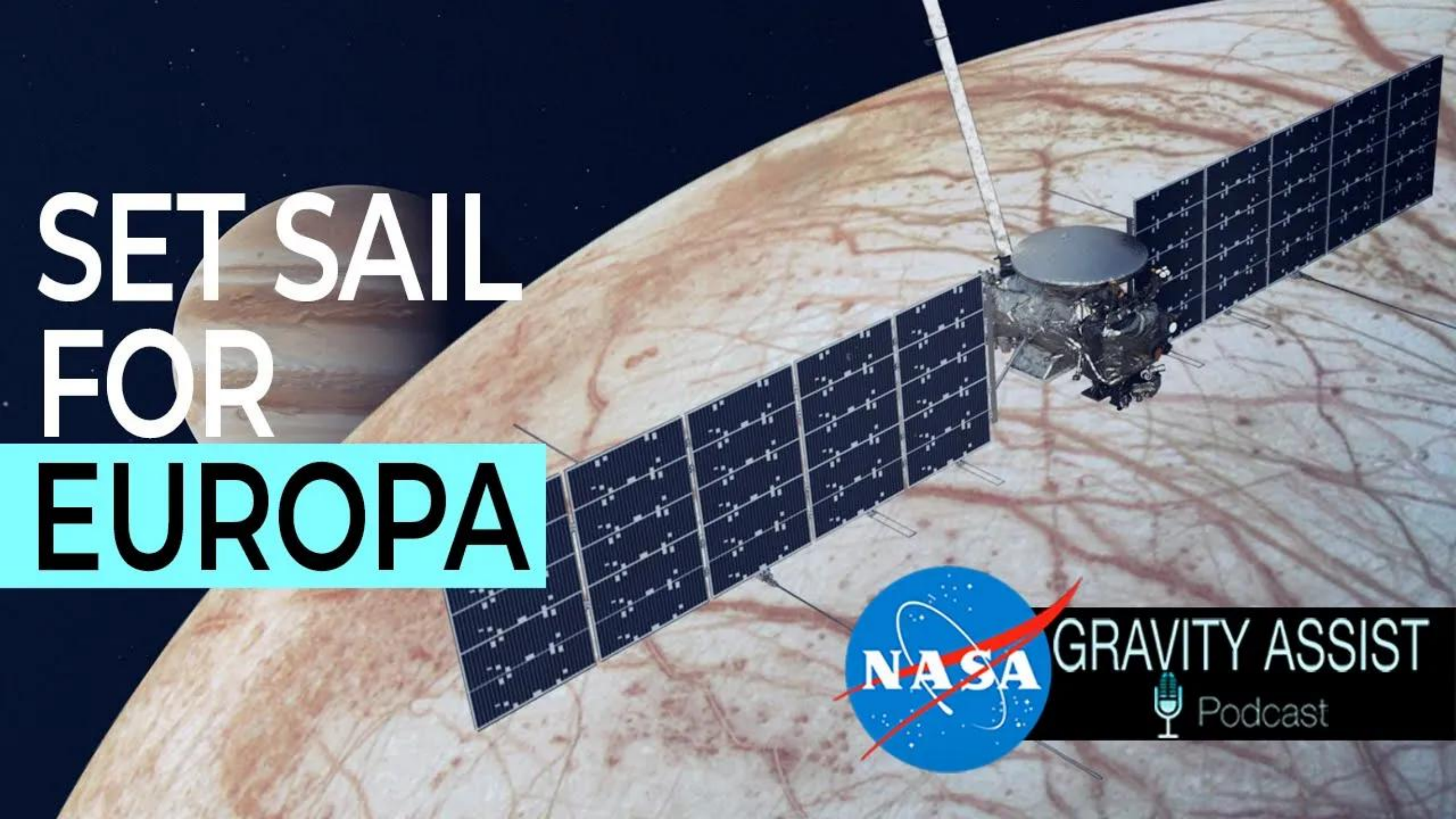
SET SAIL
FOR
EUROPA
NASA
GRAVITY ASSIST
Podcast

1
00:00:02,960 --> 00:00:09,600
Ocean worlds around our giant planets are there\h
to be discovered. Europa Clipper is being built\h\h

2
00:00:09,600 --> 00:00:16,800
to do just that. Let's find out what it can do.
Hi, I'm Jim Green, Chief Scientist at NASA and\h\h

3
00:00:16,800 --> 00:00:22,640
this is Gravity Assist. On this season of Gravity\h
Assist, we're looking for life beyond Earth.\h

4
00:00:23,840 --> 00:00:30,320
I'm here with Dr. Bob Pappalardo and he is\h
a Senior Scientist at JPL in the planetary\h\h

5
00:00:30,320 --> 00:00:35,760
science division. He's also the project\h
scientist for the NASA Europa Clipper mission\h\h

6
00:00:35,760 --> 00:00:43,840
that's going to Jupiter's moon Europa, a beautiful\h
ocean world. Welcome, Bob, to Gravity Assist.\h

7
00:00:44,400 --> 00:00:47,840
Thank you, Jim. It's so good to see\h
you and I'm so excited to be here.\h

8
00:00:47,840 --> 00:00:52,320
Well, how did Jupiter get so many\h
moons and why are they so different?\h

9
00:00:52,320 --> 00:00:59,600
Well, Jupiter has something like 79 moons. Most of\h
them are little shards from collisions or Jupiter\h\h

10
00:00:59,600 --> 00:01:06,960
captures objects that are passing by, but it's\h
these four big ones- the Galilean moons that\h\h

11
00:01:06,960 --> 00:01:12,480
are the ones that are much more like worlds.\h
Ganymede is larger than the planet Mercury.\h\h

12
00:01:12,480 --> 00:01:19,440
And those four were created along with Jupiter\h
from the same cloud of gas and dust. And the\h\h

13
00:01:20,000 --> 00:01:26,480
inner one, Io lost most of its water - does not\h
have an icy surface. The outer two, Ganymede and\h\h

14
00:01:26,480 --> 00:01:34,400
Callisto have lots of rock and lots of ice,\h
and Europa is kind of in between with a bunch\h\h

15
00:01:34,400 --> 00:01:42,160
of rock and then a skin of h2o, some of which\h
is solid ice at the surface, where it's so cold\h\h

16
00:01:42,800 --> 00:01:48,160
and some of which is liquid water -we think\h
down below the surface, which makes Europa\h\h

17
00:01:48,160 --> 00:01:54,160
so fascinating that there's a liquid water ocean\h
in there today. It's pretty close to the surface-\h\h

18
00:01:54,160 --> 00:02:04,320
13 miles or so and probably it's in contact with\h
rock below so nutrients can seep into that ocean\h\h

19
00:02:04,320 --> 00:02:09,120
and potentially serve as a fuel for life.
Well, you know, in our ocean, at these\h\h

20
00:02:09,120 --> 00:02:14,320
hydrothermal vents, we see life all over the\h
place and it doesn't require light from the sun.\h\h

21
00:02:15,040 --> 00:02:21,600
Is that a similar process that may be going on\h
in Europa or do we need sunlight to have life?\h

22
00:02:21,600 --> 00:02:26,400
We're not talking about fish and whales. That'll\h
be exciting- giant squid or something. But\h\h

23
00:02:26,400 --> 00:02:33,840
instead, probably just just single-cell organisms\h
down there. Beneath Europa's icy shell, light\h\h

24
00:02:33,840 --> 00:02:39,840
is not going to penetrate, so it's not life\h
that's dependent on photosynthesis that we're\h\h

25
00:02:39,840 --> 00:02:49,440
talking about. Instead, life that's dependent on\h
chemical reactions similar to some life on Earth.\h

26
00:02:49,440 --> 00:02:55,040
Well, over the last several years another set\h
of fantastic research has been done concerning\h\h

27
00:02:55,040 --> 00:03:01,600
the possibility of seeing geysers coming\h
out from cracks. When we look at Europa,\h\h

28
00:03:01,600 --> 00:03:06,960
we see these crack structures everywhere\h
and yet maybe some of them are active.\h\h

29
00:03:07,760 --> 00:03:13,520
So what do you think about the possibility of\h
life gets scooped up and ends up in these plumes?\h

30
00:03:13,520 --> 00:03:19,520
Yeah, there's tantalizing evidence of these\h
plumes from the Hubble space telescope\h\h

31
00:03:19,520 --> 00:03:24,800
and other observations that that says\h
maybe every once in a while Europa lets\h\h

32
00:03:24,800 --> 00:03:30,320
out a big burp of activity. When we're there with\h
Europa Clipper we might be able to fly through\h\h

33
00:03:30,960 --> 00:03:36,080
such plumes if they're there. We need to confirm\h
them. There might be a range of sizes. We don't\h\h

34
00:03:36,080 --> 00:03:43,680
know- are they consistently active or sporadic?\h
What sets them off and can we fly through them\h\h

35
00:03:43,680 --> 00:03:50,720
to directly sample the interior of Europa?
So Bob, when is it going to be launched?\h\h

36
00:03:50,720 --> 00:03:56,160
When will Europa Clipper be on its way?
We're scheduled to launch sometime in the\h\h

37
00:03:56,160 --> 00:04:04,080
mid-2020s and then depending on the launch vehicle\h
we take, it'll take a few years or up to maybe six\h\h