
Jupiter!

1
00:00:00,000 --> 00:00:03,003
[music throughout]

2
00:00:18,551 --> 00:00:20,887
The Trojan asteroids
are found in Lagrange points,

3
00:00:21,321 --> 00:00:25,058
which are these special places that lead
or follow a planet in its orbit

4
00:00:25,392 --> 00:00:30,230
by 60 degrees, and it's sort of where
the gravitational force of the planet

5
00:00:30,230 --> 00:00:33,733
and the gravitational force
of the Sun all cancel out.

6
00:00:33,767 --> 00:00:37,504
So if you put an object there,
it will stay there for a long period

7
00:00:37,504 --> 00:00:38,905
of time, basically forever.

8
00:00:38,905 --> 00:00:42,375
So when we see objects there,
these are objects

9
00:00:42,375 --> 00:00:45,945
that we know were in place
a very long time ago.

10
00:00:48,081 --> 00:00:49,182
So if you just take

11
00:00:49,182 --> 00:00:52,685
a random asteroid

and just put it in the outer Solar System,

12
00:00:52,685 --> 00:00:54,421
the gravitational force

13
00:00:54,421 --> 00:00:58,291
of the four outer planets will just clear
them out in a very short period of time.

14
00:00:58,925 --> 00:01:00,727
So they'll basically be gone.

15
00:01:00,727 --> 00:01:04,564
So the only places
it turns out in the outer Solar System

16
00:01:04,564 --> 00:01:08,368
where you can find stable regions
are these Lagrange points.

17
00:01:08,401 --> 00:01:13,173
Lucy in particular,
is going to go after the Jupiter Trojans.

18
00:01:13,473 --> 00:01:16,276
We're trying to see a type of object

19
00:01:16,643 --> 00:01:21,448
that represents and constrains
the formation of the outer planets.

20
00:01:21,915 --> 00:01:26,820
And you need to go to these Lagrange
points in order to see that kind of thing.

21
00:01:28,221 --> 00:01:29,722
One of the really groovy

22
00:01:29,722 --> 00:01:35,662

aspects of our mission is its trajectory,
because we're visiting

23
00:01:35,929 --> 00:01:39,399
a record number of objects
like these Trojans.

24
00:01:39,899 --> 00:01:43,903
And we do that with this very complicated
dance, particularly in the beginning,

25
00:01:43,970 --> 00:01:49,642
where we are using the earth
actually as a gravitational slingshot.

26
00:01:49,876 --> 00:01:53,580
So Lucy will start off in an orbit
very similar to the Earth,

27
00:01:53,847 --> 00:01:58,518
and then gravitational encounters
with the Earth will actually pump it up.

28
00:01:58,518 --> 00:02:02,422
So it gets out to the Lagrange points
near Jupiter's orbit.

29
00:02:03,323 --> 00:02:06,493
So if you're going to understand
how planets like the Earth formed,

30
00:02:07,327 --> 00:02:09,762
you have to understand
how the bigger planets