



Shadia Habbal

1  
00:00:09,990 --> 00:00:07,909  
total eclipse of the sun presented by

2  
00:00:11,509 --> 00:00:10,000  
science at nasa

3  
00:00:13,509 --> 00:00:11,519  
people from around the world are

4  
00:00:15,190 --> 00:00:13,519  
converging on the coast of northeast

5  
00:00:16,950 --> 00:00:15,200  
australia

6  
00:00:19,750 --> 00:00:16,960  
the attraction isn't the great barrier

7  
00:00:22,390 --> 00:00:19,760  
reef just offshore or the surrounding

8  
00:00:23,830 --> 00:00:22,400  
rain forest full of wildlife and exotic

9  
00:00:25,910 --> 00:00:23,840  
plants

10  
00:00:27,750 --> 00:00:25,920  
they're going to see a total eclipse of

11  
00:00:29,830 --> 00:00:27,760  
the sun

12  
00:00:31,349 --> 00:00:29,840  
on the morning of november 14th

13  
00:00:34,069 --> 00:00:31,359

australia time

14

00:00:36,709 --> 00:00:34,079

just after sunrise the moon will pass

15

00:00:38,630 --> 00:00:36,719

directly in front of the sun

16

00:00:39,670 --> 00:00:38,640

residents and visitors of the city of

17

00:00:41,430 --> 00:00:39,680

cairns

18

00:00:44,150 --> 00:00:41,440

also known as the gateway to the great

19

00:00:46,950 --> 00:00:44,160

barrier reef will enjoy an early morning

20

00:00:48,869 --> 00:00:46,960

eclipse lasting two minutes with the sun

21

00:00:51,189 --> 00:00:48,879

only 14 degrees above the eastern

22

00:00:53,830 --> 00:00:51,199

horizon

23

00:00:56,229 --> 00:00:53,840

nasa eclipse expert fred espinac has a

24

00:00:58,389 --> 00:00:56,239

rating system for natural wonders

25

00:01:00,790 --> 00:00:58,399

on a scale of one to ten he says

26  
00:01:03,029 --> 00:01:00,800  
total eclipses are a million

27  
00:01:05,509 --> 00:01:03,039  
even the reef itself will be momentarily

28  
00:01:07,830 --> 00:01:05,519  
forgotten by onlookers as the moon's

29  
00:01:10,070 --> 00:01:07,840  
cool shadow sweeps across the beach and

30  
00:01:12,630 --> 00:01:10,080  
the ghostly tendrils of the solar corona

31  
00:01:14,230 --> 00:01:12,640  
surround the black lunar disk

32  
00:01:15,510 --> 00:01:14,240  
but there's more to this event than

33  
00:01:18,070 --> 00:01:15,520  
tourism

34  
00:01:20,149 --> 00:01:18,080  
scientists are attending too

35  
00:01:22,469 --> 00:01:20,159  
for researchers the brief minutes of

36  
00:01:24,870 --> 00:01:22,479  
totality offer a window into one of the

37  
00:01:27,429 --> 00:01:24,880  
deepest mysteries of solar physics the

38  
00:01:29,670 --> 00:01:27,439

mystery of coronal heating

39

00:01:32,789 --> 00:01:29,680

in plain language they'd like to know

40

00:01:34,469 --> 00:01:32,799

why the sun's outer atmosphere or corona

41

00:01:36,310 --> 00:01:34,479

is so hot

42

00:01:39,030 --> 00:01:36,320

the surface temperature of the sun is

43

00:01:41,830 --> 00:01:39,040

only 6000 degrees celsius

44

00:01:45,270 --> 00:01:41,840

yet the corona above it is much warmer a

45

00:01:47,429 --> 00:01:45,280

million degrees celsius or even more

46

00:01:49,350 --> 00:01:47,439

to understand the physics involved

47

00:01:51,590 --> 00:01:49,360

astronomers have developed instruments

48

00:01:53,429 --> 00:01:51,600

called coronagraphs which block the

49

00:01:54,870 --> 00:01:53,439

glare of the sun to reveal the faint

50

00:01:57,590 --> 00:01:54,880

corona

51  
00:02:00,230 --> 00:01:57,600  
three spacecraft soho and the twin

52  
00:02:03,270 --> 00:02:00,240  
stereo probes currently monitor the

53  
00:02:05,350 --> 00:02:03,280  
solar corona using these devices

54  
00:02:07,350 --> 00:02:05,360  
but no man-made instrument can match

55  
00:02:08,790 --> 00:02:07,360  
earth's natural satellite

56  
00:02:10,630 --> 00:02:08,800  
the moon is nature's greatest

57  
00:02:12,869 --> 00:02:10,640  
coronagraph

58  
00:02:14,949 --> 00:02:12,879  
during an eclipse the moon reveals the

59  
00:02:17,190 --> 00:02:14,959  
innermost corona which man-made

60  
00:02:19,670 --> 00:02:17,200  
coronagraphs have trouble seeing

61  
00:02:21,830 --> 00:02:19,680  
explains shadia habal of the institute

62  
00:02:23,830 --> 00:02:21,840  
for astronomy in hawaii

63  
00:02:26,070 --> 00:02:23,840

that is where all the magnetic field and

64

00:02:28,309 --> 00:02:26,080

physical processes responsible for

65

00:02:29,750 --> 00:02:28,319

heating the corona are evolving most

66

00:02:32,309 --> 00:02:29,760

rapidly

67

00:02:34,790 --> 00:02:32,319

on november 12th haba will be in palm

68

00:02:37,270 --> 00:02:34,800

cove australia to deliver a keynote

69

00:02:39,350 --> 00:02:37,280

speech at a solar physics conference

70

00:02:41,110 --> 00:02:39,360

sponsored in part by nasa's living with

71

00:02:43,589 --> 00:02:41,120

a star program

72

00:02:46,309 --> 00:02:43,599

the title of her talk is the unique

73

00:02:48,630 --> 00:02:46,319

scientific advantages of total solar

74

00:02:50,869 --> 00:02:48,640

eclipse observations

75

00:02:53,190 --> 00:02:50,879

two days later habal and her colleagues

76

00:02:55,270 --> 00:02:53,200

will be inside the path of totality

77

00:02:57,750 --> 00:02:55,280

monitoring the eclipse with a variety of

78

00:02:59,589 --> 00:02:57,760

telescopes and spectrometers at six

79

00:03:00,949 --> 00:02:59,599

different wavelengths from two different

80

00:03:03,509 --> 00:03:00,959

sites

81

00:03:04,710 --> 00:03:03,519

williams college astronomy professor jay

82

00:03:07,030 --> 00:03:04,720

pasikov

83

00:03:09,110 --> 00:03:07,040

chair of the international astronomical

84

00:03:10,550 --> 00:03:09,120

union's working group on eclipses will

85

00:03:13,509 --> 00:03:10,560

be there too

86

00:03:14,710 --> 00:03:13,519

he has observed an astounding 55 solar

87

00:03:17,270 --> 00:03:14,720

eclipses

88

00:03:18,949 --> 00:03:17,280

the australia eclipse will be my 56th he

89

00:03:21,350 --> 00:03:18,959

notes

90

00:03:23,110 --> 00:03:21,360

over the years pasakoff and colleagues

91

00:03:25,430 --> 00:03:23,120

have developed techniques to photograph

92

00:03:27,430 --> 00:03:25,440

the corona with clarity and resolution

93

00:03:29,350 --> 00:03:27,440

that coronagraphs on current spacecraft

94

00:03:31,750 --> 00:03:29,360

cannot match

95

00:03:33,830 --> 00:03:31,760

using these techniques we are learning

96

00:03:36,070 --> 00:03:33,840

how the wonderfully detailed structures

97

00:03:39,589 --> 00:03:36,080

we see in the corona are shaped by the

98

00:03:42,229 --> 00:03:39,599

sun's magnetic field he explains

99

00:03:45,589 --> 00:03:42,239

the shapes vary in a regular way during

100

00:03:47,830 --> 00:03:45,599

the sun's 11-year sunspot cycle

101  
00:03:50,710 --> 00:03:47,840  
we can use this information to improve

102  
00:03:52,550 --> 00:03:50,720  
predictions of the next solar cycle

103  
00:03:54,470 --> 00:03:52,560  
that's a lot of science in two minutes

104  
00:03:57,110 --> 00:03:54,480  
of shadowy darkness

105  
00:03:59,030 --> 00:03:57,120  
after totality is over the moon's shadow

106  
00:04:01,589 --> 00:03:59,040  
will sweep out across the south pacific

107  
00:04:04,070 --> 00:04:01,599  
ocean tracing a line thousands of miles

108  
00:04:06,550 --> 00:04:04,080  
long across uninhabited waters

109  
00:04:08,229 --> 00:04:06,560  
reaching almost but not quite the coast

110  
00:04:10,309 --> 00:04:08,239  
of south america

111  
00:04:12,470 --> 00:04:10,319  
back on the beach scientists will be

112  
00:04:14,390 --> 00:04:12,480  
taking a first look at their data while

113  
00:04:16,390 --> 00:04:14,400

tourists start thinking about breakfast

114

00:04:18,390 --> 00:04:16,400

and snorkeling in the reef

115

00:04:19,990 --> 00:04:18,400

for all concerned it's a great way to

116

00:04:21,909 --> 00:04:20,000

begin the day

117

00:04:24,710 --> 00:04:21,919

for more information about the eclipse