



1  
00:00:04,150 --> 00:00:01,990

[Music]

2  
00:00:05,910 --> 00:00:04,160

nasa's themis mission has overturned a

3  
00:00:08,150 --> 00:00:05,920

long-standing belief about the

4  
00:00:10,549 --> 00:00:08,160

interaction between solar particles and

5  
00:00:14,310 --> 00:00:10,559

the earth's magnetic field

6  
00:00:16,150 --> 00:00:14,320

giant bar magnet

7  
00:00:18,150 --> 00:00:16,160

this magnet forms a protective field

8  
00:00:20,070 --> 00:00:18,160

around the earth shielding us from the

9  
00:00:21,750 --> 00:00:20,080

solar wind that is constantly streaming

10  
00:00:24,630 --> 00:00:21,760

towards earth

11  
00:00:28,070 --> 00:00:24,640

this shield is called the magnetosphere

12  
00:00:31,029 --> 00:00:28,080

the solar wind is primarily composed of

13  
00:00:33,750 --> 00:00:31,039

protons and electrons charge particles

14

00:00:36,150 --> 00:00:33,760

streaming out from the sun some of those

15

00:00:38,950 --> 00:00:36,160

particles have very high energies

16

00:00:41,430 --> 00:00:38,960

radiation energies and they can damage

17

00:00:43,350 --> 00:00:41,440

astronauts and spacecraft

18

00:00:45,750 --> 00:00:43,360

we are shielded by our earth's magnetic

19

00:00:47,910 --> 00:00:45,760

field most of the time however a small

20

00:00:49,910 --> 00:00:47,920

fraction of the solar wind particles get

21

00:00:51,750 --> 00:00:49,920

into the earth's magnetic field are

22

00:00:54,229 --> 00:00:51,760

energized and become the earth's

23

00:00:57,110 --> 00:00:54,239

radiation belts which can damage

24

00:00:59,029 --> 00:00:57,120

spacecraft and harm astronauts

25

00:01:01,430 --> 00:00:59,039

but the sun has a magnetic field of its

26  
00:01:03,670 --> 00:01:01,440  
own as well which the solar wind carries

27  
00:01:05,910 --> 00:01:03,680  
outwards towards earth

28  
00:01:08,070 --> 00:01:05,920  
and the themis spacecraft fleet recently

29  
00:01:09,830 --> 00:01:08,080  
observed that 20 times more solar

30  
00:01:11,670 --> 00:01:09,840  
particles get into the earth's

31  
00:01:13,990 --> 00:01:11,680  
magnetosphere when the sun's magnetic

32  
00:01:15,270 --> 00:01:14,000  
field aligns with that of the earth than

33  
00:01:16,550 --> 00:01:15,280  
when they're pointed in opposite

34  
00:01:18,950 --> 00:01:16,560  
directions

35  
00:01:20,789 --> 00:01:18,960  
in the past researchers found that the

36  
00:01:22,870 --> 00:01:20,799  
energy from the sun gets into the

37  
00:01:24,870 --> 00:01:22,880  
earth's magnetic field during periods

38  
00:01:27,590 --> 00:01:24,880

when the sun's magnetic field points

39

00:01:29,830 --> 00:01:27,600

southward here we found that the

40

00:01:31,990 --> 00:01:29,840

particles get in the plasma the

41

00:01:33,749 --> 00:01:32,000

particles from the sun get into the

42

00:01:36,069 --> 00:01:33,759

earth's magnetic field when the sun's

43

00:01:38,390 --> 00:01:36,079

magnetic field points northward

44

00:01:40,710 --> 00:01:38,400

for a long time people have known that

45

00:01:42,950 --> 00:01:40,720

the location where particles and energy

46

00:01:45,350 --> 00:01:42,960

get into the earth's magnetic field

47

00:01:47,830 --> 00:01:45,360

depend on the orientation of the sun's

48

00:01:50,389 --> 00:01:47,840

magnetic fields but they just hadn't

49

00:01:52,469 --> 00:01:50,399

realized how many particles get in for

50

00:01:55,190 --> 00:01:52,479

the northward orientation of the sun's

51  
00:01:57,590 --> 00:01:55,200  
magnetic field so what do these new

52  
00:01:59,190 --> 00:01:57,600  
findings mean for us here on earth

53  
00:02:00,789 --> 00:01:59,200  
well with this new information

54  
00:02:03,590 --> 00:02:00,799  
scientists can make better predictions

55  
00:02:05,510 --> 00:02:03,600  
about when solar storms will be severe

56  
00:02:07,830 --> 00:02:05,520  
meaning we can better prepare for the

57  
00:02:09,910 --> 00:02:07,840  
power outages satellite damage and other