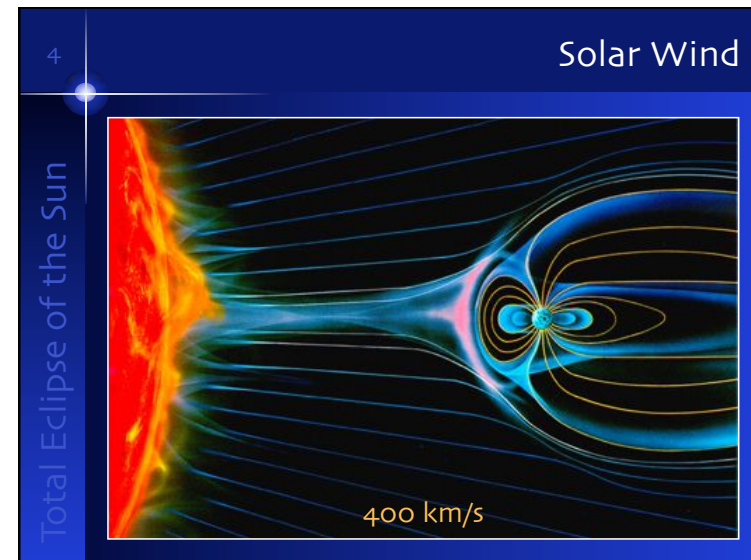
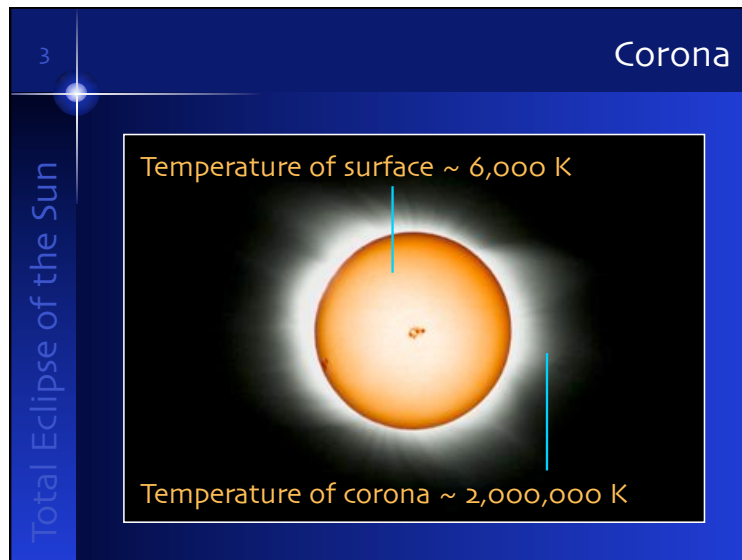
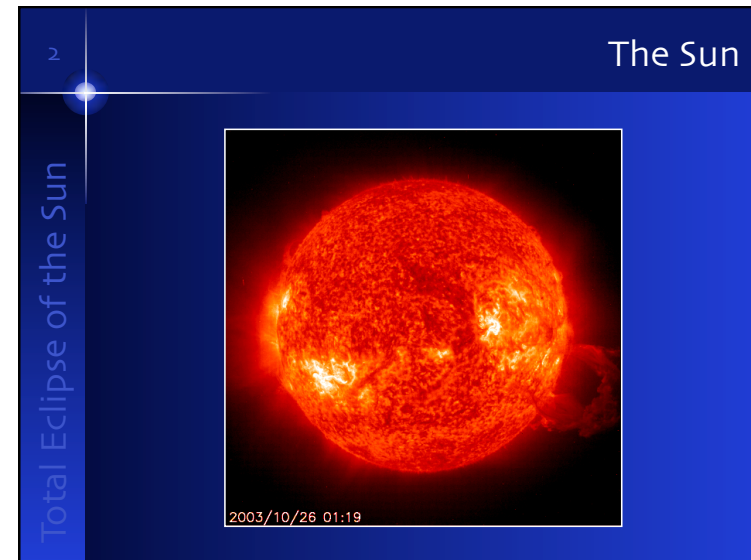
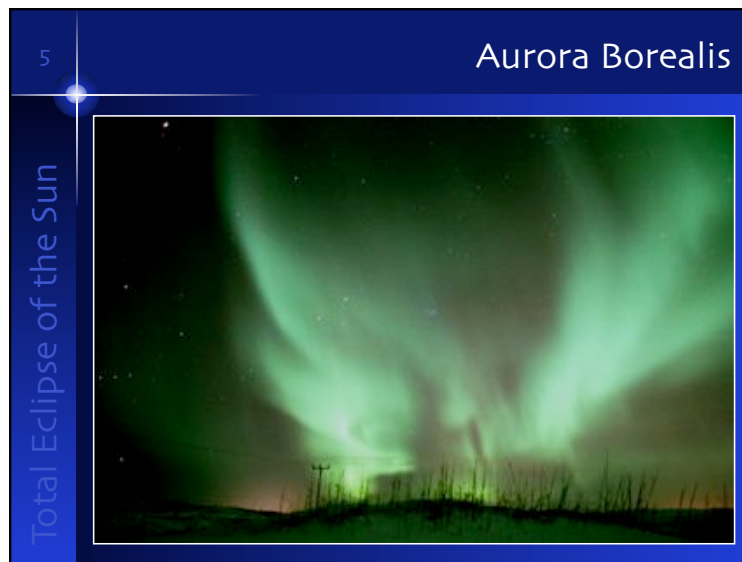


Total Eclipse of the Sun



Total Eclipse of the Sun



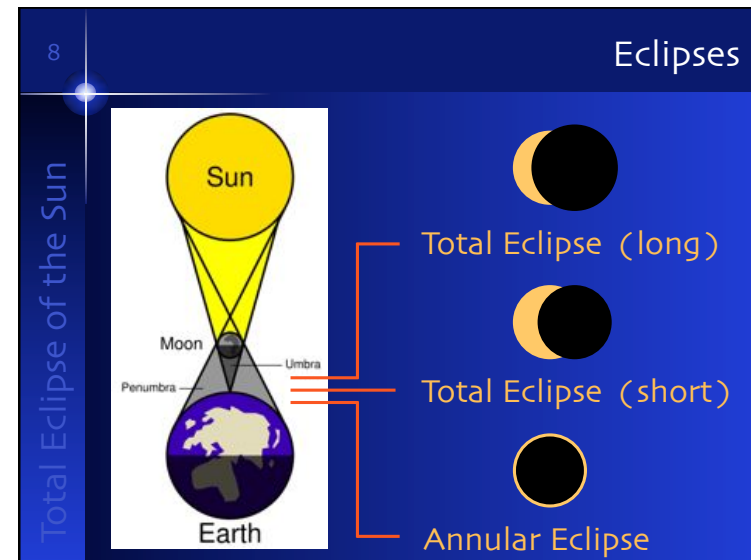
6

Eclipses

Eclipse
The passage of one object into the shadow cast by another.
Thus an *Eclipse of the Sun* should be called an *Eclipse of the Earth*.

Occultation
The passage of one object in front of another, hiding the latter from view.

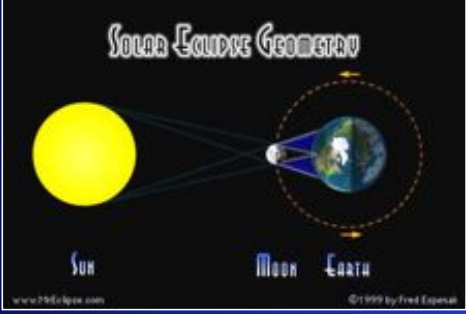
Total Eclipse of the Sun



Total Eclipse of the Sun

9

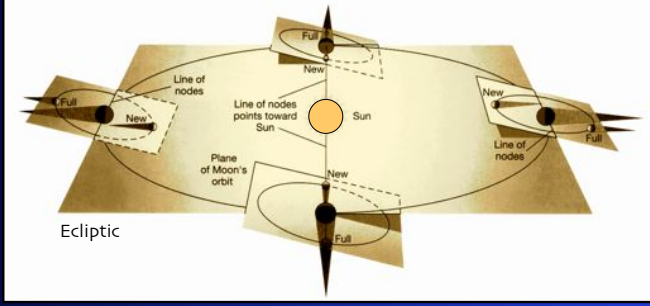
Eclipse Geometry



An eclipse cannot occur at every New Moon because the Moon's orbit is **tilted** by $\sim 5^\circ$.

10

Eclipse Geometry



The Moon crosses the plane of the Earth's orbit (the Ecliptic) at a **node**.

11

Eclipse Timing

Synodic Month	
New Moon to New Moon	29.53 days
Draconic Month	
Node to Node	27.21 days
Anomalistic Month	
Perigee to Perigee	27.55 days

12

The Saros Cycle

223 Synodic months =	6585.32 days
242 Draconic months =	6585.36 days
239 Anomalistic months =	6585.54 days

Over this time, the **saros** cycle, the Moon's orbital periods are back in 'synch'.

Two eclipses separated by one saros cycle have similar geometries.

Total Eclipse of the Sun

13

Total Eclipse of the Sun

Saros 139

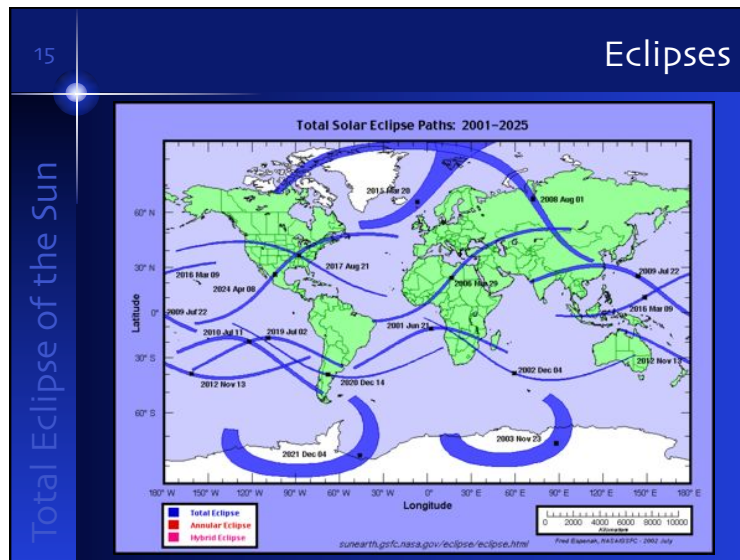
Date	ØM/ØS	Length	Seen from
1988 Mar 18	1.046	3 ^m 46 ^s	Asia
2006 Mar 29	1.052	4 ^m 07 ^s	Africa
2024 Apr 08	1.057	4 ^m 28 ^s	Americas
2042 Apr 20	1.061	4 ^m 51 ^s	Asia
2060 Apr 30	1.066	5 ^m 15 ^s	Africa
2078 May 11	1.070	5 ^m 40 ^s	Americas
2096 May 22	1.074	6 ^m 06 ^s	Asia

14

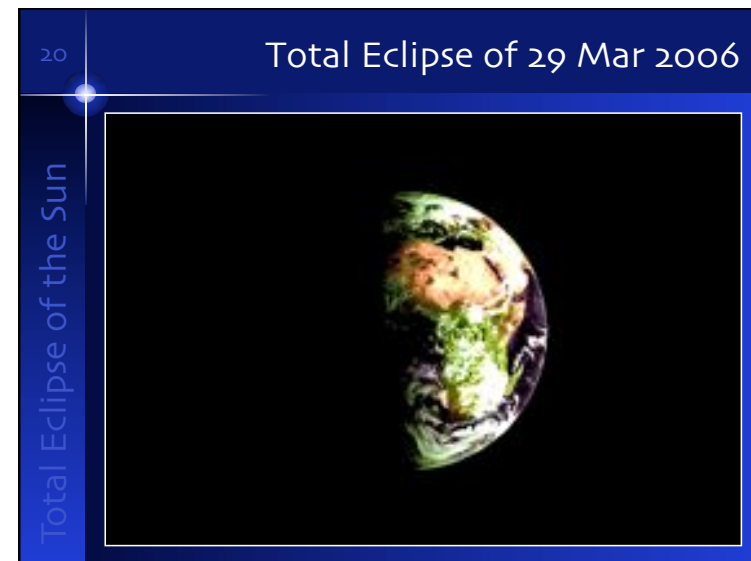
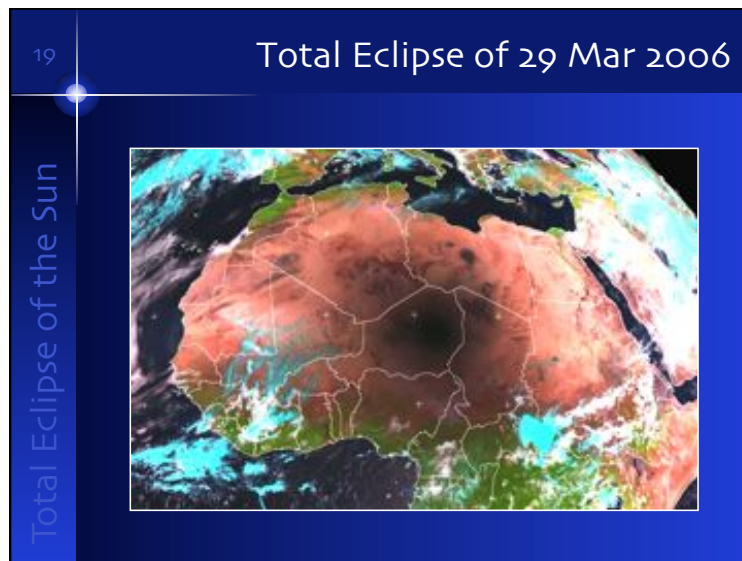
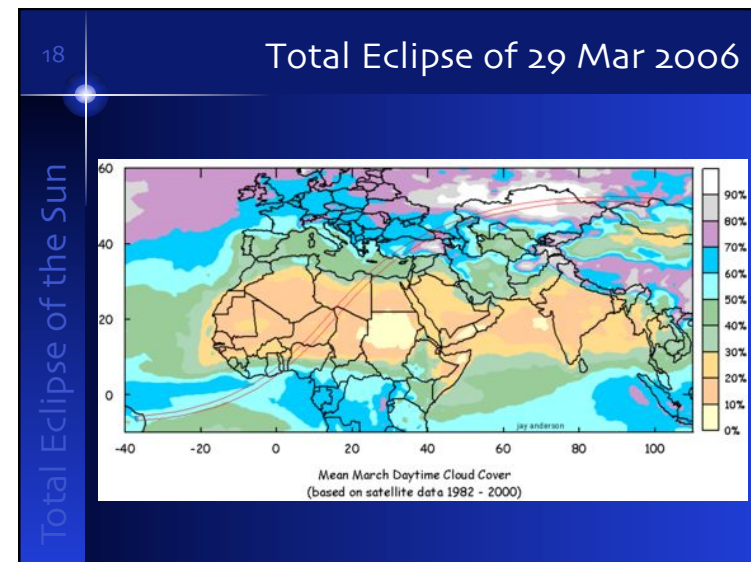
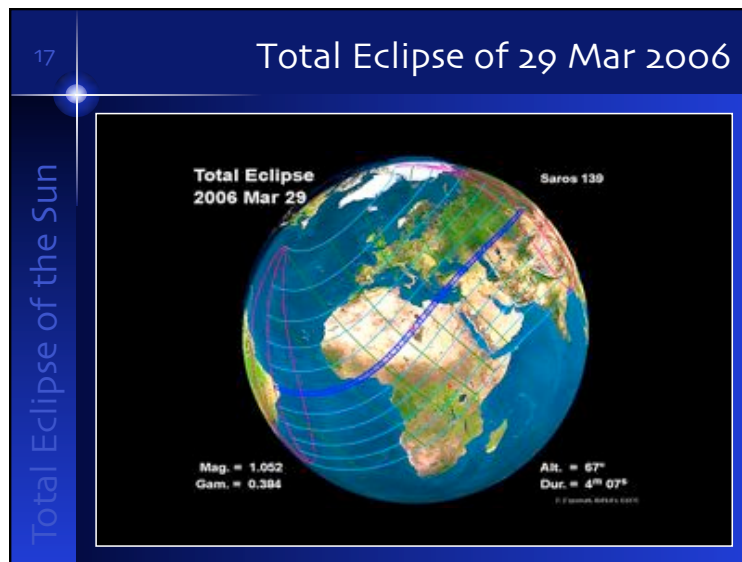
Total Eclipse of the Sun

Eclipses Coming Soon

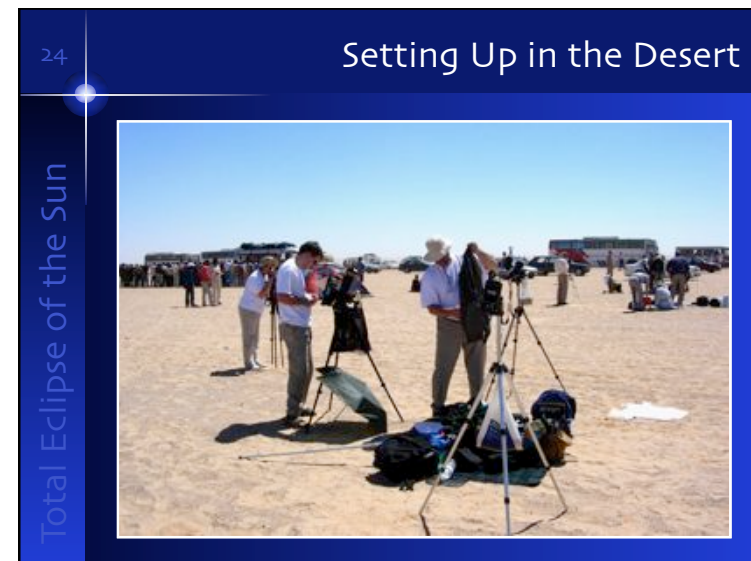
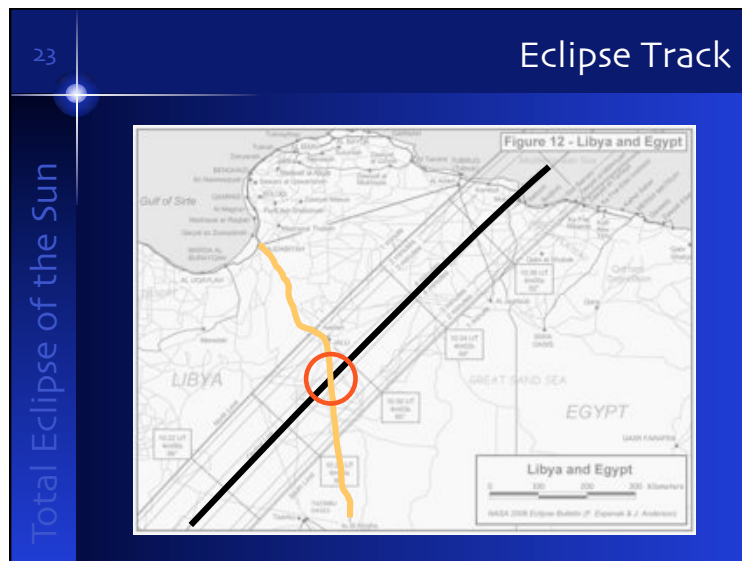
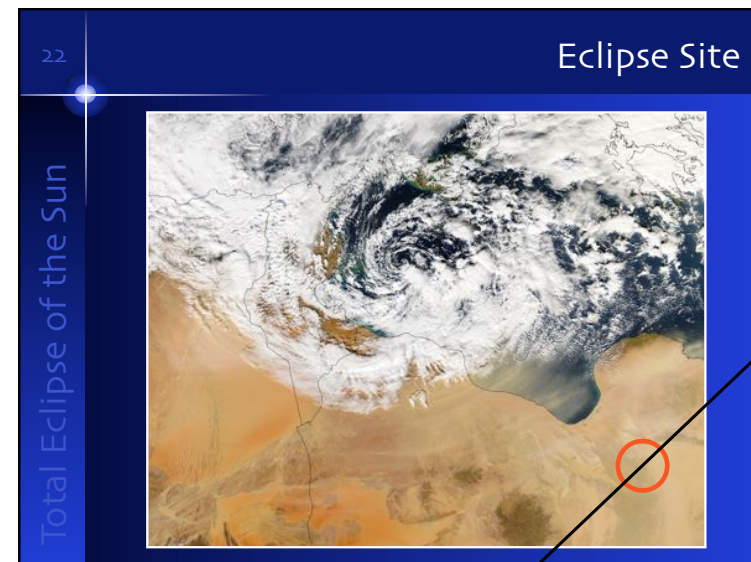
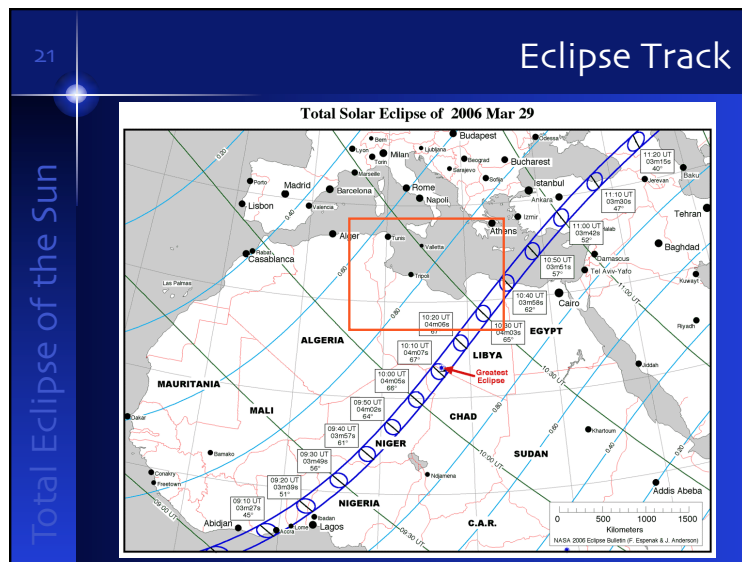
Date	Saros	Length	Seen from
2006 Mar 29	139	4 ^m 07 ^s	Africa, Turkey
2008 Aug 01	126	2 ^m 27 ^s	Greenland, Siberia
2009 Jul 22	136	6 ^m 39 ^s	India, China
2010 Jul 11	146	5 ^m 20 ^s	S Pacific, S America
2012 Nov 13	133	4 ^m 02 ^s	Australia, S Pacific
2013 Nov 03	143	1 ^m 40 ^s	Africa



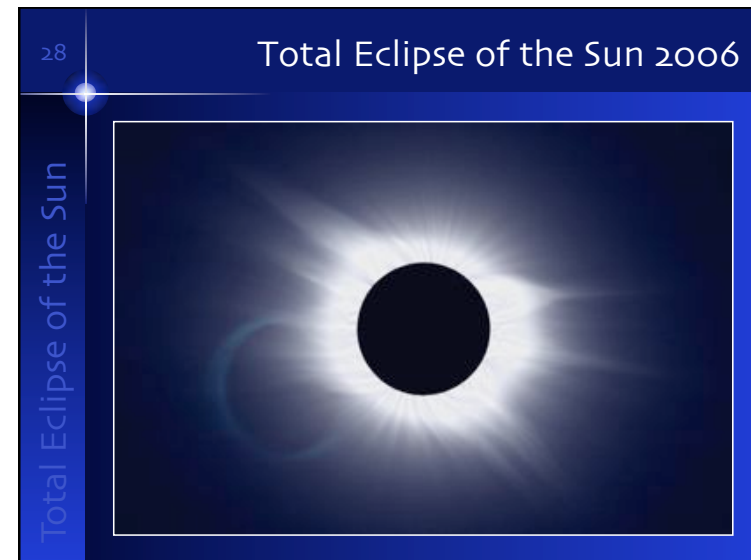
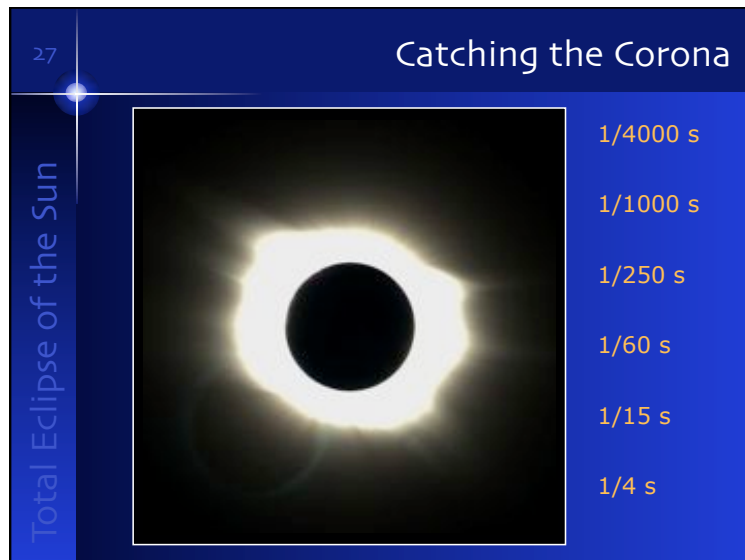
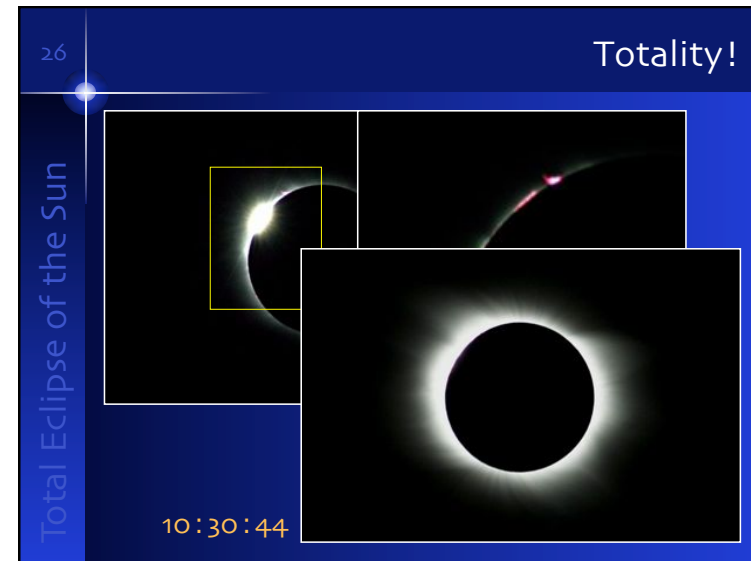
Total Eclipse of the Sun



Total Eclipse of the Sun



Total Eclipse of the Sun



Total Eclipse of the Sun

