



1
00:00:09,339 --> 00:00:06,639
as we prepare to venture deeper into

2
00:00:10,990 --> 00:00:09,349
space on long-duration missions there

3
00:00:13,180 --> 00:00:11,000
are lots of things to consider when it

4
00:00:15,430 --> 00:00:13,190
comes to just how much the crews will be

5
00:00:18,040 --> 00:00:15,440
able to take along with them Lori Meggs

6
00:00:20,380 --> 00:00:18,050
is at the payload operations integration

7
00:00:22,570 --> 00:00:20,390
Center at NASA's Marshall Space Flight

8
00:00:24,790 --> 00:00:22,580
Center to talk about one of the things

9
00:00:27,930 --> 00:00:24,800
that is very near and dear to her heart

10
00:00:30,640 --> 00:00:27,940
and one of her favorites close lori

11
00:00:32,139 --> 00:00:30,650
that's right but wouldn't it be a lot

12
00:00:33,640 --> 00:00:32,149
easier if we could just wear the same

13
00:00:35,140 --> 00:00:33,650

clothes every day until we got tired of

14

00:00:36,880 --> 00:00:35,150

them and then throw them away well

15

00:00:38,680 --> 00:00:36,890

that's how it works for crewmembers on

16

00:00:40,480 --> 00:00:38,690

the space station and until now it's

17

00:00:43,120 --> 00:00:40,490

never really been studied as to how long

18

00:00:45,069 --> 00:00:43,130

they wear their clothes but it's vital

19

00:00:48,430 --> 00:00:45,079

information as we go deeper and farther

20

00:00:49,870 --> 00:00:48,440

into space but in order to wear your

21

00:00:51,850 --> 00:00:49,880

clothes longer well you've got to find

22

00:00:53,950 --> 00:00:51,860

that right fabric and that's where a

23

00:00:54,990 --> 00:00:53,960

three-year advanced clothing study comes

24

00:01:00,850 --> 00:00:55,000

in

25

00:01:02,530 --> 00:01:00,860

look at the types of clothes that we

26

00:01:04,270 --> 00:01:02,540

need to send for astronauts and

27

00:01:05,500 --> 00:01:04,280

crewmembers to wear as we go further to

28

00:01:07,450 --> 00:01:05,510

asteroids and to Mars

29

00:01:09,790 --> 00:01:07,460

Evelyn Orndorff is actually studying

30

00:01:12,130 --> 00:01:09,800

this and your textile engineer tell us

31

00:01:18,130 --> 00:01:12,140

what we're looking at here we are

32

00:01:22,230 --> 00:01:18,140

looking at the three years of studies on

33

00:01:24,910 --> 00:01:22,240

different clothes that we would like to

34

00:01:27,789 --> 00:01:24,920

select from for those long-duration

35

00:01:30,250 --> 00:01:27,799

missions that will take us to Mars so it

36

00:01:32,649 --> 00:01:30,260

was ground-based studies for about three

37

00:01:35,140 --> 00:01:32,659

years right right and and what did you

38

00:01:37,060 --> 00:01:35,150

find you found this row is actually

39

00:01:39,390 --> 00:01:37,070

better to send yes

40

00:01:43,149 --> 00:01:39,400

so in Space Station just in front of you

41

00:01:48,070 --> 00:01:43,159

are the different garments we actually

42

00:01:51,340 --> 00:01:48,080

send on orbit for expedition 39 and 40

43

00:01:53,440 --> 00:01:51,350

was crew of three astronaut and three

44

00:01:55,450 --> 00:01:53,450

cosmonauts who wore those clothes some

45

00:01:58,929 --> 00:01:55,460

of these clothes I exercise clothing and

46

00:02:02,380 --> 00:01:58,939

the others were two of the t-shirts were

47

00:02:04,660 --> 00:02:02,390

used as routine wear over six 15

48

00:02:06,880 --> 00:02:04,670

sessions and Darwin will explain that

49

00:02:09,369 --> 00:02:06,890

later what we're talking about and and

50

00:02:12,129 --> 00:02:09,379

this is pretty much basically what they

51
00:02:13,260 --> 00:02:12,139
exercise in and and maybe kind of wear

52
00:02:15,680 --> 00:02:13,270
day-to-day just yeah

53
00:02:19,440 --> 00:02:15,690
so we would say lounge clothes yes so

54
00:02:22,160 --> 00:02:19,450
what was a shift was right there the to

55
00:02:25,110 --> 00:02:22,170
polyester their shorts and a polyester

56
00:02:28,080 --> 00:02:25,120
t-shirt and they were used for exercise

57
00:02:29,910 --> 00:02:28,090
but then we also used wool for exercise

58
00:02:33,450 --> 00:02:29,920
because we'll as very interesting

59
00:02:35,880 --> 00:02:33,460
properties in drying and actually after

60
00:02:38,760 --> 00:02:35,890
it has dried it smells bad when it's wet

61
00:02:41,700 --> 00:02:38,770
but once dried it doesn't smell anything

62
00:02:43,200 --> 00:02:41,710
and that's what we want when these when

63
00:02:45,300 --> 00:02:43,210

they're exercising when they're sweating

64

00:02:48,600 --> 00:02:45,310

I mean how long do they typically wear

65

00:02:51,750 --> 00:02:48,610

their clothes right now well we have

66

00:02:55,110 --> 00:02:51,760

never captured that because in the crew

67

00:02:58,710 --> 00:02:55,120

catalog we recommend a certain usage

68

00:03:02,130 --> 00:02:58,720

rate and based on that rate we know when

69

00:03:06,030 --> 00:03:02,140

to resupply but we have never studied

70

00:03:07,980 --> 00:03:06,040

and asked any crew members all the way

71

00:03:09,690 --> 00:03:07,990

from shuttle program to a Space Station

72

00:03:11,220 --> 00:03:09,700

program how long they were the clothes

73

00:03:12,900 --> 00:03:11,230

so this is why we needed to do those

74

00:03:15,300 --> 00:03:12,910

studies it was very important we start

75

00:03:16,680 --> 00:03:15,310

quantifying length of wear and it's

76
00:03:18,030 --> 00:03:16,690
pretty much a dream come true you just

77
00:03:19,980 --> 00:03:18,040
wear it as long as you can then you

78
00:03:21,480 --> 00:03:19,990
throw it away right now but but that's

79
00:03:24,990 --> 00:03:21,490
not going to be possible as we go

80
00:03:27,840 --> 00:03:25,000
farther correct basically using

81
00:03:31,650 --> 00:03:27,850
disposable clothing of a long duration

82
00:03:35,520 --> 00:03:31,660
mission is heavy burden on the logistics

83
00:03:37,710 --> 00:03:35,530
and we cannot afford to use the same

84
00:03:40,560 --> 00:03:37,720
type of garments on those long-duration

85
00:03:43,730 --> 00:03:40,570
missions that we've used so far in those

86
00:03:46,710 --> 00:03:43,740
missions like shuttle and station

87
00:03:50,970 --> 00:03:46,720
missions where you have constantly

88
00:03:53,340 --> 00:03:50,980

resupply of food and clothing and other

89
00:03:55,290 --> 00:03:53,350
consumables for some programs who had in

90
00:03:57,060 --> 00:03:55,300
the past we were on the forefront of

91
00:04:00,120 --> 00:03:57,070
textile technology we were not just

92
00:04:03,230 --> 00:04:00,130
using what's commercially available we

93
00:04:06,600 --> 00:04:03,240
were designing for those spacecraft with

94
00:04:08,460 --> 00:04:06,610
travel and station we have ambient air

95
00:04:10,770 --> 00:04:08,470
so we can use the same thing we use on

96
00:04:12,750 --> 00:04:10,780
earth but we want to peak or at least

97
00:04:16,199 --> 00:04:12,760
what we did in no studies that led to a

98
00:04:19,560 --> 00:04:16,209
selection of what went on the expedition

99
00:04:21,150 --> 00:04:19,570
39 and 40 that's based on the best

100
00:04:22,650 --> 00:04:21,160
that's available now and this is where

101
00:04:24,360 --> 00:04:22,660
you see all these garments because

102
00:04:27,540 --> 00:04:24,370
before we selected these

103
00:04:30,120 --> 00:04:27,550
we looked at what you see there with all

104
00:04:31,770 --> 00:04:30,130
these other fabrics all right we have

105
00:04:34,140 --> 00:04:31,780
the marina wool under this microscope

106
00:04:35,790 --> 00:04:34,150
and and this is the fabric that I was

107
00:04:38,100 --> 00:04:35,800
just holding and and that was what was

108
00:04:40,530 --> 00:04:38,110
selected for the study yes it's one of

109
00:04:42,840 --> 00:04:40,540
the fabrics that was selected for the VA

110
00:04:45,210 --> 00:04:42,850
closing study and when we looked at

111
00:04:48,240 --> 00:04:45,220
different types of wool the reason we

112
00:04:51,030 --> 00:04:48,250
chose merino is because they are the

113
00:04:52,590 --> 00:04:51,040

finest wool fibers as you touch the

114

00:04:55,290 --> 00:04:52,600

fabric you don't have the usual

115

00:04:59,460 --> 00:04:55,300

prettiness you have with the traditional

116

00:05:01,020 --> 00:04:59,470

rule like and cheap really smooth yes

117

00:05:02,430 --> 00:05:01,030

and so when you look at it under the

118

00:05:03,960 --> 00:05:02,440

microscope then you see all of these

119

00:05:07,250 --> 00:05:03,970

really neat pictures here what you're

120

00:05:09,840 --> 00:05:07,260

looking at there so what we look at

121

00:05:12,360 --> 00:05:09,850

first because these were new products to

122

00:05:14,159 --> 00:05:12,370

us we looked at the type of neat

123

00:05:16,890 --> 00:05:14,169

construction these are all knitted goods

124

00:05:21,350 --> 00:05:16,900

that we have those merino wool fibers

125

00:05:27,540 --> 00:05:21,360

the wool industry has done lots of

126

00:05:30,330 --> 00:05:27,550

advances in making these fibers feel

127

00:05:32,370 --> 00:05:30,340

smoother and the you know touch when you

128

00:05:36,450 --> 00:05:32,380

touch it earlier you didn't realize it

129

00:05:39,120 --> 00:05:36,460

was wool until we told you and so they

130

00:05:41,250 --> 00:05:39,130

also less likely to form those little

131

00:05:42,690 --> 00:05:41,260

pairs and they'll be more durable and

132

00:05:45,600 --> 00:05:42,700

that's what we're looking for and we

133

00:05:47,850 --> 00:05:45,610

pick some products that were the best in

134

00:05:50,279 --> 00:05:47,860

what was available commercially so these

135

00:05:52,010 --> 00:05:50,289

were the actual clothes used in the Ivy

136

00:05:55,860 --> 00:05:52,020

a clothing study tell us about that

137

00:05:58,740 --> 00:05:55,870

right the we we had a ground study that

138

00:06:01,469 --> 00:05:58,750

ran for about a year and a half when we

139

00:06:03,000 --> 00:06:01,479

had 80 participants and there were we

140

00:06:05,969 --> 00:06:03,010

had them wear all sorts of different

141

00:06:09,210 --> 00:06:05,979

fabrics and that led us to choose the

142

00:06:11,159 --> 00:06:09,220

fabrics used in the space station study

143

00:06:15,210 --> 00:06:11,169

the Ivy a clothing study and and that's

144

00:06:16,529 --> 00:06:15,220

these right we chose feel that and you

145

00:06:19,379 --> 00:06:16,539

wouldn't believe that that's what was so

146

00:06:21,540 --> 00:06:19,389

yeah this this is merino wool it has a

147

00:06:24,659 --> 00:06:21,550

longer fiber and it's been specially

148

00:06:25,860 --> 00:06:24,669

processed and these are polyester right

149

00:06:27,540 --> 00:06:25,870

really really light

150

00:06:29,879 --> 00:06:27,550

polyester right right those are the

151
00:06:32,490 --> 00:06:29,889
lightest polyester that shorts that we

152
00:06:34,440 --> 00:06:32,500
can buy on the market right yeah so so

153
00:06:35,909 --> 00:06:34,450
tell us what we what we looked for in

154
00:06:37,220 --> 00:06:35,919
this study on the space station how long

155
00:06:39,800 --> 00:06:37,230
it went for and how many subject

156
00:06:41,180 --> 00:06:39,810
she had right well we had actually we

157
00:06:45,800 --> 00:06:41,190
ended up with six subjects three

158
00:06:48,350 --> 00:06:45,810
astronauts and three cosmonauts and my

159
00:06:50,840 --> 00:06:48,360
understanding it was that our study was

160
00:06:53,480 --> 00:06:50,850
in a way groundbreaking in the sense

161
00:06:56,330 --> 00:06:53,490
this was the official first official

162
00:07:01,250 --> 00:06:56,340
involvement of both astronauts and

163
00:07:06,530 --> 00:07:01,260

cosmonauts in a human study well we all

164

00:07:08,360 --> 00:07:06,540

like clothes it's and the so we were

165

00:07:12,740 --> 00:07:08,370

lucky to get the the the extra three

166

00:07:15,500 --> 00:07:12,750

participants and we asked them to set

167

00:07:19,190 --> 00:07:15,510

aside 15 days 15 exercise periods to

168

00:07:22,850 --> 00:07:19,200

wear these exercise clothes and routine

169

00:07:25,280 --> 00:07:22,860

t-shirts we allocated six sets of

170

00:07:28,070 --> 00:07:25,290

clothing for them to wear in the 15 days

171

00:07:30,140 --> 00:07:28,080

but when they would get tired of a

172

00:07:33,680 --> 00:07:30,150

particular garment they would dispose of

173

00:07:35,240 --> 00:07:33,690

it and then pick the next one that was

174

00:07:37,220 --> 00:07:35,250

assigned to them in a particular

175

00:07:40,820 --> 00:07:37,230

sequence each astronaut had his own

176

00:07:45,590 --> 00:07:40,830

sequence between wool and polyester and

177

00:07:48,920 --> 00:07:45,600

weld acrylic and none of the astronauts

178

00:07:53,750 --> 00:07:48,930

or cosmos got fully to the end of their

179

00:07:55,250 --> 00:07:53,760

six yeah yeah they did let so they ended

180

00:07:57,260 --> 00:07:55,260

up with a lot of extra clothing up there

181

00:07:59,090 --> 00:07:57,270

in their pantry aboard the space station

182

00:08:01,010 --> 00:07:59,100

it's not a bad problem so it's all about

183

00:08:02,840 --> 00:08:01,020

just how long they felt like waiting

184

00:08:04,100 --> 00:08:02,850

right and we also collected that we

185

00:08:06,230 --> 00:08:04,110

collected length of wear data

186

00:08:10,190 --> 00:08:06,240

yeah and we collected perception data

187

00:08:12,800 --> 00:08:10,200

with a daily questionnaire and we are in

188

00:08:14,990 --> 00:08:12,810

the process of compiling the

189

00:08:16,850 --> 00:08:15,000

questionnaire data and analyzing it and

190

00:08:19,580 --> 00:08:16,860

sometime in the future hopefully this

191

00:08:21,950 --> 00:08:19,590

year we will have the results from that

192

00:08:23,660 --> 00:08:21,960

study and then I can get some and I can