1
00:00:13,270 --> 00:00:11,350
we're um 79 nearly 80 degrees north a

2
00:00:15,270 --> 00:00:13,280
place called bok fjord

3
00:00:18,470 --> 00:00:15,280
at the base of a volcano called

4
00:00:20,870 --> 00:00:18,480
falifield and this volcano is one of the

5
00:00:23,509 --> 00:00:20,880
only places in the world where a geology

6
00:00:26,390 --> 00:00:23,519
is similar to martian meteorites

7
00:00:29,910 --> 00:00:26,400
called alh301

8
00:00:32,950 --> 00:00:29,920
and it's our terrestrial analog for our

9
00:00:35,830 --> 00:00:32,960
mars landing site and we use this to

10
00:00:51,029 --> 00:00:35,840
test rovers and instruments that are

11
00:00:54,630 --> 00:00:52,869
these rocks are very much like mars

12
00:00:55,910 --> 00:00:54,640
meteorites so that was kind of the

13
00:00:56,950 --> 00:00:55,920

attraction to come here in the first

14
00:00:58,709 --> 00:00:56,960
place

15
00:01:00,950 --> 00:00:58,719
you know the things that are in here

16
00:01:03,430 --> 00:01:00,960
could support life now did they support

17
00:01:05,350 --> 00:01:03,440
life on mars we don't know or has there

18
00:01:07,670 --> 00:01:05,360
ever been life on mars we don't know

19
00:01:10,390 --> 00:01:07,680
but uh in my mind

20
00:01:12,469 --> 00:01:10,400
the only possible energy source on for

21
00:01:14,870 --> 00:01:12,479
organisms on early mars or even present

22
00:01:17,190 --> 00:01:14,880
day mars is chemosynthetic that is

23
00:01:18,789 --> 00:01:17,200
they're using energy from rocks

24
00:01:21,990 --> 00:01:18,799
because there's there's no other way to

25
00:01:23,190 --> 00:01:22,000
to live you either have to eat other

26
00:01:24,950 --> 00:01:23,200
organisms

27
00:01:26,469 --> 00:01:24,960
or you have to use photosynthesis

28
00:01:28,230 --> 00:01:26,479
there's no other source

29
00:01:30,550 --> 00:01:28,240
so the only only possible source for

30
00:01:33,030 --> 00:01:30,560
early life on mars or earth would be

31
00:01:34,789 --> 00:01:33,040
chemosynthetic

32
00:01:36,950 --> 00:01:34,799
there are two different types of

33
00:01:39,510 --> 00:01:36,960
carbonate on here

34
00:01:40,469 --> 00:01:39,520
there's some globules on the outside and

35
00:01:41,830 --> 00:01:40,479
there's some

36
00:01:47,190 --> 00:01:41,840
in here

37
00:01:48,230 --> 00:01:47,200
gases that formed these kind of pockets

38
00:01:49,830 --> 00:01:48,240

in the uh

39
00:01:52,230 --> 00:01:49,840
in the lava itself

40
00:01:54,550 --> 00:01:52,240
so we know that this material and this

41
00:01:56,710 --> 00:01:54,560
process that form these kind of things

42
00:01:58,469 --> 00:01:56,720
uh happened on mars

43
00:02:00,230 --> 00:01:58,479
that's why this is a mars analog site

44
00:02:02,709 --> 00:02:00,240
and that's why we're deploying the rover

45
00:02:04,870 --> 00:02:02,719
and the instruments

46
00:02:07,429 --> 00:02:04,880
they really just look like iron coatings

47
00:02:09,990 --> 00:02:07,439
kind of yeah is that the carbonate the

48
00:02:13,910 --> 00:02:10,000
carbonate's um a more magnesite

49
00:02:15,030 --> 00:02:13,920
uh hematite rich magnesium

50
00:02:16,150 --> 00:02:15,040
we should go check with kevin and see

51
00:02:17,110 --> 00:02:16,160
what results they've been getting on

52
00:02:20,470 --> 00:02:17,120
there

53
00:02:23,030 --> 00:02:20,480
the olivine samples they've been running

54
00:02:24,949 --> 00:02:23,040
i think they just started uh

55
00:02:27,190 --> 00:02:24,959
they moved to the next gully over

56
00:02:42,390 --> 00:02:27,200
not for some privacy yeah i don't know

57
00:02:42,400 --> 00:02:54,150
so

58
00:02:58,949 --> 00:02:57,910
there is a record here of ancient life

59
00:03:00,710 --> 00:02:58,959
in both

60
00:03:04,630 --> 00:03:00,720
chemical terms as well as structural

61
00:03:08,949 --> 00:03:06,790
but what we also have discovered in

62
00:03:11,430 --> 00:03:08,959
other places of svalbard and here is

63
00:03:12,790 --> 00:03:11,440

that life persists in these really harsh

64
00:03:14,869 --> 00:03:12,800
environments that

65
00:03:16,390 --> 00:03:14,879
we consider mars analog

66
00:03:18,790 --> 00:03:16,400
or at least as close as we can get to

67
00:03:19,910 --> 00:03:18,800
omar's analog while staying on earth

68
00:03:21,670 --> 00:03:19,920
and so

69
00:03:24,070 --> 00:03:21,680
what we're trying to understand is how

70
00:03:26,309 --> 00:03:24,080
can we detect life

71
00:03:28,790 --> 00:03:26,319
in these rocks meaning

72
00:03:30,789 --> 00:03:28,800
both the modern and the ancient and can

73
00:03:32,630 --> 00:03:30,799
we distinguish the two

74
00:03:34,470 --> 00:03:32,640
we also need to know how is it that life

75
00:03:36,070 --> 00:03:34,480
persists here because it's an extreme

76
00:03:36,949 --> 00:03:36,080
environment as maybe

77
00:03:41,509 --> 00:03:36,959
as

78
00:03:43,750 --> 00:03:41,519
environments because it's incredibly

79
00:03:45,750 --> 00:03:43,760
cold it's very dry so we want to be able

80
00:03:59,990 --> 00:03:45,760
to figure out how how are we going to

81
00:04:03,830 --> 00:04:01,990
i think we take for granted the

82
00:04:06,789 --> 00:04:03,840
background knowledge that we have of how

83
00:04:09,110 --> 00:04:06,799
life persists elsewhere on earth

84
00:04:11,429 --> 00:04:09,120
in interpreting what we see here if you

85
00:04:14,070 --> 00:04:11,439
take any one of these rocks and find

86
00:04:15,270 --> 00:04:14,080
indications of life you almost have to

87
00:04:17,430 --> 00:04:15,280
then imagine

88
00:04:19,509 --> 00:04:17,440

what if you found this on mars and you

89
00:04:21,670 --> 00:04:19,519
found the same observations

90
00:04:24,150 --> 00:04:21,680
is that really an indication of life how

91
00:04:26,710 --> 00:04:24,160
much confidence do you have in that

92
00:04:29,110 --> 00:04:26,720
it the whole process of going through

93
00:04:31,189 --> 00:04:29,120
this forces us to go back to

94
00:04:33,670 --> 00:04:31,199
first principles of science and how we

95
00:04:36,150 --> 00:04:33,680
interpret those observations and

96
00:04:38,070 --> 00:04:36,160
it's very difficult to do and you only