



1
00:00:08,170 --> 00:00:04,080
Music

2
00:00:08,190 --> 00:00:12,250
Narrator: What safeguards our solar system...

3
00:00:12,270 --> 00:00:16,320
is our star.

4
00:00:16,340 --> 00:00:20,390
The sun provides a shield, stretching beyond the last

5
00:00:20,410 --> 00:00:24,440
planet in its orbit: a force field that deflects these

6
00:00:24,460 --> 00:00:28,480
"cosmic rays." But these

7
00:00:28,500 --> 00:00:32,510
"solar winds" can be dangerous too,

8
00:00:32,530 --> 00:00:36,520
especially during outbursts called coronal mass ejections.

9
00:00:36,540 --> 00:00:40,640
Want a vision of earth gone

10
00:00:40,660 --> 00:00:44,740
wrong? Just look at what solar storms do our

11
00:00:44,760 --> 00:00:48,840
sister planet, Venus. They strip away lighter

12
00:00:48,860 --> 00:00:52,920
elements in its upper atmosphere, hydrogen, oxygen

13
00:00:52,940 --> 00:00:57,000

and the molecule they form: water.

14

00:00:57,020 --> 00:01:01,070

What's left is a witch's brew of noxious

15

00:01:01,090 --> 00:01:05,130

chemicals including thick sulfurous clouds.

16

00:01:05,150 --> 00:01:09,180

How has Earth avoided the grim fate of Venus?

17

00:01:09,200 --> 00:01:13,220

We can see the answer as the solar storm

18

00:01:13,240 --> 00:01:17,240

approaches Earth.

19

00:01:17,260 --> 00:01:21,250

Music

20

00:01:21,270 --> 00:01:25,360

Our planet has a protective shield

21

00:01:25,380 --> 00:01:29,470

all it's own-- A powerful magnetic field

22

00:01:29,490 --> 00:01:33,560

generated deep within its core.

23

00:01:33,580 --> 00:01:37,650

In fact, that's just our first line of

24

00:01:37,670 --> 00:01:41,720

defense. Much of the solar energy that gets through

25

00:01:41,740 --> 00:01:45,790

is reflected back to space by clouds, ice,

26

00:01:45,810 --> 00:01:49,840

and snow. The energy that Earth absorbs

27

00:01:49,860 --> 00:01:53,880

is just enough to power a remarkable planetary

28

00:01:53,900 --> 00:01:57,900

engine: the climate.

29

00:01:57,920 --> 00:02:01,910

It's set in motion

30

00:02:01,930 --> 00:02:05,990

by the unevenness of solar heating, due in part to the

31

00:02:06,010 --> 00:02:10,070

cycles of day and night, and the seasons that cause warm

32

00:02:10,090 --> 00:02:14,140

tropical winds to blow toward the poles and cold

33

00:02:14,160 --> 00:02:18,200

polar air toward the equator.

34

00:02:18,220 --> 00:02:22,260

Wind currents

35

00:02:22,280 --> 00:02:26,300

drive surface ocean currents.

36

00:02:26,320 --> 00:02:30,340

This computer simulation shows the

37

00:02:30,360 --> 00:02:34,370

Gulf Stream winding its way along the coast of North America.

38

00:02:46,480 --> 00:02:38,390

Music

39

00:02:46,500 --> 00:02:50,550

This great ocean river carries enough heat energy

40

00:02:50,570 --> 00:02:54,620

to power the industrial world a hundred times

41

00:02:54,640 --> 00:02:58,670

over. It breaks down

42

00:02:58,690 --> 00:03:02,720

in massive world pools that spread warm tropical

43

00:03:02,740 --> 00:03:06,770

waters over northern seas.

44

00:03:06,790 --> 00:03:10,800

Music

45

00:03:10,820 --> 00:03:14,820

Below the surface they mix

46

00:03:14,840 --> 00:03:18,840

with cold deep currents that swirl around

47

00:03:18,860 --> 00:03:22,930

under sea ledges and mountains.

48

00:03:43,280 --> 00:03:27,020

Music

49

00:03:43,300 --> 00:03:47,330

Earth's climate engine has countless moving parts:

50

00:03:47,350 --> 00:03:51,360

tides and terrain, cross winds and currents--

