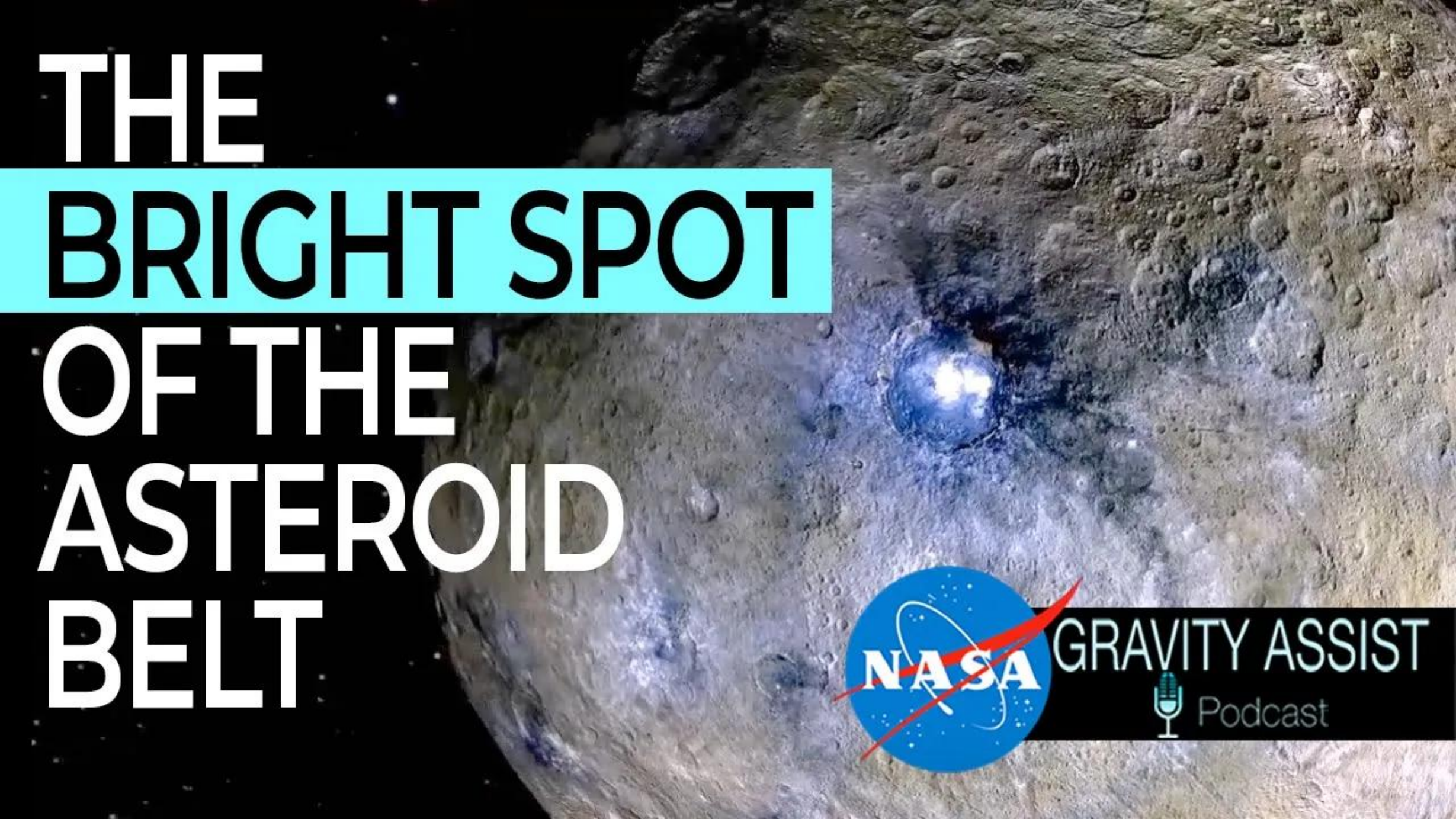
THE
BRIGHT SPOT
OF THE
ASTEROID
BELT
NASA
GRAVITY ASSIST
Podcast

1
00:00:00,550 --> 00:00:04,900
In the asteroid belt is a huge dwarf planet.

2
00:00:04,900 --> 00:00:06,190
It's called Ceres.

3
00:00:06,190 --> 00:00:10,680
Does it have an ocean underneath its icy crust?

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00:00:10,680 --> 00:00:11,870
Let's find out.

5
00:00:11,870 --> 00:00:16,730
Hi, I'm Jim Green, Chief Scientist at NASA
and this is Gravity Assist.

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00:00:16,730 --> 00:00:21,900
On this season of Gravity Assist, we're looking
for life beyond Earth.

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00:00:21,900 --> 00:00:27,859
I'm here with Dr. Britney Schmidt, who is
an astrobiologist, and an associate professor

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00:00:27,859 --> 00:00:33,690
in the earth and atmospheric sciences department
at Georgia Institute of Technology in Atlanta.

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00:00:33,690 --> 00:00:36,280
Britney, welcome to Gravity Assist.

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00:00:36,280 --> 00:00:37,280
Thanks very much.

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00:00:37,280 --> 00:00:38,280
Excited to be here.

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00:00:38,280 --> 00:00:40,130

So where is Ceres in our solar system?

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00:00:40,130 --> 00:00:41,560
And how big is it?

14
00:00:41,560 --> 00:00:44,420
So Ceres is in the main asteroid belt.

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00:00:44,420 --> 00:00:45,781
Just about smack dab in the middle of it.

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00:00:45,781 --> 00:00:49,620
It is kind of halfway between the orbits of
Mars and Jupiter.

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00:00:49,620 --> 00:00:53,039
The kind of neat thing about it is actually
how big it is, you know, when you think of

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00:00:53,039 --> 00:00:57,250
asteroids, you might think of something small,
maybe the size of your house, but actually,

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00:00:57,250 --> 00:01:01,559
Ceres is about the size of the state of Texas.

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00:01:01,559 --> 00:01:03,769
So it's absolutely gigantic.

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00:01:03,769 --> 00:01:06,040
So what makes it so special?

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00:01:06,040 --> 00:01:10,390
It's one of the only planets that's really
made of this kind of frozen ground on the

23
00:01:10,390 --> 00:01:11,390
on the outside.

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00:01:11,390 --> 00:01:13,940
So I kind of like to call it a permafrost
planet, if you will.

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00:01:13,940 --> 00:01:18,961
So if you think about the Arctic on the earth,
where the ground is frozen, year round, it's

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00:01:18,961 --> 00:01:20,060
the same thing on Ceres.

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00:01:20,060 --> 00:01:22,670
So it's kind of this frozen mud up on top.

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00:01:22,670 --> 00:01:23,800
So that's kind of special.

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00:01:23,800 --> 00:01:26,130
And it's really a weird object in that way.

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00:01:26,130 --> 00:01:32,570
Well, you know, NASA's Dawn spacecraft, which
first visited Vesta, and then left Vesta and

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00:01:32,570 --> 00:01:34,040
went out to Ceres.

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00:01:34,040 --> 00:01:40,270
It spent more than three years orbiting that
dwarf planet and took spectacular images and

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00:01:40,270 --> 00:01:41,670
other measurements.

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00:01:41,670 --> 00:01:43,751
Tell us a little bit about what we learned
from Dawn.

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00:01:43,751 --> 00:01:46,040
Dawn was a fantastic mission.

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00:01:46,040 --> 00:01:50,740
It's really a testament to doing as much as
you can with any mission.

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00:01:50,740 --> 00:01:54,750
So as you're zooming in on a planet getting
closer and closer- those first images where

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00:01:54,750 --> 00:01:58,580
it becomes more than a point of light, it
starts to become a real place.

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00:01:58,580 --> 00:02:05,360
I remember those first images because we could
start to see every rotation, this kind of

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00:02:05,360 --> 00:02:08,090
brightness that would kind of show up.

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00:02:08,090 --> 00:02:12,130
And then as we zoomed in and we got closer
and closer, you could see that there was almost

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00:02:12,130 --> 00:02:16,220
it looked like a flashlight and some of the
images coming from this crater.

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00:02:16,220 --> 00:02:20,840
And as we got closer, we could see that what
it was is that though Ceres is very, very

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00:02:20,840 --> 00:02:27,650
dark, there's also these really bright deposits
in this crater called Occator crater.

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00:02:27,650 --> 00:02:32,870
And those bright deposits were reflecting

a huge amount of light back at us.

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00:02:32,870 --> 00:02:36,980
And when we got up close, what we could see
is that these are definitely salts.

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00:02:36,980 --> 00:02:41,780
And so salts are created in the interaction
between water and rock.

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00:02:41,780 --> 00:02:42,850
It happens on the Earth.

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00:02:42,850 --> 00:02:44,970
It happens on other planets.

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00:02:44,970 --> 00:02:51,810
And so what we think is that that is briny
material, material from deeper inside Ceres

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00:02:51,810 --> 00:02:52,810
that has come up.

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00:02:52,810 --> 00:02:59,110
Well, as you say, that liquid water, in fact,
must have some aspect to do with these these

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00:02:59,110 --> 00:03:01,500
briny salty deposits.

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00:03:01,500 --> 00:03:08,740
So do we think that Ceres has an ocean inside
it or liquid water at some layer?

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00:03:08,740 --> 00:03:13,420
It looks like there probably is the gravity
data is consistent with that.

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00:03:13,420 --> 00:03:19,090

It's very, very round, which is really hard
for solid materials to do that very well.

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00:03:19,090 --> 00:03:23,700
So liquids, but ice is another good way to
make something kind of round, it can relax

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00:03:23,700 --> 00:03:24,709
over time.

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00:03:24,709 --> 00:03:29,280
So there is some evidence to suggest that
deep down there might be some liquid layers,

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00:03:29,280 --> 00:03:35,210
there's certainly evidence to suggest there
might be brine pockets or former brine pockets,

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00:03:35,210 --> 00:03:39,209
so a little bit of heat from an impact or
something could really warm those up.

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00:03:39,209 --> 00:03:42,740
So it's one of those questions that we think
there's really good evidence for it.

63
00:03:42,740 --> 00:03:48,680
But it's not clear whether that's constantly
liquid now or was recently liquid in the past.

64
00:03:48,680 --> 00:03:52,870
Studying places like Ceres, even if they don't
have bugs crawling around right now means

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00:03:52,870 --> 00:03:59,560
that it's a really neat opportunity to understand
planets as they form or as they existed just

66
00:03:59,560 --> 00:04:00,980
before life took hold.