EARTH DAY AT HOME

NASA SCIENCE LIVE

VIRTUAL EDITION

1
00:00:00,950 --> 00:00:07,150
[Music]

2
00:00:12,560 --> 00:00:10,040
hello and welcome to a special virtual

3
00:00:13,910 --> 00:00:12,570
edition of NASA science live my name is

4
00:00:16,670 --> 00:00:13,920
Dalia Kirschbaum and I'm an earth

5
00:00:18,830 --> 00:00:16,680
scientist at NASA today marks the 50th

6
00:00:20,150 --> 00:00:18,840
anniversary of Earth Day and while we

7
00:00:22,310 --> 00:00:20,160
can't be together due to social

8
00:00:24,170 --> 00:00:22,320
distancing practices were virtually

9
00:00:26,420 --> 00:00:24,180
commemorating this event with scientists

10
00:00:28,820 --> 00:00:26,430
and engineers from across the u.s. ready

11
00:00:30,710 --> 00:00:28,830
to talk to you about amazing things that

12
00:00:32,780 --> 00:00:30,720
are happening at NASA to study our

13
00:00:34,910 --> 00:00:32,790

planet but first let's take a moment to

14
00:00:41,959 --> 00:00:34,920
reflect and appreciate the one and only

15
00:00:44,630 --> 00:00:41,969
Earth earth home

16
00:00:48,049 --> 00:00:44,640
of all the planets nASA has explored

17
00:00:51,580 --> 00:00:48,059
none have matched the dynamic complexity

18
00:00:58,720 --> 00:00:55,890
deserts tropical forests icy poles

19
00:01:01,330 --> 00:00:58,730
massive storms rage over land and oceans

20
00:01:04,540 --> 00:01:01,340
a unique atmosphere protects and

21
00:01:07,420 --> 00:01:04,550
insulates us liquid water spans its vast

22
00:01:09,880 --> 00:01:07,430
surface and a delicate balance of

23
00:01:15,850 --> 00:01:09,890
systems gives way to a kaleidoscope of

24
00:01:17,920 --> 00:01:15,860
life earth is a very special place from

25
00:01:20,380 --> 00:01:17,930
the vantage point of space the

26
00:01:22,870 --> 00:01:20,390
perspective of sky and sea and all

27
00:01:25,390 --> 00:01:22,880
across the land we study our planet not

28
00:01:27,450 --> 00:01:25,400
only to learn about it but also to

29
00:01:30,470 --> 00:01:27,460
protect it

30
00:01:33,780 --> 00:01:30,480
[Music]

31
00:01:35,280 --> 00:01:33,790
on this 50th anniversary of Earth Day we

32
00:01:36,810 --> 00:01:35,290
are finding ourselves in a much

33
00:01:39,180 --> 00:01:36,820
different world than we've experienced

34
00:01:41,550 --> 00:01:39,190
before at NASA we study how our

35
00:01:43,140 --> 00:01:41,560
environment is changing using NASA and

36
00:01:45,390 --> 00:01:43,150
partner satellites that orbit the earth

37
00:01:47,730 --> 00:01:45,400
high above for example we've seen

38
00:01:49,680 --> 00:01:47,740

reduced nitrogen dioxide emissions over

39
00:01:52,260 --> 00:01:49,690
major cities as a result of changing

40
00:01:54,150 --> 00:01:52,270
factory operations with NASA's suite of

41
00:01:56,430 --> 00:01:54,160
satellites instruments and models we are

42
00:01:58,430 --> 00:01:56,440
studying our home planet 24 hours a day

43
00:02:01,020 --> 00:01:58,440
seven days a week every day of the year

44
00:02:02,790 --> 00:02:01,030
so joining us now to talk about NASA's

45
00:02:05,190 --> 00:02:02,800
unparalleled contributions to earth

46
00:02:07,050 --> 00:02:05,200
science is NASA Administrator Jim

47
00:02:10,169 --> 00:02:07,060
bridenstine Jim thank you so much for

48
00:02:12,540 --> 00:02:10,179
joining us and how are you doing well

49
00:02:14,850 --> 00:02:12,550
thank you for having me I'm doing fine

50
00:02:18,060 --> 00:02:14,860
I'm actually doing really well as you

51
00:02:20,580 --> 00:02:18,070
can see I'm in my home as many people

52
00:02:23,010 --> 00:02:20,590
right now are in their homes following

53
00:02:27,540 --> 00:02:23,020
the guidance of the Center for Disease

54
00:02:29,670 --> 00:02:27,550
Control and we are we are all a family

55
00:02:32,280 --> 00:02:29,680
here my my three children are out of

56
00:02:34,949 --> 00:02:32,290
school I've got a 14 year old a 12 year

57
00:02:37,949 --> 00:02:34,959
old and an 8 year old my wife is here

58
00:02:40,949 --> 00:02:37,959
and my mother-in-law lives with us we

59
00:02:43,280 --> 00:02:40,959
have two dogs and as you can see my

60
00:02:46,320 --> 00:02:43,290
living room is now the NASA headquarters

61
00:02:48,810 --> 00:02:46,330
so what I'm hoping is during this

62
00:02:50,940 --> 00:02:48,820
interview we won't have any maybe

63
00:02:53,850 --> 00:02:50,950

screaming kids or dogs barking but we'll

64
00:02:56,130 --> 00:02:53,860
see how it goes but I will tell you the

65
00:02:58,680 --> 00:02:56,140
the the NASA workforce across the entire

66
00:03:01,710 --> 00:02:58,690
agency a lot of people are working from

67
00:03:05,190 --> 00:03:01,720
home and it's it's not easy especially

68
00:03:08,010 --> 00:03:05,200
when kids are out of school and you know

69
00:03:10,800 --> 00:03:08,020
you know spouses are working from home

70
00:03:12,240 --> 00:03:10,810
at the same time so look I know there's

71
00:03:13,800 --> 00:03:12,250
a lot of challenges out there but we've

72
00:03:16,470 --> 00:03:13,810
got a lot of very important missions

73
00:03:18,030 --> 00:03:16,480
going forward we do have mission

74
00:03:20,759 --> 00:03:18,040
essential functions that we're

75
00:03:22,290 --> 00:03:20,769
continuing to work on as an agency and

76
00:03:25,460 --> 00:03:22,300
of course we have this really unique

77
00:03:28,380 --> 00:03:25,470
opportunity to study the earth right now

78
00:03:31,530 --> 00:03:28,390
during this pandemic when you know

79
00:03:33,240 --> 00:03:31,540
production across the globe is down and

80
00:03:34,949 --> 00:03:33,250
we're able to learn things that

81
00:03:37,620 --> 00:03:34,959
otherwise we might not be able to learn

82
00:03:39,810 --> 00:03:37,630
so we definitely want to get this

83
00:03:41,220 --> 00:03:39,820
pandemic behind us we definitely want to

84
00:03:43,589 --> 00:03:41,230
get back to

85
00:03:46,229 --> 00:03:43,599
our normal ways of life but in the mean

86
00:03:49,710 --> 00:03:46,239
time this is a really unique opportunity

87
00:03:53,009 --> 00:03:49,720
and and and so NASA intends to take

88
00:03:55,020 --> 00:03:53,019

advantage of it well thank you so much

89
00:03:57,240 --> 00:03:55,030
and and really talking about how NASA

90
00:03:59,490 --> 00:03:57,250
observes the earth you know looking back

91
00:04:02,190 --> 00:03:59,500
over the last 50 years of Earth Day and

92
00:04:03,600 --> 00:04:02,200
60 years of NASA earth science what do

93
00:04:07,110 --> 00:04:03,610
you see as some of the most important

94
00:04:09,839 --> 00:04:07,120
discoveries well you know nASA has

95
00:04:12,000 --> 00:04:09,849
really a very unique perspective when

96
00:04:14,789 --> 00:04:12,010
you talk about looking at the Earth from

97
00:04:17,009 --> 00:04:14,799
space and we're always sensing the earth

98
00:04:19,920 --> 00:04:17,019
in all parts of the electromagnetic

99
00:04:22,100 --> 00:04:19,930
spectrum and we're able to look at the

100
00:04:24,659 --> 00:04:22,110
different parts of the Earth's system

101
00:04:26,670 --> 00:04:24,669
specifically and then and then make an

102
00:04:28,950 --> 00:04:26,680
effort to to see how they affect each

103
00:04:31,050 --> 00:04:28,960
other so the lithosphere which is of

104
00:04:33,120 --> 00:04:31,060
course the study of the land and and the

105
00:04:35,790 --> 00:04:33,130
hydrosphere which is the study of the

106
00:04:39,060 --> 00:04:35,800
water and the cryosphere the study of

107
00:04:40,830 --> 00:04:39,070
the ice the atmosphere all of these

108
00:04:42,270 --> 00:04:40,840
different spheres that make up the

109
00:04:45,450 --> 00:04:42,280
Earth's system are all very very

110
00:04:48,240 --> 00:04:45,460
important and we're starting to right

111
00:04:52,710 --> 00:04:48,250
now understand how they feed into the

112
00:04:54,750 --> 00:04:52,720
whole system you know we think about you

113
00:04:56,909 --> 00:04:54,760

know we see the oceans rising and we see

114
00:04:59,159 --> 00:04:56,919
the ice melting and how does that affect

115
00:05:00,300 --> 00:04:59,169
as you know how does that affect how the

116
00:05:03,000 --> 00:05:00,310
climate is changing

117
00:05:04,770 --> 00:05:03,010
we know that the ice reflects the energy

118
00:05:07,379 --> 00:05:04,780
from the Sun and we know that the ocean

119
00:05:09,180 --> 00:05:07,389
absorbs energy from the Sun and so

120
00:05:12,020 --> 00:05:09,190
there's a feedback mechanism there where

121
00:05:14,670 --> 00:05:12,030
we're actually seeing the warming

122
00:05:18,360 --> 00:05:14,680
exacerbated by the melting ice at the

123
00:05:20,790 --> 00:05:18,370
same time carbon dioxide it B is a

124
00:05:24,779 --> 00:05:20,800
greenhouse gas but it's also used by

125
00:05:26,580 --> 00:05:24,789
plants for food and so we're seeing in a

126
00:05:29,310 --> 00:05:26,590
lot of parts of the globe we're seeing a

127
00:05:30,770 --> 00:05:29,320
greening of the earth and the greening

128
00:05:33,060 --> 00:05:30,780
of the earth has a feedback mechanism

129
00:05:36,000 --> 00:05:33,070
that actually works in the opposite

130
00:05:38,490 --> 00:05:36,010
direction against the the global warming

131
00:05:40,680 --> 00:05:38,500
that we're seeing so some of these

132
00:05:43,589 --> 00:05:40,690
feedback mechanisms have a longer delay

133
00:05:45,719 --> 00:05:43,599
some of them are immediate and really

134
00:05:47,470 --> 00:05:45,729
you know what we're doing right now as

135
00:05:49,330 --> 00:05:47,480
an agency is trying to

136
00:05:51,790 --> 00:05:49,340
understand it I guess the important

137
00:05:54,940 --> 00:05:51,800
thing is we need to we need to

138
00:05:58,720 --> 00:05:54,950

acknowledge how much we don't understand

139
00:06:02,080 --> 00:05:58,730
and that NASA is exceptionally unique in

140
00:06:04,450 --> 00:06:02,090
its ability to learn what we don't know

141
00:06:06,640 --> 00:06:04,460
and there's a there's so much left to do

142
00:06:08,770 --> 00:06:06,650
there what we're learning every day is

143
00:06:10,690 --> 00:06:08,780
how much we don't know that's what we're

144
00:06:13,890 --> 00:06:10,700
learning and NASA is in this unique

145
00:06:15,910 --> 00:06:13,900
position to to to get us a better

146
00:06:18,010 --> 00:06:15,920
understanding so that we can move

147
00:06:19,600 --> 00:06:18,020
forward with better models you know

148
00:06:22,750 --> 00:06:19,610
sometimes you know these models they're

149
00:06:25,330 --> 00:06:22,760
all over the map especially if you get

150
00:06:27,490 --> 00:06:25,340
past five years we want to get better

151
00:06:29,680 --> 00:06:27,500
modeling so we know kind of what the

152
00:06:32,830 --> 00:06:29,690
future holds and how we can respond to

153
00:06:34,480 --> 00:06:32,840
it and certainly the only way to get

154
00:06:37,150 --> 00:06:34,490
better models is to get more data and

155
00:06:38,620 --> 00:06:37,160
feedback data into the models and NASA

156
00:06:41,020 --> 00:06:38,630
is uniquely positioned to do these

157
00:06:42,340 --> 00:06:41,030
activities here on Earth Day these are

158
00:06:47,260 --> 00:06:42,350
things that we want to highlight that

159
00:06:49,150 --> 00:06:47,270
NASA is uniquely situated to do well I

160
00:06:51,280 --> 00:06:49,160
mean you highlight just these complex

161
00:06:53,170 --> 00:06:51,290
systems in the role of satellites not

162
00:06:55,450 --> 00:06:53,180
only looking into the solar system but

163
00:06:56,830 --> 00:06:55,460

also pointing right down at Earth so if

164
00:06:59,890 --> 00:06:56,840
we take a question from social media

165
00:07:02,530 --> 00:06:59,900
from being suja's on Instagram they're

166
00:07:04,150 --> 00:07:02,540
asking specifically about the ozone

167
00:07:06,160 --> 00:07:04,160
layer and they asked is it really

168
00:07:08,080 --> 00:07:06,170
healing what do we know what is NASA

169
00:07:11,680 --> 00:07:08,090
satellite data and models telling us

170
00:07:14,230 --> 00:07:11,690
about the ozone layer absolutely so you

171
00:07:17,350 --> 00:07:14,240
know NASA has been at the forefront of

172
00:07:19,570 --> 00:07:17,360
this issue now for decades and of course

173
00:07:21,220 --> 00:07:19,580
following the Montreal Protocol what we

174
00:07:24,010 --> 00:07:21,230
are now seeing is that it is in fact

175
00:07:26,860 --> 00:07:24,020
working and as it works we need to

176
00:07:28,810 --> 00:07:26,870
continue working the Montreal Protocol I

177
00:07:31,180 --> 00:07:28,820
will tell you one of the challenges is

178
00:07:33,100 --> 00:07:31,190
not all nations on the planet even

179
00:07:35,050 --> 00:07:33,110
though they're signatories to it they

180
00:07:37,450 --> 00:07:35,060
don't always follow it I'll tell you

181
00:07:39,940 --> 00:07:37,460
this NASA is uniquely positioned to be

182
00:07:41,800 --> 00:07:39,950
able to quickly identify what nations

183
00:07:44,380 --> 00:07:41,810
are not following it call them out and

184
00:07:47,560 --> 00:07:44,390
mitigate those challenges but we know

185
00:07:49,090 --> 00:07:47,570
that the ozone layer is healing and over

186
00:07:52,150 --> 00:07:49,100
the course of time it will heal even

187
00:07:56,320 --> 00:07:52,160
more and because of what NASA is doing

188
00:07:58,120 --> 00:07:56,330

all of humanity will be better off well

189
00:08:00,410 --> 00:07:58,130
thank you so much for joining us I think

190
00:08:01,970 --> 00:08:00,420
you know one last very quick

191
00:08:03,560 --> 00:08:01,980
you know what's for the future what are

192
00:08:07,190 --> 00:08:03,570
you excited about it NASA looking

193
00:08:09,890 --> 00:08:07,200
forward for earth science I'll tell you

194
00:08:12,920 --> 00:08:09,900
I get really excited about a couple a

195
00:08:16,030 --> 00:08:12,930
couple of very important things we talk

196
00:08:18,590 --> 00:08:16,040
about the the population of the globe

197
00:08:20,750 --> 00:08:18,600
increasing and how are we going to feed

198
00:08:23,420 --> 00:08:20,760
these these these increases in

199
00:08:26,240 --> 00:08:23,430
populations all over the world you know

200
00:08:28,160 --> 00:08:26,250
NASA has a lot of science capabilities

201
00:08:29,720 --> 00:08:28,170
in orbit around the Earth like I said

202
00:08:32,110 --> 00:08:29,730
we're looking at the earth in every part

203
00:08:34,550 --> 00:08:32,120
of the spectrum and of course making

204
00:08:37,250 --> 00:08:34,560
determinations about how we can improve

205
00:08:40,820 --> 00:08:37,260
lives one area where we're seeing some

206
00:08:44,290 --> 00:08:40,830
significant progress is increasing crop

207
00:08:47,330 --> 00:08:44,300
yields we're using Landsat 7 for example

208
00:08:49,790 --> 00:08:47,340
to make measurements of what we call

209
00:08:52,730 --> 00:08:49,800
evapo transpiration which is basically a

210
00:08:54,440 --> 00:08:52,740
measurement of how much moisture is

211
00:08:57,980 --> 00:08:54,450
being evaporated from the soil and how

212
00:09:00,470 --> 00:08:57,990
much plants are transpiring or think of

213
00:09:02,870 --> 00:09:00,480

it as plants breathing and we can come

214
00:09:05,270 --> 00:09:02,880
up with a precise measurement down to a

215
00:09:07,970 --> 00:09:05,280
quarter of an acre to help farmers very

216
00:09:10,490 --> 00:09:07,980
precisely figure out how to irrigate

217
00:09:11,990 --> 00:09:10,500
down to a quarter of an acre and what

218
00:09:14,380 --> 00:09:12,000
we're finding is that by doing this

219
00:09:18,080 --> 00:09:14,390
farmers are able to increase crop yields

220
00:09:20,870 --> 00:09:18,090
while reducing water usage by about 25

221
00:09:22,790 --> 00:09:20,880
percent and at the same time preserving

222
00:09:25,970 --> 00:09:22,800
nitrates in the soil and that's why the

223
00:09:29,140 --> 00:09:25,980
crop yields actually go up so we're very

224
00:09:31,450 --> 00:09:29,150
excited about using NASA's earth science

225
00:09:34,400 --> 00:09:31,460
capabilities to increase crop yields

226
00:09:35,990 --> 00:09:34,410
preserve the environment those nitrates

227
00:09:38,090 --> 00:09:36,000
that I mean that's a pollutant when it

228
00:09:39,620 --> 00:09:38,100
gets in the water supply then we have to

229
00:09:41,540 --> 00:09:39,630
clean it out so that we can actually

230
00:09:44,420 --> 00:09:41,550
drink the water that's very expensive

231
00:09:47,170 --> 00:09:44,430
for state governments and municipalities

232
00:09:50,060 --> 00:09:47,180
and so if farmers can more precisely

233
00:09:53,000 --> 00:09:50,070
irrigate and increase increased crop

234
00:09:54,950 --> 00:09:53,010
yields save water preserve nitrates in

235
00:09:57,110 --> 00:09:54,960
the soil all tremendously important and

236
00:10:00,050 --> 00:09:57,120
then we're using the international space

237
00:10:02,510 --> 00:10:00,060
station we're testing a mission we call

238
00:10:05,270 --> 00:10:02,520

eco stress so we can actually measure

239
00:10:07,730 --> 00:10:05,280
the stress on a plant based on how much

240
00:10:09,890 --> 00:10:07,740
irrigation it's getting and you know

241
00:10:12,440 --> 00:10:09,900
every plant has stomata which breathe

242
00:10:13,220 --> 00:10:12,450
think of how a plant breathe and those

243
00:10:14,690 --> 00:10:13,230
stomata

244
00:10:16,490 --> 00:10:14,700
when the plant gets stressed it's not

245
00:10:17,960 --> 00:10:16,500
getting enough water that stomata closes

246
00:10:19,850 --> 00:10:17,970
and then the temperature of the plant

247
00:10:22,400 --> 00:10:19,860
goes up well we can measure the

248
00:10:24,740 --> 00:10:22,410
temperature of the plant from space and

249
00:10:26,960 --> 00:10:24,750
and we can determine if a plant is

250
00:10:28,910 --> 00:10:26,970
stressed weeks ahead of when a farmer

251
00:10:32,530 --> 00:10:28,920
would know and the farmer can then

252
00:10:36,320 --> 00:10:32,540
respond and and irrigate or maybe do

253
00:10:38,060 --> 00:10:36,330
provide you know fertilizer or something

254
00:10:39,700 --> 00:10:38,070
that the plant needs these are all

255
00:10:42,500 --> 00:10:39,710
things that are second and third

256
00:10:45,920 --> 00:10:42,510
benefits to let NASA has been doing on

257
00:10:47,810 --> 00:10:45,930
the earth side for many years and then

258
00:10:50,060 --> 00:10:47,820
of course I'm I'm really excited about a

259
00:10:54,650 --> 00:10:50,070
mission called grace which is helping us

260
00:10:56,540 --> 00:10:54,660
understand how how the gravity of the

261
00:10:59,510 --> 00:10:56,550
earth changes if you can imagine that

262
00:11:00,980 --> 00:10:59,520
wherever you are on earth the gravity is

263
00:11:03,140 --> 00:11:00,990

a certain amount depending on where you

264
00:11:04,730 --> 00:11:03,150
are the gravity is different I know that

265
00:11:07,220 --> 00:11:04,740
sounds strange we don't feel it it's

266
00:11:10,310 --> 00:11:07,230
very very small but it's based on how

267
00:11:12,710 --> 00:11:10,320
water moves around the earth and we can

268
00:11:15,170 --> 00:11:12,720
make determinations as to you know

269
00:11:17,300 --> 00:11:15,180
whether or not aquifers are full and how

270
00:11:19,070 --> 00:11:17,310
much water is going to be available into

271
00:11:22,220 --> 00:11:19,080
the future in different parts of the

272
00:11:24,710 --> 00:11:22,230
world so NASA earth science is just

273
00:11:26,480 --> 00:11:24,720
doing amazing work it's improving lives

274
00:11:27,950 --> 00:11:26,490
we're better able to predict droughts

275
00:11:29,690 --> 00:11:27,960
we're gonna feed more of the world than

276
00:11:32,120 --> 00:11:29,700
ever before and we're gonna get a better

277
00:11:34,310 --> 00:11:32,130
understanding of how our human activity

278
00:11:36,860 --> 00:11:34,320
is affecting the climate so that in the

279
00:11:39,650 --> 00:11:36,870
future policymakers can make really good

280
00:11:41,410 --> 00:11:39,660
decisions so here on Earth Day I would

281
00:11:44,420 --> 00:11:41,420
just like to encourage everybody to know

282
00:11:46,880 --> 00:11:44,430
and be aware of the great work that NASA

283
00:11:49,670 --> 00:11:46,890
is doing and we will continue doing it

284
00:11:51,670 --> 00:11:49,680
our our earth science budget today is

285
00:11:55,130 --> 00:11:51,680
higher than it's ever been in history

286
00:11:56,780 --> 00:11:55,140
and and in fact and that's because of

287
00:11:59,170 --> 00:11:56,790
the great work that's being done and and

288
00:12:01,460 --> 00:11:59,180

and we're learning so much all the time

289
00:12:04,820 --> 00:12:01,470
well thank you so much for joining us

290
00:12:07,580 --> 00:12:04,830
administrator bridenstine well thank you

291
00:12:09,350 --> 00:12:07,590
for having me it's been a pleasure well

292
00:12:11,000 --> 00:12:09,360
we really enjoy hearing how you know we

293
00:12:12,770 --> 00:12:11,010
can connect the satellites all the way

294
00:12:15,560 --> 00:12:12,780
to the field scale and how this is so

295
00:12:18,320 --> 00:12:15,570
important for studying our home planet

296
00:12:20,480 --> 00:12:18,330
Earth now many of you may think of just

297
00:12:22,380 --> 00:12:20,490
NASA space shuttles and maybe satellites

298
00:12:24,990 --> 00:12:22,390
but you know that one of the A's and now

299
00:12:26,970 --> 00:12:25,000
is aeronautics so up next we're going to

300
00:12:29,190 --> 00:12:26,980
talk with a project leader of a new type

301
00:12:31,860 --> 00:12:29,200
of aircraft this small experimental

302
00:12:34,410 --> 00:12:31,870
plane is powered by electricity known as

303
00:12:36,630 --> 00:12:34,420
the x57 Maxwell it'll help make flying

304
00:12:40,200 --> 00:12:36,640
cleaner quieter and more sustainable

305
00:12:42,720 --> 00:12:40,210
let's take a look at this aircraft the

306
00:12:45,540 --> 00:12:42,730
x57 Maxwell is NASA's first manned

307
00:12:47,550 --> 00:12:45,550
explain in almost 20 years it's a small

308
00:12:49,950 --> 00:12:47,560
experimental airplane that is powered

309
00:12:51,780 --> 00:12:49,960
fully by electricity all-electric

310
00:12:54,380 --> 00:12:51,790
airplane technology can make flying

311
00:12:57,510 --> 00:12:54,390
cleaner quieter and more sustainable

312
00:13:00,300 --> 00:12:57,520
throttle is idle right motor area clear

313
00:13:01,980 --> 00:13:00,310

with electric power the x57 will

314
00:13:04,560 --> 00:13:01,990
demonstrate flight that is not only more

315
00:13:08,600 --> 00:13:04,570
efficient but also more reliable helping

316
00:13:11,220 --> 00:13:08,610
to advance the future of green aviation

317
00:13:13,680 --> 00:13:11,230
so to tell us more about this exciting

318
00:13:15,840 --> 00:13:13,690
project I'm pleased to be joined by the

319
00:13:16,440 --> 00:13:15,850
missions principal investigator Sean

320
00:13:20,010 --> 00:13:16,450
Clark

321
00:13:23,340 --> 00:13:20,020
Sean how're you doing I'm great thanks

322
00:13:25,620 --> 00:13:23,350
for having me so this is really exciting

323
00:13:29,580 --> 00:13:25,630
can you tell us more about the x57 what

324
00:13:31,380 --> 00:13:29,590
is it exactly well we're seeing a lot of

325
00:13:33,570 --> 00:13:31,390
new technologies become available we're

326
00:13:35,910 --> 00:13:33,580
starting to have access to electric

327
00:13:38,970 --> 00:13:35,920
motors and batteries that we can use for

328
00:13:41,790 --> 00:13:38,980
aircraft design so on x57 we're actually

329
00:13:44,010 --> 00:13:41,800
putting 14 motors along our aircraft in

330
00:13:46,410 --> 00:13:44,020
order to make a vehicle that is much

331
00:13:50,730 --> 00:13:46,420
more efficient and uses less energy and

332
00:13:52,680 --> 00:13:50,740
has zero carbon emissions in flight it's

333
00:13:54,240 --> 00:13:52,690
pretty impressive so it's clear that

334
00:13:56,550 --> 00:13:54,250
there's some benefits but can you talk a

335
00:14:00,540 --> 00:13:56,560
little bit more about how the x57 may

336
00:14:02,970 --> 00:14:00,550
help our environment absolutely so

337
00:14:04,950 --> 00:14:02,980
because it's using electric motors and

338
00:14:06,930 --> 00:14:04,960

the motors are so lightweight and so

339
00:14:08,880 --> 00:14:06,940
much more reliable we're able to put

340
00:14:10,470 --> 00:14:08,890
them in in really interesting places on

341
00:14:12,840 --> 00:14:10,480
our aircraft we've got our main motor

342
00:14:15,660 --> 00:14:12,850
system out at the wingtips which

343
00:14:17,790 --> 00:14:15,670
actually reduces the aircraft drag and

344
00:14:19,920 --> 00:14:17,800
improves performance by reducing the

345
00:14:23,400 --> 00:14:19,930
vortex that forms from from an aircraft

346
00:14:25,380 --> 00:14:23,410
wing and so along with the high

347
00:14:27,330 --> 00:14:25,390
performance wing and our small motors

348
00:14:29,370 --> 00:14:27,340
that help us takeoff and land this

349
00:14:31,230 --> 00:14:29,380
aircraft we'll use about five times less

350
00:14:33,450 --> 00:14:31,240
energy for every mile that it travels

351
00:14:35,199 --> 00:14:33,460
compared to a typical aircraft that you

352
00:14:37,190 --> 00:14:35,209
could buy today

353
00:14:39,319 --> 00:14:37,200
Wow it sounds like there's a lot of

354
00:14:40,639 --> 00:14:39,329
technological advancement going on and

355
00:14:42,340 --> 00:14:40,649
and one of the other things you've

356
00:14:44,660 --> 00:14:42,350
mentioned is about the battery is how to

357
00:14:46,100 --> 00:14:44,670
increase you know battery development to

358
00:14:49,100 --> 00:14:46,110
make it higher voltage can you talk a

359
00:14:51,139 --> 00:14:49,110
little bit about that process absolutely

360
00:14:53,210 --> 00:14:51,149
we're actually using Space Station

361
00:14:55,220 --> 00:14:53,220
technology from from the the NASA

362
00:14:58,340 --> 00:14:55,230
research on the International Space

363
00:15:00,259 --> 00:14:58,350

Station and by putting that technology

364
00:15:02,360 --> 00:15:00,269
in our aircraft batteries we're able to

365
00:15:04,819 --> 00:15:02,370
make a battery system that's safe enough

366
00:15:06,560 --> 00:15:04,829
to install next to our pilots but gives

367
00:15:08,870 --> 00:15:06,570
us the energy that we need to perform

368
00:15:10,400 --> 00:15:08,880
our experiments so that's been really

369
00:15:12,730 --> 00:15:10,410
critical and it's been something we've

370
00:15:15,980 --> 00:15:12,740
been able to share with industry already

371
00:15:17,269 --> 00:15:15,990
and and speaking of industry you know

372
00:15:19,190 --> 00:15:17,279
what do you see is the future of this

373
00:15:22,400 --> 00:15:19,200
capability how how large can these

374
00:15:24,470 --> 00:15:22,410
planes be well what's so exciting about

375
00:15:26,329 --> 00:15:24,480
this technology is these motors and

376
00:15:28,880 --> 00:15:26,339
these batteries can scale up to larger

377
00:15:31,819 --> 00:15:28,890
and larger aircraft and so our aircraft

378
00:15:34,819 --> 00:15:31,829
will hold room for our test pilot and a

379
00:15:36,380 --> 00:15:34,829
lot of instrumentation but these

380
00:15:38,210 --> 00:15:36,390
technologies will be able to make

381
00:15:40,400 --> 00:15:38,220
aircraft that could carry people a

382
00:15:42,170 --> 00:15:40,410
couple hundred miles or across the

383
00:15:46,460 --> 00:15:42,180
country if you make a hybrid version in

384
00:15:47,840 --> 00:15:46,470
the in the future so NASA conducts many

385
00:15:50,750 --> 00:15:47,850
different types of field campaigns

386
00:15:51,860 --> 00:15:50,760
flying airplanes to with instruments to

387
00:15:54,170 --> 00:15:51,870
look in all different types of

388
00:15:56,569 --> 00:15:54,180

environments here on earth you know what

389
00:15:57,710 --> 00:15:56,579
about the potential for flying people

390
00:16:01,340 --> 00:15:57,720
commercially with this type of

391
00:16:03,259 --> 00:16:01,350
technology yeah it's really exciting

392
00:16:05,389 --> 00:16:03,269
this technology isn't ready to fly

393
00:16:07,130 --> 00:16:05,399
commercially right now you wouldn't want

394
00:16:09,350 --> 00:16:07,140
to buy the x57 because it's an

395
00:16:12,350 --> 00:16:09,360
experimental airplane but our

396
00:16:14,750 --> 00:16:12,360
technologies are absolutely applicable

397
00:16:18,670 --> 00:16:14,760
to future markets that there's a lot of

398
00:16:21,139 --> 00:16:18,680
opportunity for urban air taxis or rural

399
00:16:23,090 --> 00:16:21,149
aviation marketplaces opening up due to

400
00:16:24,860 --> 00:16:23,100
electric propulsion and aircraft being

401
00:16:28,460 --> 00:16:24,870
more accessible to the public so I'm

402
00:16:29,750 --> 00:16:28,470
really excited about it so as we're you

403
00:16:31,939 --> 00:16:29,760
know as we're talking about this theme

404
00:16:33,530 --> 00:16:31,949
of technological development you know do

405
00:16:35,600 --> 00:16:33,540
you see an opportunity for this type of

406
00:16:39,400 --> 00:16:35,610
technology to be applied for other

407
00:16:43,309 --> 00:16:41,569
absolutely we were actually using some

408
00:16:45,079 --> 00:16:43,319
of the technology from the automotive

409
00:16:46,999 --> 00:16:45,089
industry and the the railway industry

410
00:16:49,129 --> 00:16:47,009
believe it or not

411
00:16:50,839 --> 00:16:49,139
and so helping to understand how do we

412
00:16:53,209 --> 00:16:50,849
can adapt those two aircraft and make

413
00:16:55,099 --> 00:16:53,219

them lightweight and reliable so that we

414
00:16:57,799 --> 00:16:55,109
can we can use them in flight has been

415
00:16:59,989 --> 00:16:57,809
critical but also learning how to take

416
00:17:01,699 --> 00:16:59,999
our software development and and flow

417
00:17:06,319 --> 00:17:01,709
that back into other industries has been

418
00:17:07,879 --> 00:17:06,329
a main goal of ours well this is just a

419
00:17:09,649 --> 00:17:07,889
really impressive project and I guess my

420
00:17:12,350 --> 00:17:09,659
last question is what excites you most

421
00:17:13,909 --> 00:17:12,360
about this inventing and building of

422
00:17:17,720 --> 00:17:13,919
technology to really help our home

423
00:17:19,399 --> 00:17:17,730
planet it's just so exciting to be

424
00:17:21,470 --> 00:17:19,409
working on aircraft right now we're able

425
00:17:23,470 --> 00:17:21,480
to take these new technologies and and

426
00:17:26,439 --> 00:17:23,480
redesign aircraft from the ground up

427
00:17:28,610 --> 00:17:26,449
we're thinking about new and interesting

428
00:17:30,409 --> 00:17:28,620
configurations that will make airplanes

429
00:17:32,330 --> 00:17:30,419
more efficient and more available to the

430
00:17:35,360 --> 00:17:32,340
public so that more people will be able

431
00:17:39,110 --> 00:17:35,370
to travel and and do it cheaply and with

432
00:17:43,190 --> 00:17:39,120
less emissions well thank you so much

433
00:17:44,570 --> 00:17:43,200
for joining us shine yeah thank you you

434
00:17:46,639 --> 00:17:44,580
know it's really exciting to hear about

435
00:17:48,590 --> 00:17:46,649
the new technologies being developed to

436
00:17:50,419 --> 00:17:48,600
create an aircraft completely powered by

437
00:17:52,190 --> 00:17:50,429
batteries you know make sure to follow

438
00:17:56,810 --> 00:17:52,200

the progress of this mission at social

439
00:17:59,450 --> 00:17:56,820
media at NASA Aero so since its founding

440
00:18:01,789 --> 00:17:59,460
in sixty years ago NASA has been a

441
00:18:03,259 --> 00:18:01,799
leading agency known for developing

442
00:18:05,810 --> 00:18:03,269
technologies to send people to space

443
00:18:07,789 --> 00:18:05,820
look at the outermost reaches of the

444
00:18:09,379 --> 00:18:07,799
solar system and beyond but did you know

445
00:18:11,180 --> 00:18:09,389
that the technology is developed to

446
00:18:13,519 --> 00:18:11,190
answer key questions about space

447
00:18:15,919 --> 00:18:13,529
exploration and travel have significant

448
00:18:17,779 --> 00:18:15,929
benefits for us on earth for example did

449
00:18:20,720 --> 00:18:17,789
you know that NASA developed the first

450
00:18:22,369 --> 00:18:20,730
computer mouse in the 1960s to interact

451
00:18:24,919 --> 00:18:22,379
with data on some of the big first

452
00:18:26,659 --> 00:18:24,929
computers and in the 1970s they

453
00:18:28,549 --> 00:18:26,669
developed memory foam to make pilot

454
00:18:30,320 --> 00:18:28,559
seats more comfortable my all-time

455
00:18:33,049 --> 00:18:30,330
favorite though is the invention of

456
00:18:36,139 --> 00:18:33,059
technology to enable the camera phone in

457
00:18:37,970 --> 00:18:36,149
the 1990s which is now pervasive in

458
00:18:41,090 --> 00:18:37,980
camera phone technology and webcams

459
00:18:42,830 --> 00:18:41,100
across across the world so to continue

460
00:18:44,600 --> 00:18:42,840
our conversation on how NASA

461
00:18:46,580 --> 00:18:44,610
technologies could help us here on earth

462
00:18:48,859 --> 00:18:46,590
I'd like to bring in innovator Annie

463
00:18:51,710 --> 00:18:48,869

Mayer take a look at some of her and her

464
00:18:53,509 --> 00:18:51,720
team's impressive work on a one-year

465
00:18:55,830 --> 00:18:53,519
mission a crew of four would produce

466
00:18:58,289 --> 00:18:55,840
around 2,500 kilograms

467
00:19:01,320 --> 00:18:58,299
trash I'm Annie Meyer and I'm turning

468
00:19:04,049 --> 00:19:01,330
trash into usable resources we're taking

469
00:19:06,180 --> 00:19:04,059
that trash converting it into gases that

470
00:19:08,880 --> 00:19:06,190
we can use for their venting off a

471
00:19:10,919 --> 00:19:08,890
spacecraft or using it for fuels so I'm

472
00:19:13,560 --> 00:19:10,929
standing in front of what's called Oscar

473
00:19:15,990 --> 00:19:13,570
it not only produces these gases but

474
00:19:18,000 --> 00:19:16,000
it's reducing the trash volume no one

475
00:19:19,980 --> 00:19:18,010
likes to sit in a room surrounded by

476
00:19:21,810 --> 00:19:19,990
their trash and neither do astronauts

477
00:19:24,360 --> 00:19:21,820
and so the things we're studying for

478
00:19:26,940 --> 00:19:24,370
converting trash into gases has to be

479
00:19:28,049 --> 00:19:26,950
safe for the crew and therefore safe for

480
00:19:30,149 --> 00:19:28,059
use on the planet

481
00:19:32,669 --> 00:19:30,159
my grandfather was actually a sanitation

482
00:19:36,450 --> 00:19:32,679
worker in the Bronx and so growing up I

483
00:19:38,519 --> 00:19:36,460
was very aware of trash all around us I

484
00:19:40,409 --> 00:19:38,529
was always curious how can we reduce our

485
00:19:42,510 --> 00:19:40,419
waste or convert it but I really try to

486
00:19:45,419 --> 00:19:42,520
take it home with me and do everything

487
00:19:47,880 --> 00:19:45,429
from composting trying to live a zero

488
00:19:48,779 --> 00:19:47,890

waste as you can show others that if I

489
00:19:52,649 --> 00:19:48,789
can do this

490
00:19:54,870 --> 00:19:52,659
you can do it too wow what an amazing

491
00:19:56,789 --> 00:19:54,880
project Annie thank you so much for

492
00:19:59,970 --> 00:19:56,799
joining us here to talk more about Oscar

493
00:20:03,360 --> 00:19:59,980
and answer our questions thank you for

494
00:20:07,710 --> 00:20:03,370
having me so first can you can you tell

495
00:20:09,870 --> 00:20:07,720
us more about Oscar sure we are

496
00:20:12,180 --> 00:20:09,880
converting solid trash that you find on

497
00:20:14,070 --> 00:20:12,190
a space mission into gas so that we can

498
00:20:17,220 --> 00:20:14,080
have a sustainable human presence on

499
00:20:19,289 --> 00:20:17,230
space missions and so it sounds as if

500
00:20:21,480 --> 00:20:19,299
there's a lot of themes but in this

501
00:20:24,870 --> 00:20:21,490
Earth Day of conservation how can this

502
00:20:28,080 --> 00:20:24,880
technology help improve or affect our

503
00:20:29,909 --> 00:20:28,090
lives on earth yeah so on the space

504
00:20:31,440 --> 00:20:29,919
mission we think about everything we

505
00:20:33,299 --> 00:20:31,450
send up there and then we have to think

506
00:20:34,950 --> 00:20:33,309
about how are we going to use every

507
00:20:37,649 --> 00:20:34,960
single drop of what we send up there

508
00:20:39,330 --> 00:20:37,659
into something useful so in our case we

509
00:20:42,330 --> 00:20:39,340
are creating a gas that can be used as a

510
00:20:44,519 --> 00:20:42,340
fuel and if we don't use it as a fuel

511
00:20:46,409 --> 00:20:44,529
we're freeing up space for astronauts

512
00:20:49,950 --> 00:20:46,419
and their spacecraft and venting it

513
00:20:51,779 --> 00:20:49,960

overboard so when we think about back on

514
00:20:55,110 --> 00:20:51,789
earth you know we always have to think

515
00:20:57,240 --> 00:20:55,120
about reduce first so reduce what you're

516
00:20:59,940 --> 00:20:57,250
using before you convert it into

517
00:21:02,010 --> 00:20:59,950
something else and and it's a common

518
00:21:06,480 --> 00:21:02,020
mindset to try and reduce as much as you

519
00:21:08,370 --> 00:21:06,490
can in space so if there's a lot of

520
00:21:09,160 --> 00:21:08,380
technological development here and one

521
00:21:11,350 --> 00:21:09,170
thing I think that's

522
00:21:13,480 --> 00:21:11,360
really inspiring is the fact that Oscar

523
00:21:15,070 --> 00:21:13,490
is an early career initiative project

524
00:21:16,570 --> 00:21:15,080
can you talk a little bit more about how

525
00:21:20,800 --> 00:21:16,580
you and your team develop this

526
00:21:24,040 --> 00:21:20,810
technology sure so most of the people on

527
00:21:26,410 --> 00:21:24,050
our team or engineers or scientists that

528
00:21:28,570 --> 00:21:26,420
had never done a hands-on project before

529
00:21:30,400 --> 00:21:28,580
or were very early in their career so we

530
00:21:33,190 --> 00:21:30,410
had to take a lean and agile approach

531
00:21:36,220 --> 00:21:33,200
and take something from just writing on

532
00:21:37,870 --> 00:21:36,230
a piece of paper to a microgravity and

533
00:21:40,030 --> 00:21:37,880
suborbital payload and a little under

534
00:21:44,110 --> 00:21:40,040
two years so it was very fast-paced a

535
00:21:46,420 --> 00:21:44,120
lot of hard work but a lot of fun so

536
00:21:47,980 --> 00:21:46,430
there's a lot of interest at ask NASA so

537
00:21:49,780 --> 00:21:47,990
we're gonna go to social media now where

538
00:21:52,000 --> 00:21:49,790

we can talk a bit more about

539
00:21:54,280 --> 00:21:52,010
developments of technologies KT on

540
00:21:56,500 --> 00:21:54,290
Instagram writes how is the process of

541
00:21:57,840 --> 00:21:56,510
recycling different in space than on

542
00:22:01,060 --> 00:21:57,850
earth

543
00:22:04,330 --> 00:22:01,070
sure so the main things I would say are

544
00:22:06,550 --> 00:22:04,340
power and time on earth you have people

545
00:22:08,530 --> 00:22:06,560
that can spend a lot of time separating

546
00:22:11,110 --> 00:22:08,540
out the materials into the different

547
00:22:13,000 --> 00:22:11,120
types of materials in space we don't

548
00:22:14,560 --> 00:22:13,010
have a lot of crew time to separate out

549
00:22:16,510 --> 00:22:14,570
the trash so we need to know exactly

550
00:22:17,800 --> 00:22:16,520
what we have up there exactly what needs

551
00:22:20,860 --> 00:22:17,810
to be converted so we can be as

552
00:22:22,660 --> 00:22:20,870
efficient and fast as possible also on

553
00:22:25,180 --> 00:22:22,670
earth you have a lot more power

554
00:22:27,940 --> 00:22:25,190
available to you and you can spend a lot

555
00:22:29,740 --> 00:22:27,950
of energy in your recycling plant in

556
00:22:34,090 --> 00:22:29,750
space we don't have that so everything

557
00:22:35,680 --> 00:22:34,100
like heating and you know heating up

558
00:22:38,410 --> 00:22:35,690
something or converting it with

559
00:22:40,390 --> 00:22:38,420
different sensors has to be done with as

560
00:22:42,550 --> 00:22:40,400
little power as possible because it's

561
00:22:44,170 --> 00:22:42,560
just not there on a spacecraft so it

562
00:22:45,580 --> 00:22:44,180
makes us very innovative in the approach

563
00:22:50,110 --> 00:22:45,590

in the design that we have for this

564
00:22:52,120 --> 00:22:50,120
trash to gas reactor it's exciting to

565
00:22:53,830 --> 00:22:52,130
hear the agility needed and the

566
00:22:55,510 --> 00:22:53,840
interplay between scientists and

567
00:22:57,340 --> 00:22:55,520
technologists and engineers to really

568
00:22:59,020 --> 00:22:57,350
kind of figure out how to advance these

569
00:23:01,120 --> 00:22:59,030
capabilities in a totally different

570
00:23:04,060 --> 00:23:01,130
environment another interesting question

571
00:23:06,670 --> 00:23:04,070
from Special K 162 four on Instagram

572
00:23:08,530 --> 00:23:06,680
asks what's one of the major changes

573
00:23:12,880 --> 00:23:08,540
you've seen from recent technological

574
00:23:15,760 --> 00:23:12,890
advancements in your in your career yeah

575
00:23:17,860 --> 00:23:15,770
so the biggest differences on earth vs.

576
00:23:19,990 --> 00:23:17,870
space waste conversion it's a

577
00:23:21,800 --> 00:23:20,000
complicated process on earth but in

578
00:23:24,770 --> 00:23:21,810
space you have things like heat

579
00:23:26,630 --> 00:23:24,780
as for fire and combustion it's all

580
00:23:29,320 --> 00:23:26,640
different in microgravity so we're

581
00:23:32,180 --> 00:23:29,330
spending a lot of time on the physics of

582
00:23:33,980 --> 00:23:32,190
fluid flow and heat transfer and things

583
00:23:36,080 --> 00:23:33,990
like natural convection and buoyancy

584
00:23:37,670 --> 00:23:36,090
it's all different in microgravity so it

585
00:23:40,240 --> 00:23:37,680
changes the approach of how we design

586
00:23:42,560 --> 00:23:40,250
the reactor but also we have a lot of

587
00:23:44,270 --> 00:23:42,570
harmful gases if you just throw trash

588
00:23:47,390 --> 00:23:44,280

into a fire on earth you're gonna create

589
00:23:49,340 --> 00:23:47,400
some bad gases on a spacecraft we need

590
00:23:51,350 --> 00:23:49,350
to protect our crew at all costs so

591
00:23:53,300 --> 00:23:51,360
we're trying innovative approaches to

592
00:23:55,190 --> 00:23:53,310
make it as clean and efficient of a gas

593
00:23:57,230 --> 00:23:55,200
as possible so we're not producing those

594
00:23:59,570 --> 00:23:57,240
harmful byproducts so that's something

595
00:24:02,360 --> 00:23:59,580
that we can take back to earth because

596
00:24:03,770 --> 00:24:02,370
earth is basically a spaceship we forget

597
00:24:05,840 --> 00:24:03,780
that sometimes but it's this big

598
00:24:07,270 --> 00:24:05,850
atmosphere protecting our planet so the

599
00:24:09,740 --> 00:24:07,280
technologies were using will hopefully

600
00:24:11,870 --> 00:24:09,750
go back to earth and protect that

601
00:24:16,340 --> 00:24:11,880
atmosphere from processing our own trash

602
00:24:17,960 --> 00:24:16,350
here on earth well Annie thank you so

603
00:24:20,060 --> 00:24:17,970
much for joining us it's been a pleasure

604
00:24:22,040 --> 00:24:20,070
talking to you and exciting exciting to

605
00:24:25,190 --> 00:24:22,050
hear about the evolution and the

606
00:24:29,030 --> 00:24:25,200
developments of Oscar thanks for having

607
00:24:30,770 --> 00:24:29,040
me happy Earth Day at the earth Day so

608
00:24:32,810 --> 00:24:30,780
while Annie and her team are working

609
00:24:35,360 --> 00:24:32,820
towards innovative ways to manage waste

610
00:24:37,280 --> 00:24:35,370
in space and on earth our final guest

611
00:24:39,920 --> 00:24:37,290
today is looking at how human pressures

612
00:24:41,960 --> 00:24:39,930
may be changing our oceans using the

613
00:24:43,790 --> 00:24:41,970

power of the global community this nest

614
00:24:46,460 --> 00:24:43,800
research project has developed an

615
00:24:48,830 --> 00:24:46,470
interactive app to characterize coral

616
00:24:51,790 --> 00:24:48,840
reef ecosystems around the world with

617
00:24:54,980 --> 00:24:51,800
unprecedented accuracy let's take a look

618
00:24:57,650 --> 00:24:54,990
what if you could help NASA create a map

619
00:24:58,450 --> 00:24:57,660
of the ocean floor with just the tip of

620
00:24:59,560 --> 00:24:58,460
your finger

621
00:25:03,729 --> 00:24:59,570
[Music]

622
00:25:06,820 --> 00:25:03,739
the ocean teeming with life it defines

623
00:25:10,060 --> 00:25:06,830
our blue planet drives our ecosystem and

624
00:25:11,950 --> 00:25:10,070
regulates our climate coral reefs are

625
00:25:13,719 --> 00:25:11,960
one of the most diverse and important

626
00:25:15,310 --> 00:25:13,729
systems in the ocean they're also

627
00:25:16,690 --> 00:25:15,320
becoming an important source of

628
00:25:19,299 --> 00:25:16,700
medicines for some of the world's

629
00:25:21,159 --> 00:25:19,309
deadliest diseases but they are dying at

630
00:25:23,560 --> 00:25:21,169
unprecedented rates due to rising

631
00:25:25,629 --> 00:25:23,570
temperatures but we don't know how much

632
00:25:28,899 --> 00:25:25,639
we're losing or how much our climate is

633
00:25:31,029 --> 00:25:28,909
changing we can't until we determine how

634
00:25:33,099 --> 00:25:31,039
much healthy reef exists now

635
00:25:34,539 --> 00:25:33,109
and the only way we can know that is

636
00:25:36,849 --> 00:25:34,549
with your help

637
00:25:39,039 --> 00:25:36,859
NASA Nemo net is a game where you

638
00:25:41,139 --> 00:25:39,049

classify the world's coral reefs by

639
00:25:43,060 --> 00:25:41,149
painting on real-life images

640
00:25:45,129 --> 00:25:43,070
scan from the ocean floor using a

641
00:25:47,399 --> 00:25:45,139
revolutionary instrument that lets us

642
00:25:50,979 --> 00:25:47,409
see beneath the waves at unprecedented

643
00:25:53,080 --> 00:25:50,989
resolutions our oceans are so vast it

644
00:25:55,269 --> 00:25:53,090
would take us 2 million years to

645
00:25:57,909 --> 00:25:55,279
classify the world's coral reefs by hand

646
00:26:00,039 --> 00:25:57,919
the classifications you create are sent

647
00:26:02,049 --> 00:26:00,049
to our teams of NASA scientists at home

648
00:26:04,289 --> 00:26:02,059
base to teach our supercomputer to

649
00:26:07,180 --> 00:26:04,299
classify coral reefs on a global scale

650
00:26:10,180 --> 00:26:07,190
every contribution you make brings us

651
00:26:12,430 --> 00:26:10,190
closer to solving this problem join the

652
00:26:15,219 --> 00:26:12,440
NASA team to help us understand these

653
00:26:17,529 --> 00:26:15,229
amazing ecosystems take command of your

654
00:26:20,739 --> 00:26:17,539
research vessel and learn about all the

655
00:26:24,099 --> 00:26:20,749
different types of calls we must keep

656
00:26:26,769 --> 00:26:24,109
the ocean alive it supports our life as

657
00:26:29,529 --> 00:26:26,779
we know it together we can create a

658
00:26:31,479 --> 00:26:29,539
global data set of coral reefs and build

659
00:26:34,599 --> 00:26:31,489
a better understanding of how to save

660
00:26:37,989 --> 00:26:34,609
these aquatic worlds one piece of coral

661
00:26:39,520 --> 00:26:37,999
at a time good luck and welcome to the

662
00:26:48,960 --> 00:26:39,530
NASA Nemo net team

663
00:26:54,310 --> 00:26:51,940

Wow what a cool app well joining me now

664
00:26:56,650 --> 00:26:54,320
is venture riot who's a NASA scientist

665
00:26:58,270 --> 00:26:56,660
and Nemo net principal investigator but

666
00:26:59,980 --> 00:26:58,280
thank you so much for being here and

667
00:27:02,440 --> 00:26:59,990
what a great way to engage the public in

668
00:27:05,950 --> 00:27:02,450
scientific discovery Thank You Dahlia a

669
00:27:07,270 --> 00:27:05,960
happy Earth Day thank you before we talk

670
00:27:11,350 --> 00:27:07,280
a little bit more about the app can you

671
00:27:14,470 --> 00:27:11,360
tell me more about Nemo net sure so Nemo

672
00:27:17,080 --> 00:27:14,480
net started in 2016 as actually a way to

673
00:27:18,970 --> 00:27:17,090
study and process all of these really

674
00:27:20,350 --> 00:27:18,980
high resolution data sets that an

675
00:27:22,510 --> 00:27:20,360
instrument called fluid cam was

676
00:27:25,330 --> 00:27:22,520
generating so we started on the NASA

677
00:27:26,830 --> 00:27:25,340
supercomputer and the challenge grew to

678
00:27:28,990 --> 00:27:26,840
how do we process all of these high

679
00:27:30,400 --> 00:27:29,000
resolution data sets from coral reefs

680
00:27:32,620 --> 00:27:30,410
from around the world and that

681
00:27:37,150 --> 00:27:32,630
eventually grew into a citizen science

682
00:27:39,070 --> 00:27:37,160
app that you can now play so what do you

683
00:27:43,000 --> 00:27:39,080
find to be the coolest part of this app

684
00:27:45,310 --> 00:27:43,010
what do you hear from users for me this

685
00:27:46,870 --> 00:27:45,320
is really just a chance to explore our

686
00:27:47,770 --> 00:27:46,880
Earth's oceans like we've never seen

687
00:27:50,590 --> 00:27:47,780
them before

688
00:27:53,290 --> 00:27:50,600

only 6% of our ocean floor is mapped as

689
00:27:55,240 --> 00:27:53,300
of 2020 that we've mapped all of Mars in

690
00:27:57,070 --> 00:27:55,250
the moon at a spatial resolution of 30

691
00:27:59,470 --> 00:27:57,080
meters or finer and it's really

692
00:28:01,900 --> 00:27:59,480
surprising because we get so much from

693
00:28:04,299 --> 00:28:01,910
the ocean coral reefs in particular are

694
00:28:06,130 --> 00:28:04,309
just an amazing source of biodiversity

695
00:28:07,750 --> 00:28:06,140
on our planet they support all these

696
00:28:10,210 --> 00:28:07,760
life-forms in the open ocean that we

697
00:28:12,370 --> 00:28:10,220
rely on and actually you know during

698
00:28:14,200 --> 00:28:12,380
this viral pandemic now more than ever I

699
00:28:15,669 --> 00:28:14,210
think about the importance of all the

700
00:28:18,430 --> 00:28:15,679
medicines we get from coral reefs

701
00:28:19,930 --> 00:28:18,440
leading antiviral medications like AZT

702
00:28:22,360 --> 00:28:19,940
which turned around the HIV epidemic

703
00:28:25,270 --> 00:28:22,370
we're first discovered in reef systems

704
00:28:27,190 --> 00:28:25,280
so for me it's it's exciting because you

705
00:28:28,870 --> 00:28:27,200
you get to explore and see these

706
00:28:31,060 --> 00:28:28,880
datasets coming from our fluid chem

707
00:28:33,100 --> 00:28:31,070
instrument which is the first instrument

708
00:28:36,220 --> 00:28:33,110
that's able to peel back the ocean wave

709
00:28:38,680 --> 00:28:36,230
distortion and actually map the seafloor

710
00:28:41,650 --> 00:28:38,690
in shallow areas at the centimeter scale

711
00:28:43,000 --> 00:28:41,660
and in the game you not only get to

712
00:28:45,580 --> 00:28:43,010
explore these environments but also

713
00:28:47,410 --> 00:28:45,590

color them and as you color all of that

714
00:28:50,080 --> 00:28:47,420
data gets sent to our supercomputer

715
00:28:51,790 --> 00:28:50,090
which is able to study coral on a global

716
00:28:53,680 --> 00:28:51,800
scale by creating a machine learning

717
00:28:54,290 --> 00:28:53,690
model with all the training data that

718
00:28:57,620 --> 00:28:54,300
users

719
00:28:59,750 --> 00:28:57,630
like you provided this is amazing

720
00:29:03,890 --> 00:28:59,760
technology do you see any other places

721
00:29:06,410 --> 00:29:03,900
this could be applied yes this is

722
00:29:09,020 --> 00:29:06,420
actually the first time 3d data has been

723
00:29:11,930 --> 00:29:09,030
classified by citizen scientists and it

724
00:29:14,960 --> 00:29:11,940
opens up an entire new way to study the

725
00:29:17,540 --> 00:29:14,970
world humans rely on our stereo vision

726
00:29:20,000 --> 00:29:17,550
our 3d vision to separate items out in

727
00:29:21,770 --> 00:29:20,010
fact if you google Chihuahua and

728
00:29:24,080 --> 00:29:21,780
blueberry muffin and you'll find that

729
00:29:26,000 --> 00:29:24,090
this is still a difficult problem for

730
00:29:28,250 --> 00:29:26,010
computers to separate out the faces of

731
00:29:30,680 --> 00:29:28,260
Chihuahua dogs and muffins look very

732
00:29:32,210 --> 00:29:30,690
similar but once you have 3d data you

733
00:29:34,820 --> 00:29:32,220
can actually separate those two things

734
00:29:37,910 --> 00:29:34,830
out so for an Evo net one of the

735
00:29:39,950 --> 00:29:37,920
applications we're looking at is going

736
00:29:43,340 --> 00:29:39,960
to Mars and the moon and other planetary

737
00:29:46,310 --> 00:29:43,350
bodies and looking for signs of life on

738
00:29:48,170 --> 00:29:46,320

earth we actually used fluid cam to

739
00:29:49,790 --> 00:29:48,180
study things called stromatolites in

740
00:29:51,140 --> 00:29:49,800
Western Australia now these are the

741
00:29:52,340 --> 00:29:51,150
first life-forms on earth

742
00:29:54,050 --> 00:29:52,350
they've been around three and a half

743
00:29:56,420 --> 00:29:54,060
billion years and they form these very

744
00:29:58,430 --> 00:29:56,430
strange-looking rocks and they're still

745
00:30:00,770 --> 00:29:58,440
living in this area in Western Australia

746
00:30:03,200 --> 00:30:00,780
so we were able to map them using fluid

747
00:30:05,600 --> 00:30:03,210
cam and then using a tool like Nemo net

748
00:30:07,310 --> 00:30:05,610
where we train what is considered a

749
00:30:09,350 --> 00:30:07,320
living organism and not we're actually

750
00:30:12,320 --> 00:30:09,360
able to separate out the stromatolites

751
00:30:14,870 --> 00:30:12,330
whether their fossilized or living from

752
00:30:16,880 --> 00:30:14,880
rocks and that's really the you know a

753
00:30:19,310 --> 00:30:16,890
life detection instrument being able to

754
00:30:21,170 --> 00:30:19,320
separate out these 3d structures and

755
00:30:23,330 --> 00:30:21,180
identify that the living organisms or

756
00:30:24,860 --> 00:30:23,340
they were the new organisms so as we

757
00:30:27,170 --> 00:30:24,870
venture out into the solar system and

758
00:30:29,030 --> 00:30:27,180
the universe I think what's exciting

759
00:30:31,160 --> 00:30:29,040
about Nemo net is that we can bring

760
00:30:33,170 --> 00:30:31,170
these advanced 3d machine learning tools

761
00:30:35,120 --> 00:30:33,180
to study in different worlds and

762
00:30:38,960 --> 00:30:35,130
directing the areas that we want to send

763
00:30:40,790 --> 00:30:38,970

our next Rovers to this is amazing I

764
00:30:42,650 --> 00:30:40,800
mean we've been hearing throughout the

765
00:30:44,420 --> 00:30:42,660
course of this show about how you know

766
00:30:46,040 --> 00:30:44,430
we can take technologies develop spur

767
00:30:48,440 --> 00:30:46,050
space and apply them on earth but it's

768
00:30:51,170 --> 00:30:48,450
really exciting to have the analog on

769
00:30:53,090 --> 00:30:51,180
earth to look into space so just we'd

770
00:30:55,430 --> 00:30:53,100
love to take some questions from axe ask

771
00:30:57,230 --> 00:30:55,440
NASA and one question is from Shannon on

772
00:31:00,740 --> 00:30:57,240
Instagram you know what got you

773
00:31:02,630 --> 00:31:00,750
interested in coral reef studies yeah

774
00:31:04,810 --> 00:31:02,640
I've actually an astrophysicist by

775
00:31:07,770 --> 00:31:04,820
training and I met dr.

776
00:31:10,360 --> 00:31:07,780
you'll see in Nemo net video game and

777
00:31:12,250 --> 00:31:10,370
two minutes with sylvia earle had me

778
00:31:14,500 --> 00:31:12,260
convinced that i needed to point my gaze

779
00:31:17,110 --> 00:31:14,510
from the sky it down into our own ocean

780
00:31:19,420 --> 00:31:17,120
the amount of information we don't know

781
00:31:23,830 --> 00:31:19,430
about something that is so important to

782
00:31:26,110 --> 00:31:23,840
us to me just makes it an instant

783
00:31:28,180 --> 00:31:26,120
switchover I mean studying the ocean has

784
00:31:30,640 --> 00:31:28,190
been incredibly fulfilling career so far

785
00:31:33,160 --> 00:31:30,650
I've got to interact with animals and

786
00:31:35,320 --> 00:31:33,170
see life in a completely different way

787
00:31:37,330 --> 00:31:35,330
and I hope that everyone playing Nemo

788
00:31:39,220 --> 00:31:37,340

net gets that same experience enjoy

789
00:31:41,440 --> 00:31:39,230
without all of the labors of wearing

790
00:31:44,260 --> 00:31:41,450
scuba gear or having to travel to these

791
00:31:46,510 --> 00:31:44,270
remote areas and swim and snorkel out to

792
00:31:48,640 --> 00:31:46,520
find life-forms but it's just it's a

793
00:31:52,150 --> 00:31:48,650
very special place and you begin to

794
00:31:53,920 --> 00:31:52,160
realize that the ocean is really what

795
00:31:55,960 --> 00:31:53,930
dominates our planet and we've lived on

796
00:31:57,220 --> 00:31:55,970
this tiny little slice of land our whole

797
00:32:00,070 --> 00:31:57,230
lives but we don't really fully

798
00:32:02,980 --> 00:32:00,080
understand how our planet works unless

799
00:32:04,600 --> 00:32:02,990
we understand the ocean well thank you

800
00:32:06,370 --> 00:32:04,610
so much you've definitely inspired me

801
00:32:09,610 --> 00:32:06,380
and how can others be inspired and get

802
00:32:11,440 --> 00:32:09,620
involved with the app so I encourage

803
00:32:13,570 --> 00:32:11,450
everybody to get involved in the app and

804
00:32:15,490 --> 00:32:13,580
also in your community you can download

805
00:32:18,550 --> 00:32:15,500
the Nemo net app in the App Store right

806
00:32:20,950 --> 00:32:18,560
now for desktop and iOS devices and it

807
00:32:26,050 --> 00:32:20,960
can also visit our homepage at Nemo net

808
00:32:28,060 --> 00:32:26,060
info great well thank you so much for

809
00:32:29,980 --> 00:32:28,070
joining us so that's about all for our

810
00:32:32,530 --> 00:32:29,990
show today thank you so much for joining

811
00:32:34,390 --> 00:32:32,540
us on today the 50th anniversary of

812
00:32:36,040 --> 00:32:34,400
Earth Day if you want to find out all

813
00:32:39,340 --> 00:32:36,050

the ways you can get involved please

814
00:32:41,800 --> 00:32:39,350
visit nasa.gov slash Earth Day nASA has

815
00:32:43,510 --> 00:32:41,810
launched a NASA at home website where

816
00:32:46,540 --> 00:32:43,520
you can find lots of different resources

817
00:32:48,880 --> 00:32:46,550
videos podcasts and activities to learn

818
00:32:51,250 --> 00:32:48,890
more about NASA's exciting technology

819
00:32:53,530 --> 00:32:51,260
and science also follow the hashtag

820
00:32:55,990 --> 00:32:53,540
Earth Day at home for a schedule of

821
00:32:57,490 --> 00:32:56,000
activities in honor of Earth Day thank

822
00:33:00,190 --> 00:32:57,500
you so much for joining us and we hope

823
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to see you next time