



1
00:00:05,990 --> 00:00:04,150
nasa's themis mission has overturned a

2
00:00:08,230 --> 00:00:06,000
long-standing belief about the

3
00:00:10,629 --> 00:00:08,240
interaction between solar particles and

4
00:00:14,390 --> 00:00:10,639
the earth's magnetic field

5
00:00:16,230 --> 00:00:14,400
giant bar magnet

6
00:00:18,150 --> 00:00:16,240
this magnet forms a protective field

7
00:00:20,150 --> 00:00:18,160
around the earth shielding us from the

8
00:00:21,750 --> 00:00:20,160
solar wind that is constantly streaming

9
00:00:24,630 --> 00:00:21,760
towards earth

10
00:00:28,150 --> 00:00:24,640
this shield is called the magnetosphere

11
00:00:31,029 --> 00:00:28,160
the solar wind is primarily composed of

12
00:00:33,190 --> 00:00:31,039
protons and electrons charged particles

13
00:00:35,270 --> 00:00:33,200

streaming out from the sun

14

00:00:38,310 --> 00:00:35,280

some of those particles have very high

15

00:00:41,430 --> 00:00:38,320

energies radiation energies and they can

16

00:00:43,430 --> 00:00:41,440

damage astronauts and spacecraft

17

00:00:45,750 --> 00:00:43,440

we are shielded by our earth's magnetic

18

00:00:47,990 --> 00:00:45,760

field most of the time however a small

19

00:00:49,990 --> 00:00:48,000

fraction of the solar wind particles get

20

00:00:51,830 --> 00:00:50,000

into the earth's magnetic field are

21

00:00:54,310 --> 00:00:51,840

energized and become the earth's

22

00:00:57,189 --> 00:00:54,320

radiation belts which can damage

23

00:00:59,110 --> 00:00:57,199

spacecraft and harm astronauts

24

00:01:01,510 --> 00:00:59,120

but the sun has a magnetic field of its

25

00:01:03,750 --> 00:01:01,520

own as well which the solar wind carries

26

00:01:05,910 --> 00:01:03,760

outwards towards earth

27

00:01:08,070 --> 00:01:05,920

and the themis spacecraft fleet recently

28

00:01:09,830 --> 00:01:08,080

observed that 20 times more solar

29

00:01:11,670 --> 00:01:09,840

particles get into the earth's

30

00:01:13,990 --> 00:01:11,680

magnetosphere when the sun's magnetic

31

00:01:15,270 --> 00:01:14,000

field aligns with that of the earth than

32

00:01:16,630 --> 00:01:15,280

when they're pointed in opposite

33

00:01:19,030 --> 00:01:16,640

directions

34

00:01:20,789 --> 00:01:19,040

in the past researchers found that the

35

00:01:22,950 --> 00:01:20,799

energy from the sun gets into the

36

00:01:24,950 --> 00:01:22,960

earth's magnetic field during periods

37

00:01:26,390 --> 00:01:24,960

when the sun's magnetic field points

38

00:01:29,030 --> 00:01:26,400

southward

39

00:01:31,350 --> 00:01:29,040

here we found that the particles get in

40

00:01:33,270 --> 00:01:31,360

the plasma the particles from the sun

41

00:01:35,030 --> 00:01:33,280

get into the earth's magnetic field when

42

00:01:36,149 --> 00:01:35,040

the sun's magnetic field points

43

00:01:38,390 --> 00:01:36,159

northward

44

00:01:40,789 --> 00:01:38,400

for a long time people have known that

45

00:01:42,950 --> 00:01:40,799

the location where particles and energy

46

00:01:45,429 --> 00:01:42,960

get into the earth's magnetic field

47

00:01:47,910 --> 00:01:45,439

depend on the orientation of the sun's

48

00:01:50,469 --> 00:01:47,920

magnetic fields but they just hadn't

49

00:01:52,469 --> 00:01:50,479

realized how many particles get in for

50

00:01:55,270 --> 00:01:52,479

the northward orientation of the sun's

51
00:01:57,670 --> 00:01:55,280
magnetic field so what do these new

52
00:01:59,190 --> 00:01:57,680
findings mean for us here on earth

53
00:02:00,870 --> 00:01:59,200
well with this new information

54
00:02:03,670 --> 00:02:00,880
scientists can make better predictions

55
00:02:05,590 --> 00:02:03,680
about when solar storms will be severe

56
00:02:07,910 --> 00:02:05,600
meaning we can better prepare for the

57
00:02:09,990 --> 00:02:07,920
power outages satellite damage and other