

Lucy's Journey



1
00:00:01,583 --> 00:00:05,166
We are minutes away
from the launch of NASA's Lucy mission

2
00:00:05,333 --> 00:00:08,250
to the never before explored
Trojan asteroids.

3
00:00:09,666 --> 00:00:12,666
Lucy's long journey to space begins today,

4
00:00:12,750 --> 00:00:15,333
but her story actually started years ago.

5
00:00:16,000 --> 00:00:19,250
It took a team of scientists and engineers
many years to plan

6
00:00:19,250 --> 00:00:21,583
where Lucy would go
and what she would have to do.

7
00:00:22,416 --> 00:00:26,000
Then Lucy's engineers had to build her
out of individual parts

8
00:00:26,333 --> 00:00:29,166
and put her together like a puzzle.

9
00:00:29,166 --> 00:00:33,666
Lucy had to go through tough physical
tests to prove she was mission ready.

10
00:00:34,583 --> 00:00:36,833
How are you holding up, Lucy?

11
00:00:37,916 --> 00:00:40,666
These are the vibration
and acoustic tests to make sure

12

00:00:40,666 --> 00:00:44,500

that Lucy won't lose any screws
during the shaky launch on a rocket.

13

00:00:45,000 --> 00:00:47,083

Lucy wasn't quite ready just yet.

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00:00:47,750 --> 00:00:49,166

The engineers still had to be sure

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00:00:49,166 --> 00:00:51,833

that she was prepared
for the harsh environment of space.

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00:00:52,583 --> 00:00:55,000

They chilled Lucy
to freezing temperatures,

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00:00:55,333 --> 00:00:59,666

then warmed her up to scalding hot
temperatures in the thermal vacuum test.

18

00:00:59,916 --> 00:01:03,750

Sure, those tests weren't easy,
but they prepared Lucy for the long

19

00:01:03,750 --> 00:01:09,166

adventure ahead.

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00:01:28,833 --> 00:01:34,416

We're glad you can

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00:01:34,416 --> 00:01:38,083

join Lucy on her adventure
to explore the Trojan asteroids.

22

00:01:38,583 --> 00:01:42,333

Now let's get the journey started.

23

00:01:44,666 --> 00:01:46,000

You might be wondering,

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00:01:46,000 --> 00:01:48,833

where is Lucy off to?

25

00:01:50,583 --> 00:01:52,666

Ah, yes! The Trojan asteroids.

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00:01:52,833 --> 00:01:56,250

These are a population of asteroids
in orbit around the Sun.

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00:01:56,583 --> 00:01:59,750

About as far away as Jupiter.

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00:01:59,750 --> 00:02:03,500

It may seem far away to you,
but our Lucy spacecraft

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00:02:03,666 --> 00:02:07,750

is a capable explorer
and ready to make the trek to her targets.

30

00:02:08,000 --> 00:02:11,833

Lucy is aiming to visit asteroids
in both of these Trojan swarms

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00:02:11,833 --> 00:02:13,500

on her 12 year mission.

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00:02:13,500 --> 00:02:17,166

The pull of gravity from the sun balances
the pull from Jupiter

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00:02:17,416 --> 00:02:20,250

to keep the Trojan asteroids
in these two groups.

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00:02:20,750 --> 00:02:23,750

Due to the gravitational balancing
act these asteroids

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00:02:23,750 --> 00:02:26,583

have been in these orbits
for billions of years.

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00:02:26,833 --> 00:02:29,750

It's still quite the challenge
to explore these targets.

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00:02:30,250 --> 00:02:33,583

However, our intrepid explorer
is ready for her mission.

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00:02:33,916 --> 00:02:35,666

Aren't you, Lucy?

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00:02:35,666 --> 00:02:39,666

Ah, of course. You'll be the
first spacecraft to visit these asteroids.

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00:02:40,000 --> 00:02:44,250

I can't help but wonder, though,
why choose these asteroids in particular?

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00:02:45,666 --> 00:02:49,666

I see, the scientific evidence says
the Trojan asteroids

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00:02:49,833 --> 00:02:54,333

are leftover material
from the formation of the planets.

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00:02:54,333 --> 00:02:59,666

Right, these asteroids hold vital clues

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00:02:59,833 --> 00:03:02,750

to understanding the history
of our Solar System.

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00:03:03,333 --> 00:03:06,083

It's just like a treasure hunt.

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00:03:06,083 --> 00:03:09,916

What you discover could teach us
about the history of the Solar System

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00:03:10,416 --> 00:03:14,083

and how the planets, including Earth,
came to be the way they are.

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00:03:16,333 --> 00:03:19,416

I won't hold you up any longer.

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00:03:19,416 --> 00:03:22,333

Safe travels on your journey.

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00:03:22,333 --> 00:03:24,500

Be sure to write home
and tell us all about it.

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00:03:34,000 --> 00:03:36,916

So you're finally getting on your way
to your asteroid encounters!

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00:03:36,916 --> 00:03:40,583

Say, which Trojan asteroid
are you visiting first, Lucy?

53

00:03:44,083 --> 00:03:47,666

Eurybates! You still have quite
a long journey before you get there.

54

00:03:48,750 --> 00:03:52,750

So why don't you tell us what you already
know about this first Trojan target?

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00:03:57,833 --> 00:04:01,750

You're right. We don't
know much about these objects just yet.

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00:04:02,250 --> 00:04:05,250

Keep in mind, our only observations
of these asteroids

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00:04:05,500 --> 00:04:09,416

have been from a great distance
away from telescopes back here on Earth.

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00:04:10,166 --> 00:04:13,166

And with the Hubble Space
Telescope, scientists

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00:04:13,333 --> 00:04:16,500

have used all kinds of different
telescopes to get basic information

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00:04:16,666 --> 00:04:20,750

about Lucy's Trojan asteroid destinations,
where they are, how they're moving,

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00:04:21,250 --> 00:04:23,416

how big they are. Their general color.

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00:04:24,000 --> 00:04:28,250

And if we're lucky,
a very rough idea of their general shape.

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00:04:29,416 --> 00:04:31,416

But nothing compares to actually flying

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00:04:31,416 --> 00:04:34,666

right past these asteroids
and getting a close up view.

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00:04:35,250 --> 00:04:39,666

And that's where Lucy comes
in. Yeah. Exciting.

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00:04:40,750 --> 00:04:42,750

This is the first close
up of these worlds.

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00:04:43,416 --> 00:04:46,583

You'll be learning as much as you can
about these Trojan asteroids

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00:04:46,916 --> 00:04:50,666

and giving us a new glimpse
into what these distant worlds are.

69

00:04:51,500 --> 00:04:53,083

Now, get some rest, Lucy.

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00:04:53,083 --> 00:04:56,000

It'll be a long journey
before you get to your first destination.

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00:05:02,916 --> 00:05:04,750

No, Lucy, still a

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00:05:04,750 --> 00:05:08,833

little way to go before
you get to your first Trojan asteroid.

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00:05:09,250 --> 00:05:12,166

But it looks like you're coming up
to the main belt asteroid.

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00:05:12,416 --> 00:05:14,583

Donald Johanson.

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00:05:14,666 --> 00:05:18,000

Right. This will give you a chance
to check in on your instrumentation

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00:05:18,250 --> 00:05:20,333

before you get out to the Trojans.

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00:05:20,333 --> 00:05:22,416

This first instrument is called L'Ralph.

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00:05:22,750 --> 00:05:25,333

It will take color
images of the Trojan asteroids

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00:05:25,583 --> 00:05:28,750

using visible and infrared light,
helping scientists

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00:05:28,750 --> 00:05:33,416

map craters and mountains and figure out
what the asteroids are made out of.

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00:05:33,416 --> 00:05:37,583

Next, this is L'LORRI,
the long range reconnaissance imager.

82

00:05:38,083 --> 00:05:41,083

This camera will provide
the most detailed images

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00:05:41,333 --> 00:05:44,250

of the surfaces of the Trojan asteroids
to help scientists

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00:05:44,250 --> 00:05:47,916

figure out what's been happening
since our Solar System formed.

85

00:05:48,083 --> 00:05:51,416

This is L'TES, the thermal
emission spectrometer.

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00:05:51,833 --> 00:05:53,833
Basically a touchless thermometer.

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00:05:53,833 --> 00:05:57,083
It will measure the temperatures
on the Trojan asteroids' surfaces

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00:05:57,166 --> 00:06:00,583
to tell scientists
whether the surfaces are rocky or dusty.

89
00:06:01,166 --> 00:06:04,583
Lastly, you couldn't get the job done
without your tracking cameras

90
00:06:04,583 --> 00:06:09,000
or the T2CAMS to make sure
the asteroids are always in view

91
00:06:09,583 --> 00:06:12,750
and the high gain antenna
that lets you communicate with Earth.

92
00:06:12,916 --> 00:06:16,166
The scientists back at home
will use your radio signals

93
00:06:16,250 --> 00:06:19,416
to measure the mass of each
asteroid as you fly past it.

94
00:06:22,250 --> 00:06:24,333
Right, Lucy! How could I forget?

95
00:06:24,333 --> 00:06:28,666
You also have two huge solar panels
to give you electrical power

96
00:06:28,666 --> 00:06:31,833
as you fly out to the Trojan

asteroids farther

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00:06:31,833 --> 00:06:34,750

from the Sun than any previous solar powered mission.

98

00:06:35,416 --> 00:06:38,500

Just a bit longer now before you get to your first target.

99

00:06:39,333 --> 00:06:43,000

Rest up and get ready to put all of those instruments to good use.

100

00:06:43,750 --> 00:06:46,916

I'll check back in with you once you make it out to your first Trojan

101

00:06:46,916 --> 00:06:54,166

asteroid. There it is, Lucy,

102

00:06:55,000 --> 00:06:58,500

your first Trojan asteroids,

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00:07:00,083 --> 00:07:02,583

Eurybates with its small moon, Queta.

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00:07:05,000 --> 00:07:07,166

Earth to Lucy. Remember,

105

00:07:07,333 --> 00:07:10,500

you need to take a lot of images of Eurybates and Queta

106

00:07:10,666 --> 00:07:14,500

in not a lot of time before you're zooming off to your next target.

107

00:07:14,916 --> 00:07:17,166

Make sure you get all those images for us.

108

00:07:32,750 --> 00:07:36,583

It's beautiful, isn't it?

109

00:07:44,666 --> 00:07:47,083

And we're past. Phew!

110

00:07:47,083 --> 00:07:49,583

That was quick, right?

111

00:07:50,166 --> 00:07:52,250

Get any good data?

112

00:07:53,666 --> 00:07:55,083

That's great to hear.

113

00:07:55,083 --> 00:07:56,500

Can't wait to see them.

114

00:07:56,500 --> 00:08:00,000

Just send them back to us here at Earth.

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00:08:08,250 --> 00:08:12,500

We have so much to learn
from what you've already sent back to us

116

00:08:12,833 --> 00:08:14,916

and you're just getting started out there.

117

00:08:16,416 --> 00:08:20,583

There are still five more Trojan asteroids
to explore on your 12 year journey.

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00:08:21,000 --> 00:08:25,250

Each one has a different story to tell
about the history of our Solar System.

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00:08:25,916 --> 00:08:31,083

Next up is Polymele, a mere 21 kilometers or 13 miles in diameter.

120

00:08:31,833 --> 00:08:36,666

Afterwards, you'll be zooming by Leucus, which rotates at an extremely slow rate

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00:08:36,833 --> 00:08:40,833

with each day being about eighteen point five Earth days long.

122

00:08:41,416 --> 00:08:46,166

Afterwards, you'll be on to Orus, which might be rich in organics and carbon.

123

00:08:48,416 --> 00:08:51,333

Lastly, you'll be on your way to a twin pair of asteroids,

124

00:08:51,583 --> 00:08:53,583

Patroclus and Menoetius.

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00:08:53,583 --> 00:08:57,750

These asteroids, relatively unchanged over four billion years,

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00:08:57,750 --> 00:09:01,500

will give us a glimpse of our Solar System's distant past.

127

00:09:02,250 --> 00:09:06,416

With each flyby of a Trojan asteroid you'll be looking at time capsules

128

00:09:06,583 --> 00:09:10,583

from the birth of our Solar System over four billion years ago.

129

00:09:11,166 --> 00:09:13,583

Lucy, what your observations tell us

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00:09:13,583 --> 00:09:16,666

about the composition
and properties of the Trojan asteroids

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00:09:16,833 --> 00:09:19,750

could give us clues
about how Earth came to be.

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00:09:22,500 --> 00:09:25,833

Absolutely. Carry on your journey, Lucy.