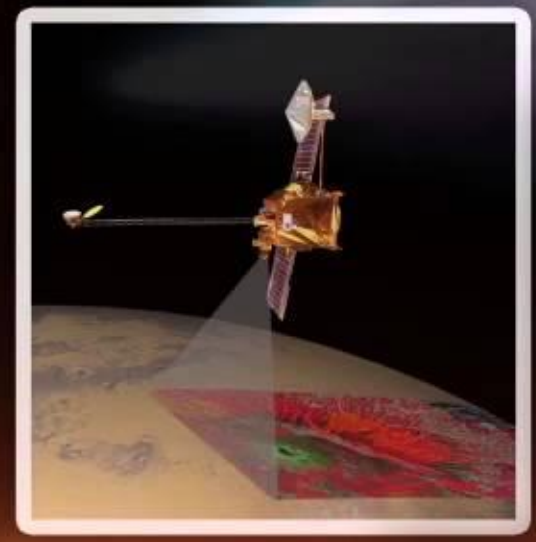
Jim Bell



1
00:00:09,750 --> 00:00:06,389
collision course a comet heads for mars

2
00:00:12,230 --> 00:00:09,760
presented by science at nasa

3
00:00:14,549 --> 00:00:12,240
over the years the space-faring nations

4
00:00:16,550 --> 00:00:14,559
of earth have sent dozens of probes and

5
00:00:18,790 --> 00:00:16,560
rovers to explore mars

6
00:00:21,670 --> 00:00:18,800
today there are three active satellites

7
00:00:23,509 --> 00:00:21,680
circling the red planet while two rovers

8
00:00:26,390 --> 00:00:23,519
solar-powered opportunity and

9
00:00:28,230 --> 00:00:26,400
nuclear-powered curiosity wheel across

10
00:00:30,790 --> 00:00:28,240
the red sands below

11
00:00:33,190 --> 00:00:30,800
mars is dry barren and apparently

12
00:00:34,950 --> 00:00:33,200
hauntingly lifeless

13
00:00:38,549 --> 00:00:34,960

soon those assets could find themselves

14
00:00:41,030 --> 00:00:38,559
exploring a very different kind of world

15
00:00:43,670 --> 00:00:41,040
there is a small but non-negligible

16
00:00:47,110 --> 00:00:43,680
chance that comet 2013 a1 will strike

17
00:00:49,750 --> 00:00:47,120
mars next year in october of 2014 says

18
00:00:51,990 --> 00:00:49,760
don yeomans of nasa's near-earth object

19
00:00:54,150 --> 00:00:52,000
program at jpl

20
00:00:56,869 --> 00:00:54,160
current solutions put the odds of impact

21
00:00:59,029 --> 00:00:56,879
at one in two thousand

22
00:01:01,750 --> 00:00:59,039
the nucleus of the comet is probably one

23
00:01:05,030 --> 00:01:01,760
to three kilometers in diameter and it

24
00:01:06,510 --> 00:01:05,040
is coming in fast around 56 kilometers

25
00:01:09,990 --> 00:01:06,520
per second

26
00:01:12,310 --> 00:01:10,000
125 000 miles per hour

27
00:01:15,190 --> 00:01:12,320
if it does hit mars it would deliver as

28
00:01:17,749 --> 00:01:15,200
much energy as 35 million megatons of

29
00:01:20,469 --> 00:01:17,759
tnt estimates humans

30
00:01:22,870 --> 00:01:20,479
for comparison the asteroid strike that

31
00:01:25,350 --> 00:01:22,880
ended the dinosaurs on earth 65 million

32
00:01:26,390 --> 00:01:25,360
years ago was about three times as

33
00:01:28,950 --> 00:01:26,400
powerful

34
00:01:30,469 --> 00:01:28,960
100 million megatons

35
00:01:32,310 --> 00:01:30,479
another point of comparison is the

36
00:01:35,590 --> 00:01:32,320
meteor that exploded over chelyabinsk

37
00:01:38,069 --> 00:01:35,600
russia in february of 2013 damaging

38
00:01:40,550 --> 00:01:38,079

buildings and knocking people down

39
00:01:42,789 --> 00:01:40,560
the mars comet is packing 80 million

40
00:01:44,950 --> 00:01:42,799
times more energy than that relatively

41
00:01:46,870 --> 00:01:44,960
puny asteroid

42
00:01:49,670 --> 00:01:46,880
an impact wouldn't necessarily mean the

43
00:01:52,230 --> 00:01:49,680
end of nasa's mars program but it would

44
00:01:53,749 --> 00:01:52,240
transform the program along with mars

45
00:01:55,429 --> 00:01:53,759
itself

46
00:01:57,510 --> 00:01:55,439
i think of it as a giant climate

47
00:01:59,350 --> 00:01:57,520
experiment says michael meyer lead

48
00:02:02,069 --> 00:01:59,360
scientist for the mars exploration

49
00:02:03,670 --> 00:02:02,079
program at nasa headquarters an impact

50
00:02:05,190 --> 00:02:03,680
would loft a lot of stuff into the

51
00:02:08,469 --> 00:02:05,200
martian atmosphere

52
00:02:10,389 --> 00:02:08,479
dust sand water and other debris

53
00:02:12,470 --> 00:02:10,399
the result could be a warmer wetter mars

54
00:02:14,070 --> 00:02:12,480
than we're accustomed to today

55
00:02:15,510 --> 00:02:14,080
meyer worries that solar-powered

56
00:02:17,190 --> 00:02:15,520
opportunity might have a hard time

57
00:02:19,670 --> 00:02:17,200
surviving if the atmosphere became

58
00:02:22,229 --> 00:02:19,680
opaque nuclear-powered curiosity though

59
00:02:23,830 --> 00:02:22,239
would carry on just fine he also notes

60
00:02:26,229 --> 00:02:23,840
that mars orbiters might have trouble

61
00:02:28,470 --> 00:02:26,239
seeing the surface for a while at least

62
00:02:31,589 --> 00:02:28,480
until the debris begins to clear a

63
00:02:33,670 --> 00:02:31,599

direct impact remains unlikely

64
00:02:35,750 --> 00:02:33,680
paul chodus of nasa's near-earth object

65
00:02:38,470 --> 00:02:35,760
program stresses that a one in two

66
00:02:40,309 --> 00:02:38,480
thousand chance of impact means there's

67
00:02:42,949 --> 00:02:40,319
a one thousand nine hundred ninety nine

68
00:02:45,270 --> 00:02:42,959
in two thousand chance of no impact

69
00:02:46,229 --> 00:02:45,280
a near miss is far more likely he points

70
00:02:48,070 --> 00:02:46,239
out

71
00:02:50,470 --> 00:02:48,080
even a near miss is a potentially big

72
00:02:52,390 --> 00:02:50,480
event the latest orbit solutions put the

73
00:02:54,550 --> 00:02:52,400
comet somewhere within 300 000

74
00:02:55,670 --> 00:02:54,560
kilometers of the red planet at closest

75
00:02:57,910 --> 00:02:55,680
approach

76
00:03:01,110 --> 00:02:57,920
that means mars could find itself inside

77
00:03:03,110 --> 00:03:01,120
the comet's gassy dusty atmosphere

78
00:03:05,830 --> 00:03:03,120
visually the comet would reach zeroth

79
00:03:08,229 --> 00:03:05,840
magnitude that is a few times brighter

80
00:03:10,390 --> 00:03:08,239
than a first magnitude star as seen from

81
00:03:12,550 --> 00:03:10,400
the red planet

82
00:03:14,149 --> 00:03:12,560
cameras on all of nasa's spacecraft

83
00:03:16,790 --> 00:03:14,159
currently operating at mars should be

84
00:03:20,390 --> 00:03:16,800
able to take photographs of comet 2013

85
00:03:22,949 --> 00:03:20,400
a1 says jim bell a planetary scientist

86
00:03:24,710 --> 00:03:22,959
and mars imaging specialist at arizona

87
00:03:27,030 --> 00:03:24,720
state university

88
00:03:29,110 --> 00:03:27,040

researchers will be keenly interested to

89
00:03:31,350 --> 00:03:29,120
see how the comet's atmosphere interacts

90
00:03:32,949 --> 00:03:31,360
with the atmosphere of mars

91
00:03:34,070 --> 00:03:32,959
for one thing there could be a meteor

92
00:03:36,550 --> 00:03:34,080
shower

93
00:03:38,470 --> 00:03:36,560
another possibility is martian auroras

94
00:03:40,470 --> 00:03:38,480
unlike earth which has a global magnetic

95
00:03:41,430 --> 00:03:40,480
field that wraps around our entire

96
00:03:44,470 --> 00:03:41,440
planet

97
00:03:47,110 --> 00:03:44,480
mars is only magnetized in patches

98
00:03:49,430 --> 00:03:47,120
here and there magnetic umbrellas sprout

99
00:03:51,990 --> 00:03:49,440
out of the ground creating a crazy quilt

100
00:03:54,229 --> 00:03:52,000
of magnetic poles concentrated mainly in

101
00:03:55,910 --> 00:03:54,239
the southern hemisphere

102
00:03:58,390 --> 00:03:55,920
ionized gases hitting the top of the

103
00:03:59,910 --> 00:03:58,400
martian atmosphere could spark auroras

104
00:04:02,149 --> 00:03:59,920
in the canopies of the magnetic

105
00:04:04,470 --> 00:04:02,159
umbrellas

106
00:04:06,229 --> 00:04:04,480
nasa is sending a new spacecraft to mars

107
00:04:07,589 --> 00:04:06,239
to study the dynamics of the martian

108
00:04:09,830 --> 00:04:07,599
atmosphere

109
00:04:12,630 --> 00:04:09,840
maven is scheduled to launch in november

110
00:04:15,429 --> 00:04:12,640
2013 and would reach mars just a few

111
00:04:17,670 --> 00:04:15,439
weeks before the comet in 2014

112
00:04:19,509 --> 00:04:17,680
however maven's principal investigator

113
00:04:21,990 --> 00:04:19,519

bruce jokowski of the university of

114
00:04:23,749 --> 00:04:22,000
colorado notes that the spacecraft won't

115
00:04:26,390 --> 00:04:23,759
be fully operational and ready to

116
00:04:28,230 --> 00:04:26,400
observe the comet when it reaches mars

117
00:04:31,270 --> 00:04:28,240
it takes a while to get into our science

118
00:04:32,870 --> 00:04:31,280
mapping orbit he explains but he adds

119
00:04:34,950 --> 00:04:32,880
there are some effects that i would

120
00:04:37,909 --> 00:04:34,960
expect to linger for a relatively long

121
00:04:39,909 --> 00:04:37,919
period especially if the comet hits mars

122
00:04:41,670 --> 00:04:39,919
and we will be able to observe those

123
00:04:43,110 --> 00:04:41,680
changes

124
00:04:45,430 --> 00:04:43,120
astronomers around the world are

125
00:04:47,590 --> 00:04:45,440
monitoring 2013 a1

126
00:04:50,629 --> 00:04:47,600
every day new data arrive to refine the

127
00:04:52,870 --> 00:04:50,639
comet's orbit as the error virus shrink

128
00:04:55,430 --> 00:04:52,880
yeomans expects a direct hit to be ruled

129
00:04:57,430 --> 00:04:55,440
out the odds favor a flyby not a

130
00:05:00,150 --> 00:04:57,440
collision he says

131
00:05:02,469 --> 00:05:00,160
either way this is going to be good