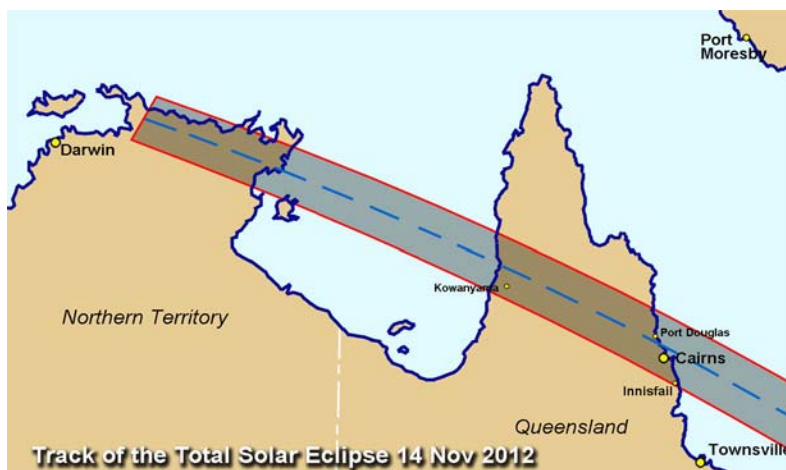
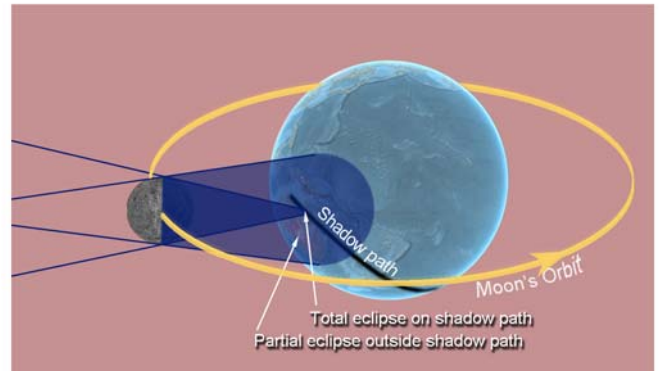
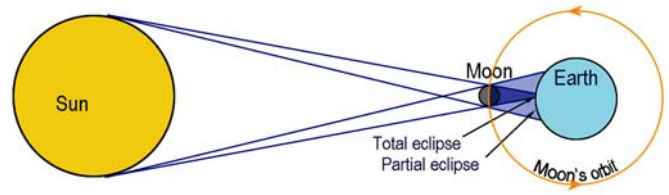
# Total Solar Eclipse 14 November 2012

A Total Eclipse of the Sun will occur over Northern Australia early in the morning of 14 November 2012. This spectacular phenomenon is probably the most awe inspiring event in the natural world.

## What is a Total Solar Eclipse?

An eclipse of the Sun occurs when the moon passes between the Earth and the Sun. The Sun is much larger than the moon but it is also much further away, such that the two bodies appear to be about the same size in the sky. During a total solar eclipse, the moon moves in front of the Sun and completely covers it. This casts a shadow on the Earth's surface. As the moon orbits the Earth and the Earth rotates, the shadow moves across the Earth's surface in a narrow path generally from west to east. To see a **Total Solar Eclipse** you must be in the shadow's path. If you are outside the shadow's path at the time of the eclipse, the moon will not completely cover the Sun and you will only see a **partial eclipse**.

During the partial phase of the eclipse, the moon gradually covers the Sun. This takes about an hour. As the total part of the eclipse approaches, the sky becomes darker and an ominous black shadow approaches from the west. The Sun is reduced to a thin crescent. The temperature can drop significantly. In the final few seconds before totality, the last brilliant parts of the Sun's surface shine through valleys on the moon in a shimmering display called **Baily's Beads**. Finally the beads are reduced to a single point and the Sun looks like a dazzling **diamond ring**. As the last bright point winks out, the Sun's pink upper surface called the **chromosphere** can be seen around the edge of the moon and often **prominences**, pink loops of plasma extending above the chromosphere, are visible. During totality, the moon appears as a black hole in the sky surrounded by the pearly white **Corona**, the Sun's outer atmosphere composed of ionised gas which curves out from the Sun, usually in a pattern formed by the Sun's magnetic field. The whole sky is dark in a surreal twilight with a glowing light around the horizon with a sunset tinge which is caused by the scattering of different wavelengths of light in the atmosphere. At the end of totality the sequence is reversed, with prominences, chromosphere, diamond ring and Baily's Beads again being visible. The moon then gradually uncovers the Sun, taking about an hour until the partial phase is over.



## The Shadow Path across Australia.

The shadow path of this eclipse starts at sunrise in the Northern Territory east of Darwin. It then travels across the Gulf of Carpentaria and across Cape York. The track across Cape York is about 140km wide and extends from the area around and to the north of Kowanyama on the west coast through to between Bloomfield and Innisfail on the east coast. The shadow then passes out over the South Pacific Ocean traveling to the north of New Zealand and makes no further landfall. The centreline of the track crosses the east coast of Cape York near Oak Beach, just south of Port Douglas and north of Cairns.

## Time and Duration of the Eclipse

The exact time of the start of the total eclipse will depend on where in the shadow path you are. It will start at about 6:37AM on the west coast of Cape York and at about 6:39AM on the east coast. The duration of the total eclipse will increase the closer you are to the centreline of the shadow path and the closer you are to the east. The maximum duration on the Australian mainland is about 2 minutes and 5 seconds at the point where the centreline crosses the east coast near Oak Beach.

The following table lists the time, duration and elevation of the Sun for the total eclipse and the start and end of the partial phases of the eclipse for selected locations:

Location	Start Partial h:m	Start Total h:m:s	Duration m:s	End Total h:m:s	End Partial h:m	Sun Elevation (at total)
Atherton	5:45	6:39:34	0m 36s	6:40:10	7:41	14°
Babinda	5:45	6:39:22	1m 16s	6:40:38	7:41	14°
Cairns CBD	5:45	6:38:33	2m 00s	6:40:33	7:40	14°
Cape Tribulation	5:44	6:37:55	1m 27s	6:39:22	7:39	13°
Gordonvale	5:45	6:38:50	1m 47s	6:40:37	7:41	14°
Innisfail CBD	5:45	6:40:02	0m 20s	6:40:22	7:41	15°
Kowanyama	5:45	6:37:07	1m 35s	6:38:42	7:37	10°
Lakeland	5:44	6:37:37	1m 32s	6:39:09	7:39	13°
Laura	5:44	6:37:32	1m 02s	6:38:34	7:38	12°
Mareeba	5:45	6:38:45	1m 40s	6:40:24	7:40	14°
Mossman	5:44	6:38:00	2m 04s	6:40:04	7:40	13°
Oak Beach	5:44	6:38:09	2m 05s	6:40:14	7:40	14°
Palmer R Rdhse	5:44	6:37:38	1m 59s	6:39:37	7:39	13°
Port Douglas	5:44	6:38:02	2m 04s	6:40:06	7:40	14°
Peninsular Dev. Rd on centreline	5:44	6:37:45	2m 03s	6:39:48	7:39	13°

Times calculated using Xavier Jubier's Google Earth local circumstances calculator – (see More Information)



The map above shows the shadow path across the eastern part of Cape York and the approximate duration of the total eclipse over the width of the path.

## Where to go to observe the eclipse will depend on the following considerations:

**Duration of the eclipse:** Locate towards the centreline of the shadow path to maximize the eclipse duration. Anywhere on the coast between Wonga Beach and Cairns will experience an eclipse of at least two minutes. In contrast, go closer to the edges of the track to maximize Baily's beads and other transitional effects.

**Weather:** The eclipse occurs at the start of the North Queensland wet season. There is risk of cloud. Onshore breezes may result in cloud build up to the east of the coastal ranges. However with the eclipse in the early morning, skies may be clearer. Depending on the weather pattern at the time, the sky may be clearer to the west of the coastal ranges.

**Access:** There is very good road access to most of the coastal areas. The western part of the eclipse track has no highways and the tracks are generally only suitable for 4 wheel drive vehicles and are often impassable in the wet. Before venturing off the highways, check road conditions and only travel with local knowledge, and in a suitable vehicle carrying appropriate emergency supplies.

**Outlook:** Choose a site with a low eastern horizon as the Sun will be low in the eastern sky and you may be able to see the shadow receding after the eclipse. A beach location would be ideal for this (but don't be caught by an incoming tide). A low horizon to the west may allow you to see the shadow approaching before the eclipse.

**Facilities:** You may want to be near where you can obtain facilities such as food and drink and toilets. The local authorities may set up public viewing areas with these facilities for the many expected visitors.

## Eye Safety

It is hazardous to look at the Sun at any time without suitable eye protection. Because the Sun is intensely bright, looking at the Sun will cause irreparable damage by burning the retina. Humans have a natural response to look away when attempting to look at the Sun. When there is an eclipse and particularly when the Sun is reduced to a thin crescent, the "look away" response diminishes and people, especially young children are tempted to look. If you can see any part of the Sun's surface it will still cause eye damage. Only when the Sun's surface is completely covered during the total phase of a total solar eclipse is it safe to look at the eclipse without eye protection. Safe solar filters can be used to view the partial phases providing they have been manufactured especially for that purpose and have been appropriately certified. It is NOT SAFE to use anything else, including stacked sunglasses, exposed film or other similar items.

## More information.

This information sheet will be updated and additional information will be added periodically up to the eclipse. The latest edition is available to be viewed or downloaded from the Astronomical Association of Queensland website [www.aaq.org.au](http://www.aaq.org.au) If you have any specific enquiry send it by email to [info@aaq.org.au](mailto:info@aaq.org.au)

There are many sources of information about the eclipse available on the internet. These include:

NASA Eclipse website:

<http://eclipse.gsfc.nasa.gov/eclipse.html>

Jay Anderson's eclipse weather site:

<http://home.cc.umanitoba.ca/~jander/tot2012/tse12intro.htm>

Xavier Jubier Google Earth kmz eclipse track files:

[http://xjubier.free.fr/en/site\\_pages/SolarEclipsesGoogleEarth.html](http://xjubier.free.fr/en/site_pages/SolarEclipsesGoogleEarth.html)