HOW DID OUR SOLAR SYSTEM FORM?

1
00:00:22,420 --> 00:00:19,570
rosetta is a space mission on its way to

2
00:00:24,070 --> 00:00:22,430
observe comet churyumov-gerasimenko and

3
00:00:26,650 --> 00:00:24,080
we're gonna be studying that comet as it

4
00:00:30,790 --> 00:00:26,660
goes around the Sun in its comets

5
00:00:32,619 --> 00:00:30,800
journey our study of this comet will

6
00:00:34,689 --> 00:00:32,629
help to inform us about our biggest

7
00:00:36,759 --> 00:00:34,699
mysteries where did this comment form

8
00:00:39,700 --> 00:00:36,769
and what can this comet tell us about

9
00:00:41,560 --> 00:00:39,710
how our solar system formed the Rosetta

10
00:00:43,660 --> 00:00:41,570
mission will help us put the origins of

11
00:00:45,910 --> 00:00:43,670
the solar system into a galactic context

12
00:00:47,670 --> 00:00:45,920
we're interested in how we turn the gas

13
00:00:52,750 --> 00:00:47,680

and dust that was the early solar system

14
00:00:54,130 --> 00:00:52,760
into the solar system we see today in

15
00:00:55,959 --> 00:00:54,140
particular we're interested in how the

16
00:00:57,729 --> 00:00:55,969
planets acquire their compositions how

17
00:01:00,099 --> 00:00:57,739
do we make rocky planets how do we make

18
00:01:01,029 --> 00:01:00,109
gas giant planets icy planets and then

19
00:01:02,770 --> 00:01:01,039
we're also interested in the

20
00:01:04,270 --> 00:01:02,780
distribution of these planets which ones

21
00:01:05,950 --> 00:01:04,280
were migrating when during the

22
00:01:08,290 --> 00:01:05,960
construction of the solar system

23
00:01:15,070 --> 00:01:08,300
comets are key to understanding that

24
00:01:17,080 --> 00:01:15,080
kind of activity how did it all begin we

25
00:01:19,809 --> 00:01:17,090
start with this ginormous

26
00:01:22,330 --> 00:01:19,819
molecular cloud the molecules that form

27
00:01:25,180 --> 00:01:22,340
our solar systems and begin to condense

28
00:01:27,999 --> 00:01:25,190
together with a Sun protosun at the

29
00:01:30,130 --> 00:01:28,009
center and proto planets scattered

30
00:01:34,779 --> 00:01:30,140
throughout this dusty and completely

31
00:01:36,580 --> 00:01:34,789
filled disk and right at this time we

32
00:01:38,529 --> 00:01:36,590
start to ask ourselves where new

33
00:01:41,650 --> 00:01:38,539
chemicals introduced into our solar

34
00:01:42,729 --> 00:01:41,660
system at that early formative stage we

35
00:01:45,040 --> 00:01:42,739
think it has something to do with

36
00:01:47,830 --> 00:01:45,050
massive stars that are the sister stars

37
00:01:49,570 --> 00:01:47,840
to the Sun which throw out these giant

38
00:01:51,370 --> 00:01:49,580

winds and in these winds are these

39
00:01:53,440 --> 00:01:51,380
radioactive elements and it's these

40
00:01:55,029 --> 00:01:53,450
radioactive isotopes that tell us

41
00:01:57,790 --> 00:01:55,039
something about the birth environment of

42
00:02:00,639 --> 00:01:57,800
the Sun because of this connection with

43
00:02:02,979 --> 00:02:00,649
our sister stars we think that something

44
00:02:06,460 --> 00:02:02,989
happened to cause a whole bunch of

45
00:02:08,260 --> 00:02:06,470
debris to come rapidly forward from the

46
00:02:11,830 --> 00:02:08,270
outer solar system into the inner solar

47
00:02:12,640 --> 00:02:11,840
system and did that bring water to the

48
00:02:15,190 --> 00:02:12,650
inner solar

49
00:02:17,679 --> 00:02:15,200
but that have brought part of the

50
00:02:19,569 --> 00:02:17,689
composition of our oceans today on earth

51
00:02:20,860 --> 00:02:19,579
we need to know where that water came

52
00:02:23,259 --> 00:02:20,870
from to understand whether or not

53
00:02:25,420 --> 00:02:23,269
there's earths elsewhere in the galaxy

54
00:02:27,610 --> 00:02:25,430
we have a lot of questions about did we

55
00:02:29,830 --> 00:02:27,620
have planets moving around in the outer

56
00:02:32,130 --> 00:02:29,840
solar system it's possible to Uranus and

57
00:02:37,479 --> 00:02:32,140
Neptune actually swapped positions and

58
00:02:39,910 --> 00:02:37,489
excited dynamically the Kuiper belt was

59
00:02:42,280 --> 00:02:39,920
that the event that caused a huge amount

60
00:02:44,710 --> 00:02:42,290
of scattering that came forward and hit

61
00:02:47,589 --> 00:02:44,720
the inner solar system a second idea is

62
00:02:49,089 --> 00:02:47,599
perhaps Jupiter might have migrated all

63
00:02:51,069 --> 00:02:49,099

the way forward and then turned around

64
00:02:53,289 --> 00:02:51,079
and gone back out again to where it is

65
00:02:55,300 --> 00:02:53,299
now and it's exciting to think about the

66
00:02:56,610 --> 00:02:55,310
fact that the planets that we all learn

67
00:02:59,140 --> 00:02:56,620
in grade school you know where they are

68
00:03:00,819 --> 00:02:59,150
all lined up not because that's where

69
00:03:02,849 --> 00:03:00,829
they form but that's where they rested

70
00:03:06,250 --> 00:03:02,859
after a sort of violent beginning

71
00:03:08,740 --> 00:03:06,260
Rosetta will help us to either validate

72
00:03:10,780 --> 00:03:08,750
or refute some of these theories this is

73
00:03:13,539 --> 00:03:10,790
a window into our roofs literally how we

74
00:03:15,550 --> 00:03:13,549
get from star dust to people you get

75
00:03:17,589 --> 00:03:15,560
there through the solar system formation

76
00:03:18,939 --> 00:03:17,599
mechanisms to me the reason to

77
00:03:20,470 --> 00:03:18,949
understand the origins of solar system

78
00:03:22,960 --> 00:03:20,480
is to know whether or not we're normal

79
00:03:25,780 --> 00:03:22,970
well whether or not our solar system is

80
00:03:28,420 --> 00:03:25,790
a is a common phenomenon in the galaxy