



1  
00:00:00,020 --> 00:00:08,700  
[ music ]

2  
00:00:08,720 --> 00:00:18,290  
On February 15, asteroid 2012 DA14 will pass within 22,000 miles of Earth: less than a tenth of the distance to

3  
00:00:18,310 --> 00:00:22,300  
Although this 45-meter rock has a zero percent chance of hitting us,

4  
00:00:22,320 --> 00:00:27,180  
near-earth asteroids in general raise a number of interesting scientific questions.

5  
00:00:27,200 --> 00:00:30,760  
What makes the difference between a near-miss and an impact?

6  
00:00:30,780 --> 00:00:34,380  
How would we navigate a spacecraft around an asteroid in the future?

7  
00:00:34,400 --> 00:00:37,580  
And what can we learn from the asteroids themselves?

8  
00:00:37,600 --> 00:00:47,580  
To answer these questions, NASA is sending the OSIRIS-REx spacecraft to another near-earth asteroid design

9  
00:00:47,600 --> 00:00:53,400  
When it arrives in the year 2018, OSIRIS-REx will study a property called the Yarkovsky Effect,

10  
00:00:53,420 --> 00:00:58,680  
where the Sun's illumination of a rotating asteroid can change its direction over time.

11  
00:00:58,700 --> 00:01:02,530  
As the asteroid rotates, the sun heats one side of the surface.

12  
00:01:02,550 --> 00:01:07,980  
Once that side rotates away from the sun, however, it radiates the heat into space.

13  
00:01:08,000 --> 00:01:12,780

This can act as a sort of mini-thruster that slowly changes the asteroid's direction,

14

00:01:12,800 --> 00:01:17,360

potentially making the difference between a near-miss and an impact.

15

00:01:17,380 --> 00:01:24,530

OSIRIS-REx will also study the gravitational properties of asteroids, providing useful insights for follow-up visits

16

00:01:24,550 --> 00:01:28,580

Because asteroids have a small and variable gravitational pull,

17

00:01:28,600 --> 00:01:33,240

new techniques will need to be developed to help spacecraft approach and fly around them.

18

00:01:33,260 --> 00:01:38,500

Finally, OSIRIS-REx will take a direct sample of the asteroid and return it to Earth.

19

00:01:38,520 --> 00:01:41,580

This could perhaps yield the most interesting results of all,

20

00:01:41,600 --> 00:01:47,780

as 1999 RQ36 is thought to be a leftover from the formation of our solar system.

21

00:01:47,800 --> 00:01:52,580

By studying its composition, scientists will be looking at a snapshot of the solar system

22

00:01:52,600 --> 00:01:59,200

taken four-and-a-half billion years ago, one that may even hold clues to understanding our own origins.

23

00:01:59,220 --> 00:02:03,910

So although 2012 DA14 will miss us when it flies by in February,

24

00:02:03,930 --> 00:02:08,080

NASA isn't missing an opportunity to study near-earth objects,