1
00:00:03,629 --> 00:00:08,670
More than 15 years after its first element
was launched, the International Space Station

2
00:00:08,670 --> 00:00:14,980
is now a round-the-clock laboratory that supports
a crew of six working on cutting edge science.

3
00:00:14,980 --> 00:00:20,390
It's currently commanded by a man who first
laid eyes on this station before the first

4
00:00:20,390 --> 00:00:21,390
permanent crew arrived.

5
00:00:21,390 --> 00:00:28,130
Koichi Wakata: It's wonderful to see that
the station has become such a wonderful scientific

6
00:00:28,130 --> 00:00:35,340
lab, and I'm so glad now to see that the
station is in the stage of full utilization,

7
00:00:35,340 --> 00:00:40,820
conducting variety of experiments in science
and technology, educational programs, observation

8
00:00:40,820 --> 00:00:43,460
of, in astronomy and also the Earth observation.

9
00:00:43,460 --> 00:00:46,550
Steve Swanson: We don't really know what
we're going to learn, but we know that we

10
00:00:46,550 --> 00:00:50,290
have the potential to learn many, many different
things, and it's almost with basic science.

11
00:00:50,290 --> 00:00:54,420

VO: Some of that research is conducted from
the exterior of the station.

12
00:00:54,420 --> 00:01:00,079
For example, from a perch on the station's
truss, the Alpha Magnetic Spectrometer gathers

13
00:01:00,079 --> 00:01:05,420
cosmic particles for investigators who are
looking into the very origins of our universe;

14
00:01:05,420 --> 00:01:11,479
other instruments look down to study the Earth's
atmosphere and oceans and land masses.

15
00:01:11,479 --> 00:01:16,250
All the while, the human crew members work
in the station's laboratories to help execute

16
00:01:16,250 --> 00:01:21,649
experiments in a range of disciplines, while
serving as test subjects for research on how

17
00:01:21,649 --> 00:01:26,350
the human body is impacted by weightlessness,
so scientists can figure out ways to help

18
00:01:26,350 --> 00:01:29,310
them adapt during deep space missions of the
future.

19
00:01:29,310 --> 00:01:35,359
Rick Mastracchio: If we want to go on to Mars
or asteroids or back to the moon or even further

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00:01:35,359 --> 00:01:40,709
out, we need to know what the body can handle
and what it can't, what, where it's weakest

21
00:01:40,709 --> 00:01:45,509

and how to protect the crew members from the radiation, from the weightlessness, all the

22
00:01:45,509 --> 00:01:48,500
effects that, that space travel have on the human body.

23
00:01:48,500 --> 00:01:59,240
Alexander Skvortsov: We have experiments that allow to monitor the condition of blood, of

24
00:01:59,240 --> 00:02:09,009
different, the composition of different microelements in human blood; determine the degree of bone

25
00:02:09,009 --> 00:02:10,009
mass loss

26
00:02:10,009 --> 00:02:17,960
Mikhail Tyurin: The muscles, the tendons are affected, they are losing their elasticity,

27
00:02:17,960 --> 00:02:24,320
something happens with your skin, with your cardiovascular system, and it adapts to zero

28
00:02:24,320 --> 00:02:28,450
gravity as well and there are some serious changes, too.

29
00:02:28,450 --> 00:02:33,550
VO: While tracking the changes undergone by the body, crew members are also testing a

30
00:02:33,550 --> 00:02:38,990
variety of ways to counteract the negative effects, and they’re having some good results.

31
00:02:38,990 --> 00:02:43,530
Mastracchio: ARED, the Advanced Resistive

Exercise Device, basically a weight lifting

32
00:02:43,530 --> 00:02:46,830
machine that we have on board the International Space Station now and it's been up there

33
00:02:46,830 --> 00:02:49,310
for, oh, a couple of years or so.

34
00:02:49,310 --> 00:02:54,250
People are coming back from space stronger than when they left, in many cases, and we're

35
00:02:54,250 --> 00:02:59,050
seeing great improvements in strength and bones, bone density and things like that.

36
00:02:59,050 --> 00:03:02,880
VO: But over time they keep finding new things to work on.

37
00:03:02,880 --> 00:03:08,660
For example, there is now research directed specifically at changes to the eyes, and to

38
00:03:08,660 --> 00:03:11,430
the inner structure of a crew member's bones.

39
00:03:11,430 --> 00:03:16,760
Swanson: We realize now that as we lose calcium once we get into space, um, that some of that

40
00:03:16,760 --> 00:03:22,970
structure on the inner side is changing in ways that we didn't realize, and we might

41
00:03:22,970 --> 00:03:26,570
be losing strength in our bones even though we keep the same bone density.

42
00:03:26,570 --> 00:03:34,100
Wakata: We will be measuring our physiological
data related to the changes in the eye and

43
00:03:34,100 --> 00:03:39,210
the brain due to the change in the intracranial
pressure in the microgravity.

44
00:03:39,210 --> 00:03:43,540
Maybe we can come up with countermeasures
to cope with the situation.

45
00:03:43,540 --> 00:03:48,580
VO: From time to time during their stay on
board, each crew member will also work with

46
00:03:48,580 --> 00:03:54,070
experiments in other scientific disciplines,
from research into basic physics to learning

47
00:03:54,070 --> 00:03:59,280
about how plants grow in space to the development
of new technologies.

48
00:03:59,280 --> 00:04:04,310
On top of that, crew members have day-to-day
responsibility for keeping the station maintained

49
00:04:04,310 --> 00:04:09,160
and running in good shape, and for handling
as many as five visiting vehicles.

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00:04:09,160 --> 00:04:17,500
Oleg Artemyev: That means that we will be
seeing cargo vehicles, unloading them, loading

51
00:04:17,500 --> 00:04:21,410
them with trash, seeing them off.

52

00:04:21,410 --> 00:04:26,820
VO: That should include the final European
Space Agency Automated Transfer Vehicle, due

53
00:04:26,820 --> 00:04:29,560
to arrive during Expedition 40.

54
00:04:29,560 --> 00:04:34,970
That increment begins in mid-May, when Wakata,
Tyurin and Mastracchio come home, and Swanson

55
00:04:34,970 --> 00:04:40,160
becomes commander; Expedition 40 welcomes
three more crew members at the end of that

56
00:04:40,160 --> 00:04:46,360
month: veteran station crew member Max Suraev,
and first-time flyers Reid Wiseman of NASA

57
00:04:46,360 --> 00:04:50,530
and German astronaut Alexander Gerst of the
European Space Agency.

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00:04:50,530 --> 00:04:55,820
They'll continue the mission together, including
making as many as four spacewalks from the

59
00:04:55,820 --> 00:05:00,889
U.S. and Russian segments of the station,
until Swanson and his Soyuz crewmates return

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00:05:00,889 --> 00:05:06,700
to Earth in September, wrapping up their contribution
to an ongoing mission of exploration on this

61
00:05:06,700 --> 00:05:10,210
vehicle, which has already lasted more than
15 years…

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00:05:10,210 --> 00:05:14,340

Swanson: So everybody’s always taken this risk just to go explore, see what else is

63
00:05:14,340 --> 00:05:18,040
out there, maybe, maybe it’s for science, maybe it’s just to, you know, get another

64
00:05:18,040 --> 00:05:22,040
land so get more resources, whatever it was during history, they always went off and did

65
00:05:22,040 --> 00:05:23,040
stuff.