



VOICE OF

Mike Fossum
NASA Astronaut

1

00:00:00,510 --> 00:00:05,260

[AMIKO KAUDERER] So that question comes to us today from Astro_Joe5,

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00:00:05,260 --> 00:00:09,100

"What was your favorite experiment on the ISS?"

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00:00:09,100 --> 00:00:13,340

[MIKE FOSSUM] My favorite experiment on the ISS was one that was called SHERE,

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00:00:13,340 --> 00:00:16,030

and I'm sorry I don't remember what the acronym stood for.

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00:00:16,030 --> 00:00:20,450

But it was a fluid physics experiment that took place in the glovebox,

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00:00:20,450 --> 00:00:24,700

the microgravity science glovebox, and I enjoyed that one because it was kind

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00:00:24,700 --> 00:00:30,410

of a hands-on activity where we got to set the equipment up, it required a careful setup

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00:00:30,410 --> 00:00:36,530

and calibration, and then we got to actually open, open up,

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00:00:36,530 --> 00:00:42,480

get in an open up this fluid sample which was a small little dollop inside there,

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00:00:42,480 --> 00:00:49,060

about the size of a peanut chocolate coated candy.

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00:00:49,060 --> 00:00:54,610

And then it was like a lathe
where it rotated, and there was,

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00:00:54,610 --> 00:00:58,760

it was a fluid with polymer strands
inside, which were microscopic.

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00:00:58,760 --> 00:01:02,660

You couldn't see those, but that
affected the physics of the fluid.

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00:01:02,660 --> 00:01:05,350

And so they spun half of it.

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00:01:05,350 --> 00:01:11,050

So you were putting, you're basically
putting a twirl on that dollop of material

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00:01:11,050 --> 00:01:16,300

and then stretching it, and they could actually
measure the tension in the in the fluid

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00:01:16,300 --> 00:01:22,340

that came from the microscopic
strands of polymer plastics

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00:01:22,340 --> 00:01:25,440

that were tangling together and that..

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00:01:25,440 --> 00:01:28,490

The reason was interesting
was first of all and we got

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00:01:28,490 --> 00:01:32,210

to really observe the science taking
place, even though we weren't measuring.

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00:01:32,210 --> 00:01:36,340

It was automatically measuring

the properties of fluid.

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00:01:36,340 --> 00:01:40,980

It also has direct application
for the petrochemical,

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00:01:40,980 --> 00:01:43,960

plastic industries as part of their process.

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00:01:43,960 --> 00:01:45,250

This is something that they're trying

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00:01:45,250 --> 00:01:52,430

to understand exactly how this affects these
polymer fluids in the industrial processes

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00:01:52,430 --> 00:01:59,120

and so there's a direct application, and it
was science they wanted for the industrial use.

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00:01:59,120 --> 00:02:02,070

So it was fun to do something like that.

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00:02:02,070 --> 00:02:03,820

[KAUDERER] That sounds like a fun experiment.

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00:02:03,820 --> 00:02:06,350

Thanks for sharing.

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00:02:06,350 --> 00:02:10,220

So again, we've been talking about some of
the science experiments, it all sounds great.

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00:02:10,220 --> 00:02:15,260

I have another question coming from the public
on Twitter, and it's a science question.

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00:02:15,260 --> 00:02:17,790

We're going to go with this one.

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00:02:17,790 --> 00:02:22,140

Their question, first of all
it's the greeting from Poland.

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00:02:22,140 --> 00:02:25,070

"Hi! I want to ask about HydroTropi.

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00:02:25,070 --> 00:02:29,310

How much have you learned about growing
plants in space since June 2011."

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00:02:29,310 --> 00:02:30,790

This person's been following you.

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00:02:30,790 --> 00:02:33,380

"Greet from Poland" [FOSSUM] I guess so.

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00:02:33,380 --> 00:02:39,070

Well, we have several different plant growth
experiments and they're quite interesting.

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00:02:39,070 --> 00:02:44,800

One of them, we're growing
plants in a centrifuge,

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00:02:44,800 --> 00:02:51,810

and so we're comparing them side-by-side on
board with a 0G and then a centrifuge spinning

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00:02:51,810 --> 00:02:57,120

so that the plant seeds for the
germination and all are growing at 1G

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00:02:57,120 --> 00:03:00,180

and you can see the difference
in the just the structure

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00:03:00,180 --> 00:03:04,570

of the plant itself as a very young plant.

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00:03:04,570 --> 00:03:09,680

You could see 0G they're weaker, and that appears to be

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00:03:09,680 --> 00:03:14,280

because the gravity actually helps toughen things up because the plant has

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00:03:14,280 --> 00:03:16,510

to work against the gravity itself.

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00:03:16,510 --> 00:03:20,690

It needs more structure and so it grows thicker stems.

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00:03:20,690 --> 00:03:23,270

The roots will grow down quicker.

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00:03:23,270 --> 00:03:25,510

At least this is just a quick look.

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00:03:25,510 --> 00:03:29,050

I'm not the investigator here, but when you get a chance to look at the samples

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00:03:29,050 --> 00:03:34,160

when you're coming out of the growth chamber.

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00:03:34,160 --> 00:03:41,160

There's another one that uses, that has a plant growth medium, and then they grow them...

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00:03:41,160 --> 00:03:47,800

They're looking, and of course it's a little confusing to talk about it

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00:03:47,800 --> 00:03:51,210

because I'm not a biologist in the sense.

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00:03:51,210 --> 00:03:57,300

They're looking at the details of
makes roots grow the way they grow.

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00:03:57,300 --> 00:04:00,170

And this is kind of a fundamental
experiment on the surface,

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00:04:00,170 --> 00:04:05,210

but what we're really doing is getting
down to the real enzymes and proteins,

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00:04:05,210 --> 00:04:11,910

and the way the plant sends the signal
to the root system to tell it what to do.

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00:04:11,910 --> 00:04:17,630

And one of the things they're looking at is
trying to figure out the amount of impact

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00:04:17,630 --> 00:04:22,030

that light has on telling
the plant which way to grow.

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00:04:22,030 --> 00:04:27,400

And so we plant these seeds in a growth
medium, and then some of them are grown

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00:04:27,400 --> 00:04:34,160

in a dark chamber and some are grown in a
light, in a chamber that has a lot of light

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00:04:34,160 --> 00:04:38,720

over the top of it, and of course that affects
the way the upper part of the plant grows

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00:04:38,720 --> 00:04:42,210

but also it affects the way that

the roots grow, and so, you know,

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00:04:42,210 --> 00:04:47,600
it looks like there may be a signal that goes to
the roots that says, "Okay, light is that way."

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00:04:47,600 --> 00:04:51,700
Therefore down and more nutrients
must be the other direction."

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00:04:51,700 --> 00:04:54,020
And so it sounds a biochemical signal...

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00:04:54,020 --> 00:04:57,290
[KAUDERER] In a place where there is no down
[FOSSUM] In a place where there is no down.

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00:04:57,290 --> 00:05:00,430
The play says "Okay, gravity's not helping us."

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00:05:00,430 --> 00:05:04,600
But light tells us which way down must
be, and so we'll grow in that direction."

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00:05:04,600 --> 00:05:04,950
[KAUDERER] Great!

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00:05:04,950 --> 00:05:05,820
That is fascinating.

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00:05:05,820 --> 00:05:08,210
That question comes to us from UrtheCast.

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00:05:08,210 --> 00:05:11,320
The question is, "What time
zone do you keep in space?"

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00:05:11,320 --> 00:05:14,100
[FOSSUM] Okay, well that is a good question.

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00:05:14,100 --> 00:05:19,640
And because you go around the Earth in 90 min.,
you have a sunrise and a sunset every hour

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00:05:19,640 --> 00:05:24,570
and half, we had to pick a time,
and we ended up just choosing GMT

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00:05:24,570 --> 00:05:29,690
or Universal Time to use as the standard clock.

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00:05:29,690 --> 00:05:36,180
And then you can still kind of arbitrarily set,
you know, at what time you choose to wake up,

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00:05:36,180 --> 00:05:40,770
and we set 6 a.m., which is kind of a
normal wake up time here on the ground.

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00:05:40,770 --> 00:05:43,370
Of course it's the middle
of the night in Houston.

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00:05:43,370 --> 00:05:50,820
You know, to begin that, and that was just so
we could all have a time that we all agree on,

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00:05:50,820 --> 00:05:54,840
that we all could communicate
in, this standard GMT time.

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00:05:54,840 --> 00:05:58,240
And on orbit, that's what you're
always thinking in, is GMT time.

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00:05:58,240 --> 00:06:02,640
At the same time, part of your brain is trying
to keep track of what time it is back home,

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00:06:02,640 --> 00:06:08,220
because you might want call home to the family,
or you know, call some friends or something

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00:06:08,220 --> 00:06:10,030
like that, so you're trying to, you want

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00:06:10,030 --> 00:06:12,190
to remember what time it is
back home so you don't....

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00:06:12,190 --> 00:06:13,690
[KAUDERER] Wake 'em up in
the middle of the night?

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00:06:13,690 --> 00:06:16,130
Although I am sure they would
welcome that phone call.

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00:06:16,130 --> 00:06:17,520
[FOSSUM] Oh yeah.

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00:06:17,520 --> 00:06:19,900
The first time, not the second time.

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00:06:19,900 --> 00:06:22,960
[KAUDERER] So that leads me to
another Twitter question we have here.

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00:06:22,960 --> 00:06:26,390
This one comes from Rhythmreactor.

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00:06:26,390 --> 00:06:28,190
"Are there any day and night shifts?"

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00:06:28,190 --> 00:06:29,400
Do you rotate duties?

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00:06:29,400 --> 00:06:30,670

Is there a weekend off?

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00:06:30,670 --> 00:06:32,700

I wonder about that."

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00:06:32,700 --> 00:06:34,090

[FOSSUM] You bet.

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00:06:34,090 --> 00:06:34,980

Normally we..

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00:06:34,980 --> 00:06:36,710

we're all working the same shift.

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00:06:36,710 --> 00:06:41,470

We don't, we don't need to have
a night watch on the station.

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00:06:41,470 --> 00:06:44,970

We do have a night watch,
but that's mission control.

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00:06:44,970 --> 00:06:48,060

They have, they're watching the systems
and taking care of everything...

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00:06:48,060 --> 00:06:50,930

[KAUDERER] So that's these folks
that we're seeing in this view.

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00:06:50,930 --> 00:06:52,030

[FOSSUM] That's exactly right.

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00:06:52,030 --> 00:06:55,730

They are there 24 hours a
day, seven days a week.

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00:06:55,730 --> 00:07:02,520

They are always on duty in Mission Control
Houston, Mission Control Moscow, Huntsville,

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00:07:02,520 --> 00:07:05,800

Tsukuba in Japan, Huntsville, Alabama.

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00:07:05,800 --> 00:07:10,030

So they're there in mission control centers
around the world and they're keeping an eye

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00:07:10,030 --> 00:07:11,890

on the vehicle so we don't have to .

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00:07:11,890 --> 00:07:13,230

So we work a single shift.

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00:07:13,230 --> 00:07:15,560

Everybody gets up at six in the morning.

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00:07:15,560 --> 00:07:20,880

And the official bed time
is 9:30 in the evening.

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00:07:20,880 --> 00:07:25,090

I would say we pretty very rare that we're
actually in bed at 9:30 in the evening.

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00:07:25,090 --> 00:07:28,660

That's time to kind of finish catching
up and have little bit of free time.

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00:07:28,660 --> 00:07:31,820

But usually we're trying
to get to bed by 10, 10:30.