1
00:00:00,530 --> 00:00:04,060
In 2015, Earth saw the birth of a new island,

2
00:00:04,080 --> 00:00:07,170
the first of its explosive type in 53 years.

3
00:00:07,190 --> 00:00:12,020
The blast was so large that nearby tourists caught the explosion on camera.

4
00:00:12,040 --> 00:00:17,630
Despite raging volcanic activity above and below the Earth’s crust, an event like this is pretty rare.

5
00:00:17,650 --> 00:00:20,940
Which is why it immediately caught the attention of Dr. Jim Garvin -

6
00:00:20,960 --> 00:00:24,800
Chief Scientist at NASA's Goddard Space Flight Center and Mars expert.

7
00:00:24,820 --> 00:00:27,500
It should be a pile of basaltic andesite rocks.

8
00:00:27,520 --> 00:00:30,310
That’s what you expect in this kind of setting

9
00:00:30,330 --> 00:00:32,210
But there’s more.

10
00:00:32,230 --> 00:00:36,310
What answers does a Mars expert see in the island that the rest of don’t?

11
00:00:40,380 --> 00:00:44,340
The new island unofficially known as Hunga Tonga-Hunga Ha'apai

12
00:00:44,360 --> 00:00:46,760
is located in the remote Southwest Pacific,

13
00:00:46,780 --> 00:00:49,940

nestled between two other islands in Kingdom of Tonga.

14
00:00:49,960 --> 00:00:54,310
It’s the first island of its kind to erupt and persist in the modern satellite era,

15
00:00:54,330 --> 00:00:59,250
giving scientists an unprecedented view from space of its evolution.

16
00:00:59,270 --> 00:01:02,290
There are other islands being formed including one’s near Japan.

17
00:01:02,310 --> 00:01:04,430
Very nice, lava eruptions, classic.

18
00:01:04,450 --> 00:01:09,710
But this one was special because there was this explosive element that reminded us at first glance

19
00:01:09,730 --> 00:01:13,040
– not exactly – of the kind of eruption at Surtsey.

20
00:01:13,060 --> 00:01:15,660
This is the eruption Jim is talking about

21
00:01:15,680 --> 00:01:20,960
– an island born from a similar explosive eruption in 1963 and one of only

22
00:01:20,980 --> 00:01:25,230
three volcanic islands that have survived in the past 150 years.

23
00:01:25,640 --> 00:01:31,490
Very early in Jim's career, Surtsey was the first newly-formed oceanic island he ever studied.

24
00:01:34,280 --> 00:01:37,000
Years later, he went on to become NASA’s Chief Scientist

25
00:01:37,020 --> 00:01:42,210
pushing the agency’s priorities towards Mars exploration that eventually led to the creation of

26
00:01:42,230 --> 00:01:45,750
the Mars Exploration Rovers, the Mars Reconnaissance Orbiter

27
00:01:45,770 --> 00:01:48,090
and the Mars Science Laboratory.

28
00:01:48,110 --> 00:01:53,920
So why is a scientist clearly fixated on Mars intrigued by new land on Earth?

29
00:01:53,940 --> 00:01:58,250
The truth is, the two systems are actually cosmically related.

30
00:01:58,270 --> 00:02:01,390
I think these small islands, small volcanic islands,

31
00:02:01,410 --> 00:02:08,040
freshly made, evolving rapidly, are windows into the role of surface waters on Mars

32
00:02:08,060 --> 00:02:10,980
as they have effected small land forms like volcanoes.

33
00:02:11,000 --> 00:02:12,750
And we see fields of them on Mars!

34
00:02:12,770 --> 00:02:14,380
There’s a lot to unpack there,

35
00:02:14,400 --> 00:02:17,760
but before you can understand the major significance of this on Mars,

36
00:02:17,780 --> 00:02:20,720
you have to understand why it’s a big deal on Earth.

37
00:02:22,370 --> 00:02:28,970
It really felt like we were witnessing something that nobody else had seen.

38
00:02:28,990 --> 00:02:30,940

That’s the voice Dr. Vicki Ferrini

39
00:02:30,960 --> 00:02:36,740
– one of the first pairs of eyes to see the new island from the deck of her research vessel.

40
00:02:36,760 --> 00:02:41,500
It’s this crazy, huge land mass that’s sticking up out of the water

41
00:02:41,520 --> 00:02:44,840
where we know there wasn’t one before.

42
00:02:44,860 --> 00:02:47,090
We watched this island change.

43
00:02:47,110 --> 00:02:50,480
And it got more and more exciting. It didn’t wash away.

44
00:02:50,500 --> 00:02:55,650
While there was massive erosion, there was redeposition protecting the island.

45
00:02:55,670 --> 00:02:58,740
The initial mass above sea level was eroding very quickly

46
00:02:58,760 --> 00:03:02,010
over the first three to six months and then it leveled off.

47
00:03:02,030 --> 00:03:03,310
So you kind of see a curve –

48
00:03:03,330 --> 00:03:09,000
a logarithmic fall off in change in that mass above sea level.

49
00:03:09,020 --> 00:03:12,770
Basically, the island dramatically changed shape and size every day

50
00:03:12,790 --> 00:03:14,360
for the first few months.

51
00:03:14,380 --> 00:03:18,960
About six months in, it finally stabilized.

52
00:03:18,980 --> 00:03:22,430
Vicki’s initial measurements and observations were crucial,

53
00:03:22,450 --> 00:03:27,860
but their research ship couldn’t get close to the island without risking a collision.

54
00:03:27,880 --> 00:03:31,290
Two French explorers who were sailing past the islands on their worldwide

55
00:03:31,310 --> 00:03:34,940
voyage became NASA’s eyes and ears, collecting some of the very first

56
00:03:34,960 --> 00:03:37,950
images and samples of the interior island.

57
00:03:38,950 --> 00:03:41,120
This is the Earth at its best.

58
00:03:41,140 --> 00:03:45,300
Because new land, new life, new landscapes

59
00:03:45,320 --> 00:03:46,900
and new patterns.

60
00:03:46,920 --> 00:03:49,110
How do they all work together?

61
00:03:51,270 --> 00:03:55,250
The combined observations, satellite images, samples

62
00:03:55,270 --> 00:03:58,030
and three-dimensional topographical maps lead Jim and the team

63
00:03:58,050 --> 00:04:00,930

to make some pretty stunning preliminary conclusions

64
00:04:00,950 --> 00:04:03,020
Scientists think that, in this case,

65
00:04:03,040 --> 00:04:06,570
warmed seawater interacted with ash after the eruption,

66
00:04:06,590 --> 00:04:10,370
chemically altering the fragile rock into a tougher material.

67
00:04:10,390 --> 00:04:16,330
But studying the life and death of land on Earth also has much broader implications.

68
00:04:16,350 --> 00:04:19,440
This island may give us insights into if –

69
00:04:19,460 --> 00:04:23,830
and how – life formed on Mars in its early history.

70
00:04:23,850 --> 00:04:25,960
Islands like this might have worked on Mars.

71
00:04:25,980 --> 00:04:30,980
Two or three billion years ago, lakes and small seas, filling depressions,

72
00:04:31,000 --> 00:04:35,620
persistent surface waters – the stuff we really strive to understand

73
00:04:35,640 --> 00:04:41,020
because it could have produced the conditions necessary for microbial life – or not!

74
00:04:41,040 --> 00:04:43,970
While the verdict is still out on whether or not liquid water

75
00:04:43,990 --> 00:04:46,150
on the surface of Mars may have produced life,

76
00:04:46,170 --> 00:04:51,060
scientists are currently running detailed chemical analysis of the island rock samples

77
00:04:51,080 --> 00:04:54,640
that will hopefully provide more answers in the months to come.

78
00:04:54,660 --> 00:04:57,150
Earth is a magical place because, really,

79
00:04:57,170 --> 00:04:59,360
it’s our point of departure for everything.

80
00:04:59,380 --> 00:05:02,610
And we come to realize in the last hundred years or so

81
00:05:02,630 --> 00:05:06,770
that it’s a far more dynamic world than we ever thought.

82
00:05:06,790 --> 00:05:08,120
Which begs the question,