



1
00:00:02,240 --> 00:00:10,400
(tone)

2
00:00:10,420 --> 00:00:14,440
(Music) Narrator: Launched in 2007,

3
00:00:14,460 --> 00:00:18,450
NASA's five THEMIS spacecraft have now successfully completed their two-year mission to

4
00:00:18,470 --> 00:00:22,570
determine the cause of geomagnetic substorms.

5
00:00:22,590 --> 00:00:26,650
Because they are continuing to work perfectly, NASA is redirecting

6
00:00:26,670 --> 00:00:30,680
the outermost two spacecraft to special orbits at and around the Moon.

7
00:00:30,700 --> 00:00:34,770
This new mission, which is called ARTEMIS, uses some very complex maneuvers

8
00:00:34,790 --> 00:00:38,860
over two years to get both spacecraft into position.

9
00:00:38,880 --> 00:00:42,910
Although the spacecraft sometimes move far

10
00:00:42,930 --> 00:00:46,920
outside the orbit of the Moon, their every move is carefully orchestrated to ease

11
00:00:46,940 --> 00:00:50,990
them into position while using very little of their precious fuel.

12
00:00:51,010 --> 00:00:55,090
ARTEMIS 1, in red, had the larger orbit to begin with,

13
00:00:55,110 --> 00:00:59,170

so it requires a much more dynamic path to harness its energy.

14

00:01:07,420 --> 00:01:03,350

(Music)

15

00:01:07,440 --> 00:01:11,450

For a few months, the spacecraft don't even orbit the Earth or the Moon.

16

00:01:11,470 --> 00:01:15,470

Instead, they circle the two locations where the the gravity of the Earth and the Moon

17

00:01:15,490 --> 00:01:19,550

cancel out exactly. These spots, just inside and just beyond

18

00:01:19,570 --> 00:01:23,690

lunar orbit are known as Lagrange points. NASA has

19

00:01:23,710 --> 00:01:27,740

several satellites orbiting one such point between the Earth and the Sun.

20

00:01:27,760 --> 00:01:31,840

As the Moon orbits the Earth, it passes in and out of the Earth's

21

00:01:31,860 --> 00:01:35,920

magnetic field and the million-mile per hour stream of particles emitted by the Sun

22

00:01:35,940 --> 00:01:39,970

known as the solar wind. While in these regions, the two ARTEMIS

23

00:01:39,990 --> 00:01:43,990

spacecraft will seek evidence turbulence, particle acceleration

24

00:01:44,010 --> 00:01:48,070

and magnetic reconnection, three fundamental phenomena that control

25

00:01:48,090 --> 00:01:52,210

the nature of the solar wind's interaction with the Earth's magnetosphere.

26

00:01:52,230 --> 00:01:56,270

Finally, in 2011,

27

00:01:56,290 --> 00:02:00,300

the ARTEMIS settle into a lunar orbit.

28

00:02:00,320 --> 00:02:04,440

(Music)

29

00:02:04,460 --> 00:02:08,480

Employing their full complement of instruments and unique vantage points,

30

00:02:08,500 --> 00:02:12,490

the spacecraft will study the vacuum the Moon carves out in the solar wind and the processes

31

00:02:12,510 --> 00:02:16,640

that eventually fill this lunar wake.

32

00:02:16,660 --> 00:02:19,720

(Music)

33

00:02:19,740 --> 00:02:23,790

Nearer the Moon, they will observe the effects of surface electric fields,

34

00:02:23,810 --> 00:02:27,850

ions sputtered off the lunar surface, and determine the internal structure of the

35

00:02:27,870 --> 00:02:31,960

Moon from variations in its magnetic field.

36

00:02:31,980 --> 00:02:36,030

These observations will improve

37

00:02:36,050 --> 00:02:40,170

understanding of the Sun-Earth connection called space weather, and its interaction

38

00:02:40,190 --> 00:02:44,210

with our nearest neighbor in space.