



1
00:00:03,750 --> 00:00:15,669

[Music]

2
00:00:20,950 --> 00:00:18,630

planet earth is an oasis of life

3
00:00:22,950 --> 00:00:20,960

but without the sun our home planet

4
00:00:26,310 --> 00:00:22,960

would be little more than a frozen rock

5
00:00:31,429 --> 00:00:29,189

the sun is a powerful blazing star it

6
00:00:34,790 --> 00:00:31,439

radiates huge amounts of electromagnetic

7
00:00:37,030 --> 00:00:34,800

energy in all directions

8
00:00:38,389 --> 00:00:37,040

earth is only one small recipient of the

9
00:00:40,310 --> 00:00:38,399

sun's energy

10
00:00:42,869 --> 00:00:40,320

the sun's rays extend far out into the

11
00:00:44,430 --> 00:00:42,879

solar system illuminating all the other

12
00:00:46,630 --> 00:00:44,440

planets

13
00:00:48,869 --> 00:00:46,640

[Music]

14

00:00:51,029 --> 00:00:48,879

the sun warms the earth and makes life

15

00:00:53,830 --> 00:00:51,039

possible here

16

00:00:55,990 --> 00:00:53,840

its energy also generates clouds cleans

17

00:01:00,389 --> 00:00:56,000

our water and drives ocean currents

18

00:01:04,549 --> 00:01:02,630

for three decades nasa's scientists have

19

00:01:07,429 --> 00:01:04,559

investigated the unique relationship

20

00:01:09,510 --> 00:01:07,439

between the sun and the earth

21

00:01:11,429 --> 00:01:09,520

they study the solar power arriving at

22

00:01:14,390 --> 00:01:11,439

earth and they examine how it breaks

23

00:01:16,390 --> 00:01:14,400

down into different wavelengths

24

00:01:18,789 --> 00:01:16,400

thirty percent of incoming solar power

25

00:01:23,670 --> 00:01:18,799

is reflected back into space by things

26

00:01:25,350 --> 00:01:23,680

like clouds aerosols ice and snow

27

00:01:27,190 --> 00:01:25,360

the remaining seventy percent is

28

00:01:29,590 --> 00:01:27,200

absorbed by the land ocean and

29

00:01:32,630 --> 00:01:29,600

atmosphere and this solar power is what

30

00:01:34,710 --> 00:01:32,640

drives the climate system

31

00:01:36,870 --> 00:01:34,720

the earth's energy budget is a delicate

32

00:01:38,870 --> 00:01:36,880

balance between incoming solar and

33

00:01:41,670 --> 00:01:38,880

outgoing thermal energy

34

00:01:43,190 --> 00:01:41,680

it's the balance between those two forms

35

00:01:46,389 --> 00:01:43,200

of energy that determines the

36

00:01:48,870 --> 00:01:46,399

temperature of the planet

37

00:01:51,109 --> 00:01:48,880

our energy budget is a little bit out of

38

00:01:53,429 --> 00:01:51,119

balance now and that's due to the carbon

39

00:01:55,590 --> 00:01:53,439

dioxide and other greenhouse gases in

40

00:01:58,550 --> 00:01:55,600

the atmosphere

41

00:02:00,870 --> 00:01:58,560

as humans burn fossil fuels greenhouse

42

00:02:03,670 --> 00:02:00,880

gases accumulate in the atmosphere and

43

00:02:05,670 --> 00:02:03,680

block the earth's outgoing heat

44

00:02:07,990 --> 00:02:05,680

the resulting imbalance will cause the

45

00:02:09,830 --> 00:02:08,000

earth to heat up over the next century

46

00:02:12,790 --> 00:02:09,840

accelerating the melting of polar ice

47

00:02:14,630 --> 00:02:12,800

caps causing sea levels to rise and

48

00:02:15,840 --> 00:02:14,640

creating more violent global weather

49

00:02:18,470 --> 00:02:15,850

patterns

50

00:02:21,110 --> 00:02:18,480

[Music]

51
00:02:22,949 --> 00:02:21,120
humans affect earth's climate internally

52
00:02:24,309 --> 00:02:22,959
and the sun is the primary external

53
00:02:26,550 --> 00:02:24,319
influence

54
00:02:28,390 --> 00:02:26,560
sunspots in solar weather cause incoming

55
00:02:30,390 --> 00:02:28,400
solar power to vary

56
00:02:32,660 --> 00:02:30,400
and long-term fluctuations in the solar

57
00:02:34,550 --> 00:02:32,670
cycle can impact earth's climate

58
00:02:36,869 --> 00:02:34,560
[Music]

59
00:02:39,110 --> 00:02:36,879
as the earth warms scientists strive to

60
00:02:41,670 --> 00:02:39,120
better understand the sun's direct and

61
00:02:43,910 --> 00:02:41,680
indirect effect on the earth

62
00:02:46,869 --> 00:02:43,920
the total irradiance monitor or tim

63
00:02:49,030 --> 00:02:46,879

instrument was launched in 2003 as part

64

00:02:51,110 --> 00:02:49,040
of nasa's source mission

65

00:02:53,190 --> 00:02:51,120
tim measures total solar irradiance with

66

00:02:55,350 --> 00:02:53,200
state-of-the-art accuracy and has been

67

00:02:56,790 --> 00:02:55,360
rebuilt as part of nasa's upcoming glory

68

00:02:59,670 --> 00:02:56,800
mission

69

00:03:02,070 --> 00:02:59,680
scheduled to launch in 2009 glory will

70

00:03:03,670 --> 00:03:02,080
also collect data on aerosols one of the

71

00:03:06,390 --> 00:03:03,680
least understood components of the

72

00:03:07,910 --> 00:03:06,400
climate puzzle

73

00:03:10,070 --> 00:03:07,920
as our home planet changes in

74

00:03:12,070 --> 00:03:10,080
unprecedented ways researchers will

75

00:03:13,430 --> 00:03:12,080
continue to rely on nasa missions to

76

00:03:15,980 --> 00:03:13,440

illuminate their understanding of the

77

00:03:24,789 --> 00:03:15,990

earth and the sun