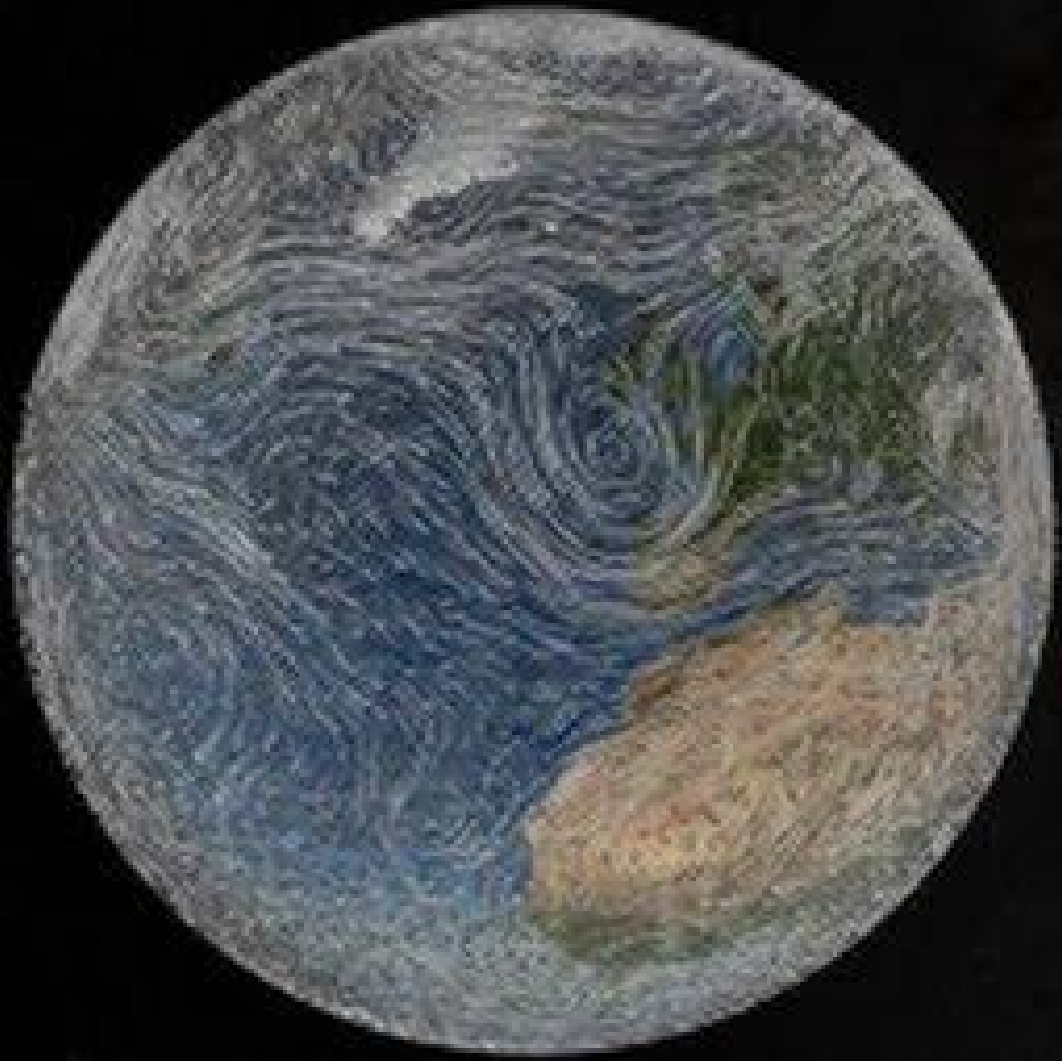

1
00:00:00,010 --> 00:00:04,030
(Music)

2
00:00:08,090 --> 00:00:12,120
Narrator: What safeguards our solar system...

3
00:00:12,140 --> 00:00:16,130
is our star.

4
00:00:16,150 --> 00:00:20,170
The sun provides a shield, stretching beyond the last

5
00:00:20,190 --> 00:00:24,310
planet in its orbit: a force field that deflects these "cosmic

6
00:00:24,330 --> 00:00:28,330
rays."

7
00:00:28,350 --> 00:00:32,370
But these "solar winds" can be dangerous too, especially during

8
00:00:32,390 --> 00:00:36,430
outbursts called coronal mass ejections.

9
00:00:36,450 --> 00:00:40,470
Want a vision of earth gone wrong?

10
00:00:40,490 --> 00:00:44,650
Just look at what solar storms do our sister planet,

11
00:00:44,670 --> 00:00:48,650
Venus. They strip away lighter

12
00:00:48,670 --> 00:00:52,670
elements in its upper atmosphere, hydrogen, oxygen

13
00:00:52,690 --> 00:00:56,780

and the molecule they form: water.

14
00:00:56,800 --> 00:01:01,060
What's left is a witch's brew of noxious chemicals

15
00:01:01,080 --> 00:01:05,230
including thick sulfurous clouds.

16
00:01:05,250 --> 00:01:09,270
How has Earth avoided the grim fate of Venus?

17
00:01:09,290 --> 00:01:13,370
We can see the answer as the solar storm

18
00:01:13,390 --> 00:01:17,660
approaches Earth.

19
00:01:17,680 --> 00:01:21,900
Music

20
00:01:21,920 --> 00:01:26,110
Our planet has a protective shield all it's own--

21
00:01:26,130 --> 00:01:30,180
A powerful magnetic field

22
00:01:30,200 --> 00:01:34,240
generated deep within its core.

23
00:01:34,260 --> 00:01:38,340
In fact, that's just our first line of defense.

24
00:01:38,360 --> 00:01:42,370
Much of the solar energy that gets through is reflected back

25
00:01:42,390 --> 00:01:46,400
to space by clouds, ice, and snow.

26
00:01:46,420 --> 00:01:50,440
The energy that Earth absorbs is just enough to power

27
00:01:50,460 --> 00:01:54,480
a remarkable planetary engine: the climate.

28
00:01:54,500 --> 00:01:58,510
(Music)

29
00:01:58,530 --> 00:02:02,560
It's set in motion by the unevenness of solar

30
00:02:02,580 --> 00:02:06,600
heating, due in part to the cycles of day and night,

31
00:02:06,620 --> 00:02:10,690
and the seasons that cause warm tropical winds

32
00:02:10,710 --> 00:02:14,770
to blow toward the poles and cold polar air

33
00:02:14,790 --> 00:02:18,860
toward the equator.

34
00:02:18,880 --> 00:02:22,930
Wind currents drive surface ocean currents.

35
00:02:22,950 --> 00:02:27,020
(Music)

36
00:02:27,040 --> 00:02:31,080
This computer simulation shows the Gulf Stream winding its

37
00:02:31,100 --> 00:02:35,140
way along the coast of North America.

38
00:02:43,280 --> 00:02:39,190

(Music)

39
00:02:43,300 --> 00:02:47,400
This great

40
00:02:47,420 --> 00:02:51,490
ocean river carries enough heat energy to power the industrial

41
00:02:51,510 --> 00:02:55,630
world a hundred times over.

42
00:02:55,650 --> 00:02:59,770
It breaks down in massive world pools

43
00:02:59,790 --> 00:03:03,890
that spread warm tropical waters over northern seas.

44
00:03:12,180 --> 00:03:08,050
(Music)

45
00:03:12,200 --> 00:03:16,210
Below the surface they mix with cold deep currents that swirl

46
00:03:16,230 --> 00:03:20,240
around under sea ledges and mountains.

47
00:03:40,360 --> 00:03:24,260
(Music)

48
00:03:40,380 --> 00:03:44,380
Earth's climate engine

49
00:03:44,400 --> 00:03:48,420
has countless moving parts: tides and terrain,

50
00:03:48,440 --> 00:03:52,470
cross winds and currents-- all working to equalize temperatures

51
00:03:52,490 --> 00:03:56,500
around the globe.