1
00:00:07,190 --> 00:00:03,990
comets are icy leftovers from the solar

2
00:00:09,030 --> 00:00:07,200
system's formation billions of years ago

3
00:00:11,190 --> 00:00:09,040
usually found in the cold distant

4
00:00:13,190 --> 00:00:11,200
reaches of the solar system some comets

5
00:00:14,709 --> 00:00:13,200
have orbits that periodically bring them

6
00:00:16,790 --> 00:00:14,719
closer to the sun

7
00:00:19,029 --> 00:00:16,800
once there the heat and radiation of the

8
00:00:22,470 --> 00:00:19,039
inner solar system vaporizes gas and

9
00:00:25,589 --> 00:00:22,480
dust from the comet and forms a tail

10
00:00:27,910 --> 00:00:25,599
coronal mass ejections or cmes are large

11
00:00:29,509 --> 00:00:27,920
clouds of magnetized gas ejected into

12
00:00:31,349 --> 00:00:29,519
space by the sun

13
00:00:33,590 --> 00:00:31,359

there are violent eruptions with masses

14
00:00:35,750 --> 00:00:33,600
upwards of a few billion tons that can

15
00:00:37,830 --> 00:00:35,760
travel out from the sun as fast as six

16
00:00:41,110 --> 00:00:37,840
million miles an hour

17
00:00:43,350 --> 00:00:41,120
on april 20th 2007 nasa's stereo

18
00:00:46,310 --> 00:00:43,360
satellite captured the first ever images

19
00:00:48,709 --> 00:00:46,320
of a collision between a comet and a cme

20
00:00:50,630 --> 00:00:48,719
combining the images into a movie we can

21
00:00:53,830 --> 00:00:50,640
actually watch as the comet known as

22
00:00:55,910 --> 00:00:53,840
comet enki collides with the passing cme

23
00:00:57,670 --> 00:00:55,920
pay attention to the way the cme causes

24
00:01:08,950 --> 00:00:57,680
a complete detachment of the comet's

25
00:01:12,789 --> 00:01:10,870
a preliminary analysis suggests that the

26
00:01:14,950 --> 00:01:12,799
tail was ripped away when magnetic

27
00:01:17,830 --> 00:01:14,960
fields bumped together in an explosive

28
00:01:20,070 --> 00:01:17,840
process called magnetic reconnection

29
00:01:22,710 --> 00:01:20,080
magnetic fields around the comet bumped

30
00:01:24,230 --> 00:01:22,720
into oppositely directed magnetic fields

31
00:01:26,390 --> 00:01:24,240
in the cme

32
00:01:28,550 --> 00:01:26,400
though our planet doesn't have a tail

33
00:01:30,149 --> 00:01:28,560
a similar process actually takes place

34
00:01:31,830 --> 00:01:30,159
when a cme collides with earth's

35
00:01:34,149 --> 00:01:31,840
magnetosphere

36
00:01:36,149 --> 00:01:34,159
shining beautifully in the polar sky the