
EPISODE FIVE:
FROZEN WORLD

1
00:00:06,000 --> 00:00:10,600
Some places on the surface you might have these steep cracks and giant fissures

2
00:00:10,600 --> 00:00:13,180
that you would have to be careful not to fall into

3
00:00:13,180 --> 00:00:16,740
In other places, you might see towers of ice

4
00:00:16,740 --> 00:00:19,410
right next to places that are relatively smooth

5
00:00:19,410 --> 00:00:21,410
You might see places that were dark

6
00:00:21,410 --> 00:00:27,820
Ice there takes the form of rock. It's frozen solid until you dig down into that ocean

7
00:00:27,820 --> 00:00:34,030
So you may see somethings that look similar to Earth, but you may see things that are very different

8
00:00:42,560 --> 00:00:46,070
NASA Explorers

9
00:00:46,070 --> 00:00:48,570
Cryosphere

10
00:00:51,310 --> 00:00:52,890
Frozen World

11
00:00:52,890 --> 00:00:56,330
Episode Five

12
00:00:56,330 --> 00:00:57,450
That voice you just heard?

13
00:00:57,450 --> 00:01:00,920

I am Morgan Cable, NASA scientist!

14
00:01:00,920 --> 00:01:02,980
That's Morgan.

15
00:01:02,980 --> 00:01:08,460
She’s probably one of NASA’s best spokespeople for exploring our solar system’s icy moons

16
00:01:08,460 --> 00:01:10,100
Europa is a fascinating place

17
00:01:10,100 --> 00:01:16,730
It has this liquid water ocean that’s about three times the volume of all of Earth’s oceans combined

18
00:01:16,730 --> 00:01:18,280
That’s a lot of water

19
00:01:19,220 --> 00:01:21,470
To understand what makes Earth so special,

20
00:01:21,470 --> 00:01:25,000
sometimes you need to back up and take in the big picture

21
00:01:25,000 --> 00:01:28,420
Remember, the cryosphere is every place on Earth with frozen water

22
00:01:28,420 --> 00:01:31,800
And water is one of the biggest indicators for life

23
00:01:31,800 --> 00:01:37,150
Every place, at least so far, that we’ve found life we’ve found water along with it

24
00:01:37,150 --> 00:01:42,500
And so far, Earth is the only planet we know of with life

25
00:01:42,500 --> 00:01:46,470
Although Europa isn’t the only icy moon in our solar system,

26
00:01:46,470 --> 00:01:52,080
NASA has identified it as one of those places with key astro-biological potential

27
00:01:52,080 --> 00:01:56,180
Morgan is a collaborator on the Mapping Imaging Spectrometer for Europa

28
00:01:56,180 --> 00:02:00,810
an instrument selected for NASA’s next mission to Jupiter’s icy moon Europa

29
00:02:00,810 --> 00:02:04,740
But she’s also more than just a scientist working in a laboratory

30
00:02:04,740 --> 00:02:10,860
She’s preparing future NASA missions for success on the surface of alien worlds

31
00:02:19,160 --> 00:02:24,810
This year, Morgan and her colleagues were in the field studying how life colonizes in fresh lava

32
00:02:24,810 --> 00:02:29,480
Earth it turns out has a lot of excellent, what we call, analog environments

33
00:02:29,480 --> 00:02:32,620
– places that are similar enough to some of these other worlds

34
00:02:32,620 --> 00:02:37,090
that we can conduct some tests and we can do some analysis here

35
00:02:37,090 --> 00:02:39,090
Now they’re not perfect, of course.

36
00:02:39,090 --> 00:02:44,670
They’re not going to be exactly like Europa, but we can still learn a lot by testing in these environments

37
00:02:44,670 --> 00:02:48,860
Some of these places include Antarctica and the Artic Circle

38
00:02:48,860 --> 00:02:53,060

But there are other places too – Alaska, Greenland and even Iceland

39
00:02:53,060 --> 00:02:58,450
Any place where you have a lot of ice, because guess what the surface of Europa is made of...a lot of ice!

40
00:02:59,020 --> 00:03:02,480
Studying the cryosphere doesn't just have big implications for Earth

41
00:03:02,480 --> 00:03:06,210
It also matters for the frozen worlds in our own cosmic backyard

42
00:03:06,210 --> 00:03:11,910
If we're able to find life, or evidence of past life on a place like Europa

43
00:03:11,910 --> 00:03:15,380
that tells us that not only can life happen in other places

44
00:03:15,380 --> 00:03:20,070
but it's common enough that it happened at least twice in the same tiny solar system

45
00:03:20,070 --> 00:03:26,400
That means that the universe is wide open in terms of how much life we might find

46
00:03:26,400 --> 00:03:28,400
- the types of life we might find!

47
00:03:28,400 --> 00:03:35,940
It would revolutionize how we see ourselves and the possibilities for contact in the universe

48
00:03:35,940 --> 00:03:38,060
It just...it would be amazing

49
00:03:43,380 --> 00:03:45,090
It's so exciting!

50
00:03:47,860 --> 00:03:50,390
On the next episode of Cryosphere

51
00:03:50,390 --> 00:03:53,430
As it flows down the valleys, it actually carves those valleys out

52
00:03:53,430 --> 00:03:57,000
and makes them deeper, and so it creates these beautiful fjords

53
00:03:57,000 --> 00:04:02,710
where the ice flows down, snakes out down to the ocean, or to the lakes, or further inland