1
00:00:26,710 --> 00:00:24,310
the purpose of lro is to provide data

2
00:00:28,710 --> 00:00:26,720
and information to safely go back to the

3
00:00:30,950 --> 00:00:28,720
moon and our experience in the past this

4
00:00:32,950 --> 00:00:30,960
includes apollo but it's also true of

5
00:00:35,750 --> 00:00:32,960
the martian landers where we've worked

6
00:00:38,229 --> 00:00:35,760
on the same kind of work there is that

7
00:00:39,910 --> 00:00:38,239
a lander is built in such a way with an

8
00:00:42,069 --> 00:00:39,920
assumption that

9
00:00:43,830 --> 00:00:42,079
when it lands it there are going to be

10
00:00:45,670 --> 00:00:43,840
rocks underneath and it can only take a

11
00:00:46,549 --> 00:00:45,680
certain size of rock and the ones that

12
00:00:50,869 --> 00:00:46,559
on

13
00:00:52,470 --> 00:00:50,879

if there was a 30 centimeter rock which

14
00:00:54,310 --> 00:00:52,480
is about one foot

15
00:00:55,510 --> 00:00:54,320
and it landed on top of it it would be

16
00:00:57,350 --> 00:00:55,520
just okay

17
00:00:59,670 --> 00:00:57,360
all right so

18
00:01:01,750 --> 00:00:59,680
they're interested to know how how high

19
00:01:04,229 --> 00:01:01,760
these rocks are to see whether in fact a

20
00:01:06,469 --> 00:01:04,239
particular area is safe to land because

21
00:01:07,350 --> 00:01:06,479
if you have a roughness as we call it a

22
00:01:09,190 --> 00:01:07,360
rocks

23
00:01:27,590 --> 00:01:09,200
of three or four feet there's no way a

24
00:01:33,830 --> 00:01:30,870
lola is a laser altimeter

25
00:01:37,590 --> 00:01:33,840
it sends a short pulse of light from the

26
00:01:38,950 --> 00:01:37,600
spacecraft it is then split into five

27
00:01:41,270 --> 00:01:38,960
separate pulses

28
00:01:43,910 --> 00:01:41,280
so actually five pulses go down to the

29
00:01:45,830 --> 00:01:43,920
surface hit the surface come back again

30
00:01:48,230 --> 00:01:45,840
and come to five different detectors on

31
00:01:50,630 --> 00:01:48,240
the spacecraft and hence derive the

32
00:01:54,069 --> 00:01:50,640
distance of the surface below the

33
00:02:00,389 --> 00:01:54,079
spacecraft and we do this

34
00:02:03,910 --> 00:02:02,469
in addition to the altimetric

35
00:02:05,830 --> 00:02:03,920
measurement which is the distance

36
00:02:07,670 --> 00:02:05,840
measurement to the surface we measure

37
00:02:10,070 --> 00:02:07,680
something we call this pulse spreading

38
00:02:12,869 --> 00:02:10,080

which is the fact that the laser pulse

39
00:02:14,070 --> 00:02:12,879
that goes out is is is shaped rather

40
00:02:15,589 --> 00:02:14,080
like a

41
00:02:18,229 --> 00:02:15,599
pulse a a

42
00:02:20,229 --> 00:02:18,239
a gaussian curve that cur that pulse

43
00:02:23,270 --> 00:02:20,239
goes to the surface and because of the

44
00:02:24,309 --> 00:02:23,280
surface features it gets distorted it

45
00:02:26,470 --> 00:02:24,319
gets

46
00:02:30,070 --> 00:02:26,480
spread as we call it if it's like a

47
00:02:32,150 --> 00:02:30,080
sheet of ice or let's say water or glass

48
00:02:34,070 --> 00:02:32,160
there'll be no spraying of the pulse if

49
00:02:37,030 --> 00:02:34,080
in fact it's all got rocks and lumps and

50
00:02:39,270 --> 00:02:37,040
bumps on it then the pulse will come

51
00:02:41,430 --> 00:02:39,280
back spread and although we don't know

52
00:02:44,550 --> 00:02:41,440
exactly the distribution of the rocks or

53
00:02:45,430 --> 00:02:44,560
the bumps we can say approximately what

54
00:02:49,190 --> 00:02:45,440
the

55
00:02:55,110 --> 00:02:49,200
heights if you like within that five

56
00:03:01,110 --> 00:02:58,309
it was not easy to do this instrument as

57
00:03:03,350 --> 00:03:01,120
quickly as as we needed to we knew

58
00:03:05,509 --> 00:03:03,360
approximately what they would need and

59
00:03:07,830 --> 00:03:05,519
so myself and and colleagues got

60
00:03:10,070 --> 00:03:07,840
together and and sat down and thought

61
00:03:13,190 --> 00:03:10,080
about the stringent requirements that

62
00:03:15,030 --> 00:03:13,200
clearly were going to come along for

63
00:03:17,190 --> 00:03:15,040

this mission in terms of say an

64
00:03:19,589 --> 00:03:17,200
altimeter and

65
00:03:21,589 --> 00:03:19,599
we like most of these things you have a

66
00:03:24,149 --> 00:03:21,599
hiccup along the way at least once or

67
00:03:26,309 --> 00:03:24,159
twice but uh we have a great instrument

68
00:03:27,910 --> 00:03:26,319
team and uh they worked very hard

69
00:03:29,910 --> 00:03:27,920
weekends as well trying to get this

70
00:03:32,229 --> 00:03:29,920
thing together so right now the