



EPISODE 3:
THE CARBON PROBLEM

1
00:00:02,310 --> 00:00:04,970
This seems like an unlikely place for fires.

2
00:00:04,970 --> 00:00:08,320
In the winter the landscape is still.

3
00:00:08,320 --> 00:00:12,130
But the warmer months can bring conditions that, combined with fire,

4
00:00:12,130 --> 00:00:15,780
can release dangerous amounts of carbon into the atmosphere

5
00:00:15,780 --> 00:00:18,140
And in more ways than one.

6
00:00:18,140 --> 00:00:22,930
What happens in the Arctic does not stay in the Arctic anymore.

7
00:00:22,930 --> 00:00:28,410
NASA Explorers

8
00:00:28,410 --> 00:00:30,010
Episode Three

9
00:00:30,010 --> 00:00:32,940
The Carbon Problem

10
00:00:32,940 --> 00:00:33,450
Fires

11
00:00:33,450 --> 00:00:36,870
I see that you're wearing a hat with a logo on it.

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00:00:36,870 --> 00:00:39,910
Can you describe what that is?

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00:00:39,910 --> 00:00:41,800

You don't have to take your hat off!

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00:00:41,800 --> 00:00:42,870

Well, that's good.

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00:00:43,980 --> 00:00:48,110

Kevin, in the orange jacket, is a close NASA collaborator.

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00:00:48,110 --> 00:00:53,160

He and his team are used to getting their hands dirty to collect crucial fire data.

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00:00:53,160 --> 00:00:56,500

I'm wearing a hat right now, from the ABoVE field campaign

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00:00:56,500 --> 00:00:58,350

And what you see is a big "A"

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00:00:58,350 --> 00:01:03,760

And it stands for trees tilting over with thawing permafrost

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00:01:03,760 --> 00:01:05,150

[laughing]

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00:01:05,150 --> 00:01:08,600

Trees aren't the only thing getting warped by thawing permafrost.

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00:01:08,600 --> 00:01:10,890

Buildings and even roads begin to buckle

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00:01:10,890 --> 00:01:14,180

when the ground beneath them literally begins to liquify.

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00:01:14,180 --> 00:01:18,100

NASA's ABoVE campaign is currently in the Northwest Territories

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00:01:18,100 --> 00:01:21,850

to understand large scale changes to permafrost.

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00:01:21,850 --> 00:01:26,160

Permafrost is basically, picture in your mind, frozen dirt

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00:01:26,160 --> 00:01:29,100

Now if you thaw the permafrost out, it changes from

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00:01:29,100 --> 00:01:32,390

solid rock or concrete, to mud.

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00:01:32,390 --> 00:01:35,890

If you watched Season One of NASA Explorers,

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00:01:35,890 --> 00:01:39,090

then you know that permafrost stores huge amounts of carbon.

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00:01:39,090 --> 00:01:43,770

As a matter of fact, twice as much as what's currently in the atmosphere today.

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00:01:43,770 --> 00:01:46,740

Now, thankfully permafrost thaws really slowly

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00:01:46,740 --> 00:01:49,490

and therefore releases carbon really slowly.

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00:01:49,490 --> 00:01:51,880

But here's where it gets complicated.

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00:01:51,880 --> 00:01:55,080

Fires in high northern latitudes (permafrost regions)

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00:01:55,080 --> 00:01:59,360

are getting larger, they're getting more frequent, getting more intense

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00:01:59,360 --> 00:02:03,640

In the past, permafrost has had a reliable layer of insulation

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00:02:03,640 --> 00:02:05,490

- mostly moss.

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00:02:05,490 --> 00:02:06,690

But if you have a fire,

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00:02:06,690 --> 00:02:10,720

it burns off the vegetation. The insulation is, essentially, removed.

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00:02:10,720 --> 00:02:14,340

To summarize, changing climate means more fires,

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00:02:14,340 --> 00:02:17,340

more thawing, more carbon in the atmosphere

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00:02:17,340 --> 00:02:19,910

and that accelerates warming.

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00:02:19,910 --> 00:02:24,020

Permafrost is one of those important factors that affects life on Earth,

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00:02:24,020 --> 00:02:28,110

yet it isn't really in the public eye - unless you live on it.

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00:02:28,110 --> 00:02:31,140

But for Kevin, understanding this phenomenon is

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00:02:31,140 --> 00:02:34,460

the best way to make the biggest difference.

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00:02:34,460 --> 00:02:37,240

So way back in the 80s, when I was in college

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00:02:37,240 --> 00:02:41,500

my mom got cancer. And was dying.

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00:02:41,500 --> 00:02:43,810

And I remember the last time I saw her,

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00:02:43,810 --> 00:02:48,180
We were sitting down, and she was in bed, very sick.

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00:02:48,180 --> 00:02:50,990
And she asked me what did I want to do.

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00:02:50,990 --> 00:02:54,210
And until then, of course, I was a typical teenager in college

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00:02:54,210 --> 00:02:55,140
I had no clue.

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00:02:55,140 --> 00:02:57,630
But then it crystalized in my mind that

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00:02:57,630 --> 00:02:59,950
I wanted to save the planet.

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00:02:59,950 --> 00:03:02,170
And that was the words that I used.

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00:03:02,170 --> 00:03:07,560
I decided that my path for doing that was to go into spaceflight

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00:03:07,560 --> 00:03:11,120
Save the planet by leaving it, I suppose.

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00:03:12,110 --> 00:03:14,490
But then, circumstances changed and

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00:03:14,490 --> 00:03:17,700
I started working on Earth observations.

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00:03:17,700 --> 00:03:22,870
and it opened my eyes to what you can do with remote sensing and satellites

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00:03:22,870 --> 00:03:28,370

And what you could see and learn about the Earth from looking at it from space

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00:03:28,370 --> 00:03:31,140

That's why I decided to go back to school

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00:03:31,140 --> 00:03:36,640

And I rethought of what I talked to my mom about

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00:03:36,640 --> 00:03:42,620

and I decided to go back to school and become a scientist.

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00:03:45,400 --> 00:03:47,970

The hours are long and the work is hard.

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00:03:47,970 --> 00:03:51,230

But these explorers wouldn't have it any other way.

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00:03:51,230 --> 00:03:55,160

This is really, you know, tough country. It's really rugged.

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00:03:55,160 --> 00:03:57,450

But it's also very beautiful country.

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00:03:58,190 --> 00:04:02,010

I think I can speak for nearly every scientist that I've worked with.

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00:04:02,010 --> 00:04:04,800

They do this because they want to help.

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00:04:04,800 --> 00:04:10,480

They want to provide the information and tools to solve problems.

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00:04:17,760 --> 00:04:21,530

On the next episode of NASA Explorers

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00:04:21,530 --> 00:04:24,150

NASA is a big and capable organization,

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00:04:24,150 --> 00:04:27,570

but Earth science is a subject far too big