



**Benjamin E. S**  
University of Washington AF



Benjamin E.

1  
00:00:16,750 --> 00:00:13,300  
welcome everyone to this Google hangout

2  
00:00:19,120 --> 00:00:16,760  
about NASA's operation IceBridge ice

3  
00:00:21,100 --> 00:00:19,130  
bridges NASA's ongoing mission to fly

4  
00:00:24,340 --> 00:00:21,110  
planes over Earth's North and South

5  
00:00:26,070 --> 00:00:24,350  
Poles to study ice I'm Laura bets here

6  
00:00:29,560 --> 00:00:26,080  
at NASA's Goddard Space Flight Center

7  
00:00:32,080 --> 00:00:29,570  
we're very fortunate to have two guests

8  
00:00:34,930 --> 00:00:32,090  
who are just on an ice bridge flight to

9  
00:00:38,430 --> 00:00:34,940  
Antarctica US ambassador Michael hammer

10  
00:00:40,210 --> 00:00:38,440  
who is the US ambassador to chilling

11  
00:00:43,930 --> 00:00:40,220  
honored to have you with us mr.

12  
00:00:45,850 --> 00:00:43,940  
ambassador it's a pleasure being with

13  
00:00:49,990 --> 00:00:45,860

you when I started this was just not

14

00:00:54,180 --> 00:00:50,000

gonna status also on that flight we have

15

00:00:58,330 --> 00:00:54,190

NASA's chief scientist dr. Ellen stofan

16

00:01:00,459 --> 00:00:58,340

welcome dr. Stefan thank you it's great

17

00:01:02,200 --> 00:01:00,469

to be here today but I have to say it

18

00:01:06,490 --> 00:01:02,210

was even better flying over an arm Vicki

19

00:01:08,920 --> 00:01:06,500

yesterday both ambassador hammer and dr.

20

00:01:11,320 --> 00:01:08,930

Stefan are joining us from Chile the

21

00:01:13,719 --> 00:01:11,330

jumping-off point for NASA's flight to

22

00:01:16,780 --> 00:01:13,729

Antarctica from the University of

23

00:01:20,109 --> 00:01:16,790

Washington in Seattle Ben Smith is a

24

00:01:23,710 --> 00:01:20,119

senior ice bridge researcher been thank

25

00:01:25,270 --> 00:01:23,720

you for joining us my pleasure we're

26

00:01:28,840 --> 00:01:25,280

answering your questions if you're

27

00:01:31,810 --> 00:01:28,850

watching live just use hashtag icebridge

28

00:01:35,260 --> 00:01:31,820

and our first question is for ambassador

29

00:01:38,410 --> 00:01:35,270

hammer mr. ambassador you have been

30

00:01:41,740 --> 00:01:38,420

previously posted in Bolivia Norway

31

00:01:43,870 --> 00:01:41,750

Iceland and Denmark and have also served

32

00:01:47,410 --> 00:01:43,880

at the White House and the National

33

00:01:52,179 --> 00:01:47,420

Security Council how and why does the

34

00:01:53,560 --> 00:01:52,189

State Department support science well

35

00:01:55,810 --> 00:01:53,570

thank you very much for that question

36

00:01:56,969 --> 00:01:55,820

and it goes to the core of part of our

37

00:01:59,260 --> 00:01:56,979

mission at the State Department

38

00:02:01,899 --> 00:01:59,270

obviously our focus is to explain

39

00:02:04,569 --> 00:02:01,909

America's foreign policy and to promote

40

00:02:07,719 --> 00:02:04,579

American interest but science is a very

41

00:02:10,629 --> 00:02:07,729

key component of what we do in the sense

42

00:02:12,670 --> 00:02:10,639

that we know that through science we

43

00:02:14,530 --> 00:02:12,680

could solve the world's challenges and

44

00:02:17,080 --> 00:02:14,540

we also know that as a kind

45

00:02:21,220 --> 00:02:17,090

tree the United States can't solve the

46

00:02:24,009 --> 00:02:21,230

problems alone and so science means that

47

00:02:25,990 --> 00:02:24,019

we can work with other governments to

48

00:02:29,410 --> 00:02:26,000

confront for example the current crisis

49

00:02:31,149 --> 00:02:29,420

on Ebola to confront the challenge of

50

00:02:33,670 --> 00:02:31,159

climate change that we were learning

51  
00:02:36,369 --> 00:02:33,680  
about yesterday through our ice bridge

52  
00:02:38,979 --> 00:02:36,379  
mission and so even at times when

53  
00:02:41,860 --> 00:02:38,989  
because of political reasons perhaps

54  
00:02:45,369 --> 00:02:41,870  
there's tension between countries we

55  
00:02:48,460 --> 00:02:45,379  
find that scientists still find that

56  
00:02:50,679 --> 00:02:48,470  
it's easy and wanting to communicate on

57  
00:02:52,539 --> 00:02:50,689  
the issues that are relevant and so it's

58  
00:02:55,780 --> 00:02:52,549  
another vehicle through which we the

59  
00:02:59,530 --> 00:02:55,790  
United States can be contacting other

60  
00:03:02,670 --> 00:02:59,540  
other folks and connecting them because

61  
00:03:05,530 --> 00:03:02,680  
science in the day is as I said

62  
00:03:07,629 --> 00:03:05,540  
important to the United States but to

63  
00:03:09,970 --> 00:03:07,639

the world and it's a way that we can

64

00:03:11,920 --> 00:03:09,980

solve the problems that we currently

65

00:03:17,080 --> 00:03:11,930

face for the benefit of future

66

00:03:20,050 --> 00:03:17,090

generations thank you I should also note

67

00:03:22,780 --> 00:03:20,060

that we know that science and technology

68

00:03:25,539 --> 00:03:22,790

are important for creativity innovation

69

00:03:28,599 --> 00:03:25,549

and they help with economic development

70

00:03:30,580 --> 00:03:28,609

and growth which is another core mission

71

00:03:33,550 --> 00:03:30,590

of the State Department promoting

72

00:03:36,580 --> 00:03:33,560

American business and investment but

73

00:03:40,979 --> 00:03:36,590

also through innovation and creativity

74

00:03:43,869 --> 00:03:40,989

which tie in the sciences attract very

75

00:03:47,080 --> 00:03:43,879

important groups of people and through

76

00:03:51,099 --> 00:03:47,090

education we're able to again advanced

77

00:03:52,990 --> 00:03:51,109

another one of our core interests thank

78

00:03:56,640 --> 00:03:53,000

you we have another question for you mr.

79

00:03:59,140 --> 00:03:56,650

ambassador what is science diplomacy

80

00:04:01,360 --> 00:03:59,150

well thank you very much for that

81

00:04:03,129 --> 00:04:01,370

question we have been doing science

82

00:04:05,860 --> 00:04:03,139

diplomacy under the Obama administration

83

00:04:09,159 --> 00:04:05,870

first Under Secretary Clinton and then

84

00:04:11,649 --> 00:04:09,169

now with secretary Kerry because what it

85

00:04:15,189 --> 00:04:11,659

means is that we are again connecting

86

00:04:17,979 --> 00:04:15,199

with people in a way that they can

87

00:04:19,960 --> 00:04:17,989

relate to the United States we find that

88

00:04:23,110 --> 00:04:19,970

science breaks down a lot of barriers

89

00:04:27,219 --> 00:04:23,120

people are problem solvers we find that

90

00:04:27,879 --> 00:04:27,229

it's a way that again we can gloss over

91

00:04:30,279 --> 00:04:27,889

some

92

00:04:33,489 --> 00:04:30,289

other political or economic tensions and

93

00:04:35,379 --> 00:04:33,499

be able to engage with a broad audience

94

00:04:37,300 --> 00:04:35,389

and let's touch on education which is

95

00:04:39,670 --> 00:04:37,310

critically important we know for future

96

00:04:41,679 --> 00:04:39,680

generations people are attracted to the

97

00:04:43,719 --> 00:04:41,689

work of NASA there were attracted to our

98

00:04:45,629 --> 00:04:43,729

universities I'm sure even University of

99

00:04:48,129 --> 00:04:45,639

Washington gets a fair number of

100

00:04:49,570 --> 00:04:48,139

international students and we want to

101  
00:04:51,249 --> 00:04:49,580  
attract the very best from around the

102  
00:04:54,159 --> 00:04:51,259  
world and what better way to highlight

103  
00:04:56,320 --> 00:04:54,169  
what we are able to do in the science

104  
00:04:58,480 --> 00:04:56,330  
field and to generate the international

105  
00:05:01,390 --> 00:04:58,490  
cooperation that promotes better

106  
00:05:02,559 --> 00:05:01,400  
relations between countries so we don't

107  
00:05:05,679 --> 00:05:02,569  
only have government to government

108  
00:05:08,529 --> 00:05:05,689  
contacts we want to have scientists like

109  
00:05:11,469 --> 00:05:08,539  
dr. Ellen stofan with us visiting here

110  
00:05:13,959 --> 00:05:11,479  
until eight connecting with students as

111  
00:05:16,179 --> 00:05:13,969  
she has been during her visit connecting

112  
00:05:18,820 --> 00:05:16,189  
with people at the Antarctic Center here

113  
00:05:21,790 --> 00:05:18,830

in Chile and fostering that positive

114

00:05:27,510 --> 00:05:21,800

feeling that allows us to then cooperate

115

00:05:30,279 --> 00:05:27,520

when problems arise well thank you

116

00:05:32,980 --> 00:05:30,289

speaking of transcending borders and

117

00:05:35,850 --> 00:05:32,990

other cultures Ellen your research has

118

00:05:39,399 --> 00:05:35,860

focused on the geology of Venus Mars

119

00:05:41,740 --> 00:05:39,409

Saturn's moon Titan and Earth what is

120

00:05:46,540 --> 00:05:41,750

NASA's role in studying the climate and

121

00:05:47,920 --> 00:05:46,550

polar regions in general you know a lot

122

00:05:49,420 --> 00:05:47,930

of people wonder her you know why does

123

00:05:51,309 --> 00:05:49,430

NASA study the earth well for one thing

124

00:05:54,459 --> 00:05:51,319

the earth is a planet and of course it's

125

00:05:56,379 --> 00:05:54,469

our favorite planet um and by studying

126

00:05:58,629 --> 00:05:56,389

the Earth from space you really get a

127

00:06:00,540 --> 00:05:58,639

global view in that global view is what

128

00:06:04,089 --> 00:06:00,550

you need to study so much of the Earth's

129

00:06:05,800 --> 00:06:04,099

how the earth works because um you have

130

00:06:07,420 --> 00:06:05,810

to pull back from that distance to

131

00:06:09,969 --> 00:06:07,430

really observe processes that are

132

00:06:11,529 --> 00:06:09,979

operating on very large scales how does

133

00:06:13,749 --> 00:06:11,539

the out of the oceans work how do they

134

00:06:15,909 --> 00:06:13,759

interact with the atmosphere what is the

135

00:06:18,249 --> 00:06:15,919

state of health of the polar caps and of

136

00:06:20,740 --> 00:06:18,259

course due to the fact that our climate

137

00:06:22,360 --> 00:06:20,750

is changing it's getting warmer that is

138

00:06:24,790 --> 00:06:22,370

affecting the polar caps we've had

139

00:06:26,499 --> 00:06:24,800

record melting in the Arctic over the

140

00:06:28,779 --> 00:06:26,509

last 10 years the Arctic ice cap gets

141

00:06:30,969 --> 00:06:28,789

smaller and smaller odd it in the

142

00:06:33,519 --> 00:06:30,979

summers exposing a lot more dark ocean

143

00:06:36,159 --> 00:06:33,529

which certainly is affecting climate and

144

00:06:38,379 --> 00:06:36,169

ultimately weather and in Antarctica

145

00:06:40,730 --> 00:06:38,389

some of the ice sheets are not very

146

00:06:43,700 --> 00:06:40,740

healthy they're in a state of collapse

147

00:06:46,730 --> 00:06:43,710

and so we need to monitor this from

148

00:06:49,339 --> 00:06:46,740

space um or we can use aircraft like we

149

00:06:51,320 --> 00:06:49,349

do with ice bridge to go out and fly

150

00:06:53,360 --> 00:06:51,330

over the planet make the measurements

151  
00:06:55,460 --> 00:06:53,370  
that that we need to make to truly

152  
00:06:57,860 --> 00:06:55,470  
understand how the planet is operating

153  
00:06:59,710 --> 00:06:57,870  
we need that from a practical point of

154  
00:07:02,300 --> 00:06:59,720  
view how can we better understand our

155  
00:07:04,550 --> 00:07:02,310  
armor climate and how that affects our

156  
00:07:09,920 --> 00:07:04,560  
weather ah so that we can help people

157  
00:07:12,249 --> 00:07:09,930  
here on earth our next question is for

158  
00:07:16,850 --> 00:07:12,259  
been generally what is operation

159  
00:07:19,999 --> 00:07:16,860  
IceBridge operation IceBridge is an

160  
00:07:22,730 --> 00:07:20,009  
effort to bridge the gap between two

161  
00:07:24,559 --> 00:07:22,740  
NASA satellites I sep one and I set to

162  
00:07:27,230 --> 00:07:24,569  
now both of these satellites are

163  
00:07:29,270 --> 00:07:27,240

altimeters they measure the height of

164

00:07:31,939 --> 00:07:29,280

the ice sheet I step one finish in about

165

00:07:34,939 --> 00:07:31,949

two thousand nine and I SAT two should

166

00:07:36,529 --> 00:07:34,949

launch sometime in 2017 so these are

167

00:07:37,790 --> 00:07:36,539

both really valuable missions for

168

00:07:39,830 --> 00:07:37,800

telling us what the ice sheets were

169

00:07:41,540 --> 00:07:39,840

doing they showed us that the ice sheet

170

00:07:43,820 --> 00:07:41,550

Heights the ice at one showed us that

171

00:07:47,930 --> 00:07:43,830

the ice sheet heights were sinking in a

172

00:07:50,480 --> 00:07:47,940

lot of places and i SAT to will continue

173

00:07:52,249 --> 00:07:50,490

that series of measurements when I

174

00:07:53,689 --> 00:07:52,259

watched but in the meantime we have sort

175

00:07:55,790 --> 00:07:53,699

of a gap in the data and so we're

176

00:07:57,409 --> 00:07:55,800

filling that gap by flying airplanes

177

00:07:59,930 --> 00:07:57,419

that make the same kind of measurements

178

00:08:02,240 --> 00:07:59,940

as these two satellites now of course

179

00:08:04,310 --> 00:08:02,250

you can't fly an airplane everywhere all

180

00:08:06,439 --> 00:08:04,320

the time so we've had to be a little bit

181

00:08:08,689 --> 00:08:06,449

smart about where we might to send these

182

00:08:11,629 --> 00:08:08,699

airplanes so we've focused on some

183

00:08:13,730 --> 00:08:11,639

important areas one of them is the part

184

00:08:16,279 --> 00:08:13,740

of Antarctica that's closest to South

185

00:08:17,930 --> 00:08:16,289

America so Pine Island glacier in the

186

00:08:19,339 --> 00:08:17,940

Thwaites glacier are really exciting

187

00:08:22,070 --> 00:08:19,349

places because they're changing a lot

188

00:08:23,420 --> 00:08:22,080

and the some other places are in

189

00:08:25,309 --> 00:08:23,430

Greenland where we know that glaciers

190

00:08:27,020 --> 00:08:25,319

are changing really rapidly and then

191

00:08:28,610 --> 00:08:27,030

beyond getting those places we try and

192

00:08:31,580 --> 00:08:28,620

make the measurements everywhere else we

193

00:08:33,740 --> 00:08:31,590

can as best we can now since we're

194

00:08:35,930 --> 00:08:33,750

flying these airplanes with the laser

195

00:08:37,490 --> 00:08:35,940

altimeter some of them we might as well

196

00:08:38,870 --> 00:08:37,500

put some other instruments on the

197

00:08:41,060 --> 00:08:38,880

airplane at the same time you get a

198

00:08:43,069 --> 00:08:41,070

little bit more bang for our buck so

199

00:08:46,040 --> 00:08:43,079

among the instruments that we have on

200

00:08:48,410 --> 00:08:46,050

the airplane is a nice penetrating radar

201

00:08:51,110 --> 00:08:48,420

which tells you how thick the ice is

202

00:08:53,240 --> 00:08:51,120

which is really important from being

203

00:08:54,570 --> 00:08:53,250

able to make predictions of what the ice

204

00:08:57,240 --> 00:08:54,580

sheet is going to do in the future

205

00:08:59,280 --> 00:08:57,250

after understanding how speed changes in

206

00:09:00,870 --> 00:08:59,290

the ice sheet affect sea level and

207

00:09:02,580 --> 00:09:00,880

there's some other measurements that

208

00:09:04,410 --> 00:09:02,590

tell us how much snow is on top of the

209

00:09:06,450 --> 00:09:04,420

ice sheet how much snow has fallen

210

00:09:09,000 --> 00:09:06,460

recently and how much snow has fallen in

211

00:09:10,620 --> 00:09:09,010

the past and some instruments that tell

212

00:09:12,900 --> 00:09:10,630

us about the temperature of the ice and

213

00:09:15,140 --> 00:09:12,910

if there's open water the temperature of

214

00:09:16,980 --> 00:09:15,150

the water so it's an airplane that's

215

00:09:18,480 --> 00:09:16,990

festooned with all sorts of great

216

00:09:21,450 --> 00:09:18,490

instruments and it's really producing

217

00:09:22,830 --> 00:09:21,460

fantastic data sets that have that have

218

00:09:24,120 --> 00:09:22,840

really helped us know what the ice

219

00:09:27,870 --> 00:09:24,130

sheets are doing what they might do the

220

00:09:33,000 --> 00:09:27,880

future we have a question from Twitter

221

00:09:35,610 --> 00:09:33,010

at floor Torian how does one navigate

222

00:09:37,500 --> 00:09:35,620

down there given that east and west is

223

00:09:39,560 --> 00:09:37,510

near meaningless and everything is north

224

00:09:43,980 --> 00:09:39,570

of you been would you like to take that

225

00:09:46,950 --> 00:09:43,990

yeah navigating with GPS and the poles

226

00:09:51,270 --> 00:09:46,960

is really not that hard you start out

227

00:09:54,180 --> 00:09:51,280

with a map that's has Antarctica in this

228

00:09:55,770 --> 00:09:54,190

in the center of the map and then you

229

00:09:58,350 --> 00:09:55,780

just draw the lens you'd like to fly

230

00:10:00,570 --> 00:09:58,360

upload those to your GPS and the GPS

231

00:10:02,010 --> 00:10:00,580

will take you where you need to go so if

232

00:10:04,310 --> 00:10:02,020

you're doing this with a compass it can

233

00:10:07,440 --> 00:10:04,320

get really confusing and that's because

234

00:10:09,240 --> 00:10:07,450

compass will always point north and in

235

00:10:11,010 --> 00:10:09,250

fact in Antarctica a compass will point

236

00:10:12,240 --> 00:10:11,020

in a lot of different directions because

237

00:10:14,460 --> 00:10:12,250

the magnetic field is kind of

238

00:10:20,090 --> 00:10:14,470

complicated down there but with GPS

239

00:10:24,780 --> 00:10:22,680

then another question for you how do

240

00:10:28,200 --> 00:10:24,790

these changes to the ice and polar

241

00:10:31,080 --> 00:10:28,210

regions impact impact us thousands of

242

00:10:33,060 --> 00:10:31,090

miles away well the one that we're

243

00:10:34,650 --> 00:10:33,070

always the most interested in is sea

244

00:10:38,640 --> 00:10:34,660

level change because that affects the

245

00:10:40,920 --> 00:10:38,650

whole planet at once so as I sleeves

246

00:10:43,500 --> 00:10:40,930

Antarctica or leaves Greenland and goes

247

00:10:45,930 --> 00:10:43,510

into the ocean unless it's replaced by

248

00:10:50,820 --> 00:10:45,940

new snowfall that's going to make the

249

00:10:53,760 --> 00:10:50,830

ocean levels rise so for just

250

00:10:56,160 --> 00:10:53,770

back-of-the-envelope calculations 360

251  
00:10:58,530 --> 00:10:56,170  
cubic kilometers of ice removed from

252  
00:11:02,700 --> 00:10:58,540  
Antarctica and added to the ocean equals

253  
00:11:04,320 --> 00:11:02,710  
one millimeter of sea level we like to

254  
00:11:05,730 --> 00:11:04,330  
make measurements in places where we

255  
00:11:07,950 --> 00:11:05,740  
know that the ice sheet is changing

256  
00:11:08,340 --> 00:11:07,960  
rapidly because it's easier to have

257  
00:11:10,260 --> 00:11:08,350  
measure

258  
00:11:11,610 --> 00:11:10,270  
that are greater than the errors but we

259  
00:11:15,600 --> 00:11:11,620  
also like to know what the whole ice

260  
00:11:17,250 --> 00:11:15,610  
sheet is doing at once so once i SAT two

261  
00:11:19,050 --> 00:11:17,260  
is up we'll have sort of ice sheet wide

262  
00:11:20,100 --> 00:11:19,060  
measurements but for the meantime we're

263  
00:11:22,200 --> 00:11:20,110

looking at the places that are changing

264

00:11:23,700 --> 00:11:22,210

the most rapidly because those will have

265

00:11:28,350 --> 00:11:23,710

the greatest impact on sea level in the

266

00:11:31,260 --> 00:11:28,360

short term we're still collecting

267

00:11:33,930 --> 00:11:31,270

questions at hashtag ice bridge here's

268

00:11:38,640 --> 00:11:33,940

another one for Ellen why is it called

269

00:11:41,370 --> 00:11:38,650

ice bridge well because it studies the

270

00:11:43,080 --> 00:11:41,380

ice again in the arse of northern North

271

00:11:44,970 --> 00:11:43,090

American summer we go up to the Arctic

272

00:11:46,890 --> 00:11:44,980

we go to Greenland look at the the

273

00:11:48,780 --> 00:11:46,900

extent of thickness of the Arctic ice

274

00:11:50,580 --> 00:11:48,790

cap then we go to Greenland make lots of

275

00:11:51,930 --> 00:11:50,590

measurements in that area to understand

276

00:11:55,320 --> 00:11:51,940

the state of the Greenland ice sheet in

277

00:11:57,630 --> 00:11:55,330

ah now it's in down here in South

278

00:11:59,880 --> 00:11:57,640

America it's spring going towards summer

279

00:12:02,820 --> 00:11:59,890

so we bring the aircraft down here and

280

00:12:05,640 --> 00:12:02,830

fly over Antarctica so we're studying

281

00:12:08,850 --> 00:12:05,650

ice at both poles and we're bridging ice

282

00:12:12,020 --> 00:12:08,860

bridge on the gap as Ben was talking

283

00:12:14,190 --> 00:12:12,030

about between i SAT one and i SAT two um

284

00:12:15,420 --> 00:12:14,200

and it's actually a really great

285

00:12:17,400 --> 00:12:15,430

opportunity because when you have

286

00:12:19,620 --> 00:12:17,410

instruments on an airplane rather than

287

00:12:22,440 --> 00:12:19,630

up in space you can keep improving them

288

00:12:23,760 --> 00:12:22,450

you can keep thinking as Ben was saying

289

00:12:25,440 --> 00:12:23,770

what other instruments can we bring

290

00:12:27,840 --> 00:12:25,450

along with this it's easy to swap things

291

00:12:29,910 --> 00:12:27,850

in and out so it really allows us to

292

00:12:32,220 --> 00:12:29,920

optimize the instruments really get at

293

00:12:34,050 --> 00:12:32,230

how can we make the best bring the best

294

00:12:36,570 --> 00:12:34,060

instruments along so that we can really

295

00:12:38,430 --> 00:12:36,580

understand what's happening in these

296

00:12:42,570 --> 00:12:38,440

polar regions where climate change is

297

00:12:45,150 --> 00:12:42,580

making things change just so rapidly we

298

00:12:48,120 --> 00:12:45,160

have a Twitter question from at fit

299

00:12:52,770 --> 00:12:48,130

Orion what data are you collecting with

300

00:12:54,450 --> 00:12:52,780

these flights been there are quite a few

301

00:12:56,670 --> 00:12:54,460

different instruments that are on the

302

00:12:58,890 --> 00:12:56,680

airplane one of the most important is

303

00:13:01,530 --> 00:12:58,900

the laser altimeter measurements and

304

00:13:03,260 --> 00:13:01,540

that's just where you send a pulse laser

305

00:13:05,580 --> 00:13:03,270

down to the surface of the ice and

306

00:13:07,020 --> 00:13:05,590

measure the time it takes to go from the

307

00:13:08,820 --> 00:13:07,030

airplane to the ice and back that tells

308

00:13:11,280 --> 00:13:08,830

you how high the surface of the ice is

309

00:13:12,960 --> 00:13:11,290

and if you measure that more than once

310

00:13:14,910 --> 00:13:12,970

if you measure that this hearing next

311

00:13:17,880 --> 00:13:14,920

year you can see how much the surface of

312

00:13:19,340 --> 00:13:17,890

the ice is going up or gone down the

313

00:13:21,430 --> 00:13:19,350

other measurements we have are from

314

00:13:23,890 --> 00:13:21,440

radars so

315

00:13:26,290 --> 00:13:23,900

one radar system measures the thickness

316

00:13:28,240 --> 00:13:26,300

of the ice it sends pulses radar energy

317

00:13:29,980 --> 00:13:28,250

that travel all the way through the ice

318

00:13:32,350 --> 00:13:29,990

sheet bounced off the bottom and come

319

00:13:33,850 --> 00:13:32,360

back to the airplane so you know the

320

00:13:36,460 --> 00:13:33,860

time that takes you can figure out how

321

00:13:39,460 --> 00:13:36,470

thick the ice is another set of radars

322

00:13:41,380 --> 00:13:39,470

measures the ice right near the surface

323

00:13:43,360 --> 00:13:41,390

so it measures the snow layers that are

324

00:13:45,010 --> 00:13:43,370

right close to the surface if you see

325

00:13:47,860 --> 00:13:45,020

how thick those layers are you can tell

326

00:13:50,200 --> 00:13:47,870

how much it's been snowing and that

327

00:13:52,630 --> 00:13:50,210

tells you how much snow has been added

328

00:13:54,370 --> 00:13:52,640

back to the ice sheet these things also

329

00:13:56,470 --> 00:13:54,380

operate over sea ice and they can be

330

00:13:58,300 --> 00:13:56,480

used to measure how thick the sea ice is

331

00:14:00,310 --> 00:13:58,310

and how thick the snow on the sea ice is

332

00:14:04,120 --> 00:14:00,320

and then we have some other measurements

333

00:14:05,530 --> 00:14:04,130

that tell about the temperatures of the

334

00:14:09,070 --> 00:14:05,540

surface and the temperature of the

335

00:14:10,780 --> 00:14:09,080

atmosphere we have measurements that we

336

00:14:15,730 --> 00:14:10,790

have cameras that take pictures of the

337

00:14:17,590 --> 00:14:15,740

ice below the below the airplane and we

338

00:14:19,660 --> 00:14:17,600

have some measurements of infrared

339

00:14:20,710 --> 00:14:19,670

radiation around the end of the airplane

340

00:14:25,570 --> 00:14:20,720

which are important for understanding

341

00:14:29,650 --> 00:14:25,580

how sea ice forms and grows so that's

342

00:14:32,230 --> 00:14:29,660

that's the mission in a nutshell Thank

343

00:14:37,000 --> 00:14:32,240

You Ellen and Michael what was it like

344

00:14:40,330 --> 00:14:37,010

on the flight yesterday wow that's the

345

00:14:42,580 --> 00:14:40,340

scientific explanation no frankly it was

346

00:14:45,700 --> 00:14:42,590

really truly remarkable one dreams of

347

00:14:48,790 --> 00:14:45,710

perhaps someday being able to see

348

00:14:50,890 --> 00:14:48,800

Antarctica but actually doing it is is

349

00:14:53,080 --> 00:14:50,900

really an incredible experience and also

350

00:14:55,000 --> 00:14:53,090

to learn from the crew and incredible

351  
00:14:57,100 --> 00:14:55,010  
scientists that are on the board as they

352  
00:14:59,650 --> 00:14:57,110  
were explained to us exactly what was

353  
00:15:01,960 --> 00:14:59,660  
going on so it's not only the sides but

354  
00:15:03,610 --> 00:15:01,970  
also the remarkable effort in science

355  
00:15:06,010 --> 00:15:03,620  
that's behind all this so for me as a

356  
00:15:08,350 --> 00:15:06,020  
diplomat here I was learning things that

357  
00:15:09,910 --> 00:15:08,360  
you know you were very curious about but

358  
00:15:11,890 --> 00:15:09,920  
to see it in real life and see the

359  
00:15:13,390 --> 00:15:11,900  
natural beauty is really quite

360  
00:15:14,890 --> 00:15:13,400  
spectacular and you're seeing some of

361  
00:15:16,720 --> 00:15:14,900  
the images there in the background well

362  
00:15:20,230 --> 00:15:16,730  
it truly is like that just this

363  
00:15:21,940 --> 00:15:20,240

incredible expense of ice and then the

364

00:15:24,250 --> 00:15:21,950

mix with the water in the mountains that

365

00:15:26,170 --> 00:15:24,260

you see is is really phenomenal and I

366

00:15:28,410 --> 00:15:26,180

certainly had a great time it was 11

367

00:15:30,820 --> 00:15:28,420

hours but it seems go by in a flash

368

00:15:33,130 --> 00:15:30,830

because we were sort of busy trying to

369

00:15:35,369 --> 00:15:33,140

absorb it all and learning really what's

370

00:15:37,379 --> 00:15:35,379

going on and the incredible

371

00:15:39,239 --> 00:15:37,389

iversity of the crew in fact of the

372

00:15:40,969 --> 00:15:39,249

people that were there from different

373

00:15:43,589 --> 00:15:40,979

parts of the country different

374

00:15:45,449 --> 00:15:43,599

backgrounds all working together to try

375

00:15:47,189 --> 00:15:45,459

to really understand that the science

376

00:15:48,960 --> 00:15:47,199

behind climate change in the impact that

377

00:15:51,749 --> 00:15:48,970

that eventually will have you know for

378

00:15:53,789 --> 00:15:51,759

policymakers as we feed them the data so

379

00:15:54,889 --> 00:15:53,799

that they can make smart decisions and

380

00:15:57,809 --> 00:15:54,899

it's something again we appreciate

381

00:16:00,269 --> 00:15:57,819

Chile's cooperation in this and letting

382

00:16:01,979 --> 00:16:00,279

assumes do these these missions out of

383

00:16:04,169 --> 00:16:01,989

put that in is where we are here today I

384

00:16:06,269 --> 00:16:04,179

think the thing that surprised me the

385

00:16:08,549 --> 00:16:06,279

most about about the trip yesterday was

386

00:16:10,079 --> 00:16:08,559

first of all how smooth it was um you

387

00:16:12,599 --> 00:16:10,089

know my children can attest to the fact

388

00:16:14,789 --> 00:16:12,609

i'm not the calmest airplane flyer in

389

00:16:16,829 --> 00:16:14,799

the world and this was probably the

390

00:16:19,799 --> 00:16:16,839

smoothest flight i have ever gone on the

391

00:16:22,169 --> 00:16:19,809

pilots were amazing um and then just

392

00:16:24,869 --> 00:16:22,179

being able to look out the window and

393

00:16:28,249 --> 00:16:24,879

you see the beautiful um Antarctic

394

00:16:31,979 --> 00:16:28,259

continent on the ice surrounding it and

395

00:16:34,859 --> 00:16:31,989

just thinking about the impacts that

396

00:16:36,319 --> 00:16:34,869

humans are having um through putting

397

00:16:38,549 --> 00:16:36,329

green house at gases into the atmosphere

398

00:16:41,009 --> 00:16:38,559

causing these immense changes that are

399

00:16:43,919 --> 00:16:41,019

occurring at our poles it kind of

400

00:16:45,719 --> 00:16:43,929

reaffirmed to me on that certainly at

401  
00:16:47,609 --> 00:16:45,729  
NASA we need to continue making the best

402  
00:16:49,859 --> 00:16:47,619  
measurements we can't understand how

403  
00:16:52,469 --> 00:16:49,869  
climate change is affecting our planet

404  
00:16:54,479 --> 00:16:52,479  
um but certainly again this idea that

405  
00:17:03,239 --> 00:16:54,489  
it's our responsibility to help protect

406  
00:17:08,069 --> 00:17:03,249  
this planet also so we're very fortunate

407  
00:17:11,399 --> 00:17:08,079  
to have one of NASA's video producers

408  
00:17:14,369 --> 00:17:11,409  
here who has been on five different ice

409  
00:17:16,649 --> 00:17:14,379  
bridge this is Jefferson Beck here with

410  
00:17:19,169 --> 00:17:16,659  
us today and Jefferson could you tell us

411  
00:17:21,509 --> 00:17:19,179  
a little bit about what a typical day is

412  
00:17:24,419 --> 00:17:21,519  
like sure well we've heard a little bit

413  
00:17:27,029 --> 00:17:24,429

about it already but basically you're

414

00:17:28,799 --> 00:17:27,039

waking up at very early you're in for a

415

00:17:31,019 --> 00:17:28,809

long day but it's an exciting day waking

416

00:17:33,529 --> 00:17:31,029

up at we're heading out from the hotel

417

00:17:36,539 --> 00:17:33,539

about five in the morning heading to the

418

00:17:38,070 --> 00:17:36,549

out to the airstrip and you don't know

419

00:17:42,200 --> 00:17:38,080

if you're flying at all and you don't

420

00:17:45,060 --> 00:17:42,210

know if you're going to be flying over

421

00:17:48,900 --> 00:17:45,070

beautiful sea ice formations in the wood

422

00:17:50,550 --> 00:17:48,910

LC for example

423

00:17:53,310 --> 00:17:50,560

you can see a shot of the of the

424

00:17:55,080 --> 00:17:53,320

aircraft right now taking off from when

425

00:17:58,560 --> 00:17:55,090

Terrenas a little bit sped up as you can

426

00:18:00,720 --> 00:17:58,570

tell in this in this first shot and you

427

00:18:02,220 --> 00:18:00,730

make the long three or four hour transit

428

00:18:04,230 --> 00:18:02,230

to your science area then you spend

429

00:18:06,210 --> 00:18:04,240

about five or six areas coming back and

430

00:18:07,110 --> 00:18:06,220

forth getting the data you need here are

431

00:18:09,330 --> 00:18:07,120

some of those beautiful sea ice

432

00:18:10,980 --> 00:18:09,340

formations I was referencing you might

433

00:18:13,170 --> 00:18:10,990

see some beautiful icebergs they're

434

00:18:16,380 --> 00:18:13,180

stuck in the sea ice which is the frozen

435

00:18:18,090 --> 00:18:16,390

sea water or some giant tabular icebergs

436

00:18:21,180 --> 00:18:18,100

of these guys that you're seeing now are

437

00:18:23,160 --> 00:18:21,190

50 meters thick perhaps and a lot

438

00:18:26,160 --> 00:18:23,170

thicker below the water and as big as a

439

00:18:28,460 --> 00:18:26,170

runway or you could be flying over a

440

00:18:31,110 --> 00:18:28,470

land ice mission seeing these crevasses

441

00:18:33,300 --> 00:18:31,120

they flew around the South Pole a couple

442

00:18:36,590 --> 00:18:33,310

days ago did a little loop i think at 88

443

00:18:40,470 --> 00:18:36,600

degrees over the pine island glacier

444

00:18:42,480 --> 00:18:40,480

some some pretty stunning scenery this

445

00:18:44,940 --> 00:18:42,490

is the edge of an ice sheet where it

446

00:18:48,090 --> 00:18:44,950

meets the ocean again meeting sea ice

447

00:18:50,010 --> 00:18:48,100

there at the edge or one of my favorite

448

00:18:52,020 --> 00:18:50,020

parts is flying over the Antarctic

449

00:18:55,140 --> 00:18:52,030

Peninsula or you can see these are

450

00:18:57,420 --> 00:18:55,150

almost Alpine like glaciers here some

451  
00:18:59,430 --> 00:18:57,430  
pretty stunning scenery but also what I

452  
00:19:01,050 --> 00:18:59,440  
really enjoy is you know you're you're

453  
00:19:03,780 --> 00:19:01,060  
going back and forth it's a long day

454  
00:19:05,760 --> 00:19:03,790  
taking a few moments out to just kind of

455  
00:19:07,980 --> 00:19:05,770  
stare out the window at the expanse of

456  
00:19:09,690 --> 00:19:07,990  
ice below you try to get a sense for

457  
00:19:12,750 --> 00:19:09,700  
that scale of the kilometers of ice

458  
00:19:14,880 --> 00:19:12,760  
below and out in every direction it's

459  
00:19:17,910 --> 00:19:14,890  
like almost like a hot air balloon ride

460  
00:19:20,160 --> 00:19:17,920  
sometimes it's so smooth and then I

461  
00:19:21,330 --> 00:19:20,170  
guess on the on the way back people are

462  
00:19:24,780 --> 00:19:21,340  
kind of catching up on their data

463  
00:19:26,100 --> 00:19:24,790

processing there you know grabbing some

464

00:19:28,740 --> 00:19:26,110

meals they may have missed maybe even

465

00:19:30,690 --> 00:19:28,750

sleeping because you've got another big

466

00:19:32,460 --> 00:19:30,700

day ahead of you the next day and and

467

00:19:34,140 --> 00:19:32,470

here's the aircraft crew you know

468

00:19:38,310 --> 00:19:34,150

getting the aircraft ready for operation

469

00:19:41,100 --> 00:19:38,320

the next day so what's the coolest thing

470

00:19:43,020 --> 00:19:41,110

you've seen seen a lot of cool things I

471

00:19:46,260 --> 00:19:43,030

think flying over this massive crack in

472

00:19:47,940 --> 00:19:46,270

the Pine Island glacier again as deep as

473

00:19:49,820 --> 00:19:47,950

the Statue of Liberty is high and then

474

00:19:53,160 --> 00:19:49,830

eight times below that below water

475

00:19:55,350 --> 00:19:53,170

creating a ice about to calve off a

476

00:19:57,720 --> 00:19:55,360

giant iceberg the size of all of New

477

00:19:58,890 --> 00:19:57,730

York City that was pretty cool is a

478

00:20:01,950 --> 00:19:58,900

crack that wasn't there a few days

479

00:20:02,790 --> 00:20:01,960

before we flew and and there it was 20

480

00:20:05,820 --> 00:20:02,800

some may become

481

00:20:09,840 --> 00:20:05,830

there's long so some cool stuff thank

482

00:20:12,180 --> 00:20:09,850

you jack are centrally so the ice bridge

483

00:20:16,110 --> 00:20:12,190

flight today is to Pine Island glacier

484

00:20:19,380 --> 00:20:16,120

in West Antarctica been earlier this

485

00:20:21,810 --> 00:20:19,390

spring NASA scientists and you and your

486

00:20:24,420 --> 00:20:21,820

colleagues published reports saying that

487

00:20:27,740 --> 00:20:24,430

this region of West Antarctica was an

488

00:20:31,830 --> 00:20:27,750

irreversible decline what does that mean

489

00:20:34,200 --> 00:20:31,840

well what it means is that given the way

490

00:20:36,810 --> 00:20:34,210

we think that the ice is melting at the

491

00:20:39,360 --> 00:20:36,820

bottom right now if it keeps going like

492

00:20:41,160 --> 00:20:39,370

that in the next couple hundred years

493

00:20:43,980 --> 00:20:41,170

the amount of ice coming out of that

494

00:20:46,500 --> 00:20:43,990

region will double and it will keep

495

00:20:50,040 --> 00:20:46,510

going at that rate or a slightly greater

496

00:20:52,020 --> 00:20:50,050

rate for the foreseeable future and if

497

00:20:53,940 --> 00:20:52,030

it keeps doing that eventually we won't

498

00:20:56,730 --> 00:20:53,950

have much of an anti West Antarctic Ice

499

00:20:59,190 --> 00:20:56,740

Sheet left so what we've found is that

500

00:21:01,920 --> 00:20:59,200

this glacier has been pushed to the

501  
00:21:05,100 --> 00:21:01,930  
point or if we keep pushing it like that

502  
00:21:07,500 --> 00:21:05,110  
or even a little bit less ice will keep

503  
00:21:09,630 --> 00:21:07,510  
flowing into it ice will soon start

504  
00:21:11,130 --> 00:21:09,640  
flowing into the ocean faster and then a

505  
00:21:13,670 --> 00:21:11,140  
lot of ice will leave the continent and

506  
00:21:17,400 --> 00:21:13,680  
end up in the ocean now this isn't a

507  
00:21:21,540 --> 00:21:17,410  
huge immediate contribution to sea level

508  
00:21:22,980 --> 00:21:21,550  
rise it's not like the oceans are going

509  
00:21:26,730 --> 00:21:22,990  
to rise up and swallow in New York City

510  
00:21:28,740 --> 00:21:26,740  
next year but it is a big change that we

511  
00:21:33,660 --> 00:21:28,750  
can be fairly confident is happening and

512  
00:21:35,550 --> 00:21:33,670  
happening fairly soon so that was a

513  
00:21:38,430 --> 00:21:35,560

result that we were able to do because

514

00:21:42,450 --> 00:21:38,440

we have new measurements of the ice

515

00:21:43,680 --> 00:21:42,460

thickness in this area I guess there are

516

00:21:45,300 --> 00:21:43,690

two important things about it we have

517

00:21:46,950 --> 00:21:45,310

measurements of ice thicknesses in the

518

00:21:48,870 --> 00:21:46,960

area and we have measurements of height

519

00:21:50,670 --> 00:21:48,880

change that's ongoing in the area

520

00:21:52,620 --> 00:21:50,680

without the measurements of ice

521

00:21:54,540 --> 00:21:52,630

thickness we wouldn't be able to predict

522

00:21:57,540 --> 00:21:54,550

with any confidence what might happen in

523

00:21:59,940 --> 00:21:57,550

the future and if we didn't know that

524

00:22:02,940 --> 00:21:59,950

the surface was already dropping in this

525

00:22:04,200 --> 00:22:02,950

area pretty rapidly there's almost no

526

00:22:06,840 --> 00:22:04,210

way that we would have believed the

527

00:22:08,910 --> 00:22:06,850

results that we got from our model so

528

00:22:10,350 --> 00:22:08,920

these two things together are what we

529

00:22:13,320 --> 00:22:10,360

really need to understand what's

530

00:22:15,600 --> 00:22:13,330

happening in areas like this

531

00:22:18,090 --> 00:22:15,610

another question for you been so we're

532

00:22:20,220 --> 00:22:18,100

talking about a mission studying changes

533

00:22:25,230 --> 00:22:20,230

in ice melting what's driving these

534

00:22:27,570 --> 00:22:25,240

changes well the probably the main thing

535

00:22:30,750 --> 00:22:27,580

that's driving changes in ice melt in

536

00:22:33,750 --> 00:22:30,760

West Antarctica is the way the oceans

537

00:22:36,240 --> 00:22:33,760

are flowing so the surface temperature

538

00:22:40,890 --> 00:22:36,250

hasn't changed a whole lot on the

539

00:22:42,570 --> 00:22:40,900

Antarctic continent but we see the

540

00:22:44,580 --> 00:22:42,580

surface going down we know that the ice

541

00:22:46,440 --> 00:22:44,590

is melting quite a bit more so the way

542

00:22:48,540 --> 00:22:46,450

that has to be happening is that ocean

543

00:22:50,040 --> 00:22:48,550

temperatures have gotten warmer right at

544

00:22:52,320 --> 00:22:50,050

the bottom of the ice sheet where the

545

00:22:54,060 --> 00:22:52,330

ice sheet meets the ocean and when the

546

00:22:57,540 --> 00:22:54,070

water temperature goes up it's very very

547

00:22:59,480 --> 00:22:57,550

good at melting more ice so I we are

548

00:23:02,520 --> 00:22:59,490

pretty sure that there are areas where

549

00:23:04,500 --> 00:23:02,530

150 meters of ice are melting off the

550

00:23:06,810 --> 00:23:04,510

bottom of the ice sheet every year this

551  
00:23:09,360 --> 00:23:06,820  
is close to the grounding lines of Pine

552  
00:23:11,220 --> 00:23:09,370  
Island awaits glaciers and probably the

553  
00:23:13,890 --> 00:23:11,230  
increase in that melt over the last few

554  
00:23:15,780 --> 00:23:13,900  
years has driven the big changes that

555  
00:23:17,490 --> 00:23:15,790  
we've seen we also know that the ocean

556  
00:23:19,680 --> 00:23:17,500  
has gotten warmer over the same period

557  
00:23:21,450 --> 00:23:19,690  
and there seems to be a pretty fair

558  
00:23:23,130 --> 00:23:21,460  
correlation between the changes in the

559  
00:23:25,230 --> 00:23:23,140  
temperature of the ocean and the changes

560  
00:23:26,820 --> 00:23:25,240  
in the melting of the ice sheet if you

561  
00:23:29,580 --> 00:23:26,830  
look on the internet a peninsula which

562  
00:23:34,350 --> 00:23:29,590  
is the thumb of Antarctica so right

563  
00:23:36,810 --> 00:23:34,360

there the changes probably have a lot to

564

00:23:41,370 --> 00:23:36,820

do also with changes in the air

565

00:23:42,900 --> 00:23:41,380

temperature because we know that the air

566

00:23:44,130 --> 00:23:42,910

has gotten a lot warmer in the peninsula

567

00:23:49,410 --> 00:23:44,140

even though it hasn't changed very much

568

00:23:52,770 --> 00:23:49,420

on the continent itself so then what

569

00:23:54,360 --> 00:23:52,780

happens to the world as we lose ice the

570

00:23:57,080 --> 00:23:54,370

big thing that happens is the sea level

571

00:23:59,340 --> 00:23:57,090

goes up and when sea level goes up

572

00:24:02,580 --> 00:23:59,350

places where there are a lot of people

573

00:24:05,640 --> 00:24:02,590

living close to the ocean can start to

574

00:24:07,980 --> 00:24:05,650

go underwater I guess the big effects

575

00:24:09,630 --> 00:24:07,990

are places where the land is really flat

576

00:24:11,790 --> 00:24:09,640

near the near the edge of the water and

577

00:24:14,370 --> 00:24:11,800

New Orleans would be a good example of

578

00:24:16,050 --> 00:24:14,380

that a lot of places where people are

579

00:24:18,090 --> 00:24:16,060

living at the mouths of rivers which are

580

00:24:19,950 --> 00:24:18,100

good places if you want to have a port

581

00:24:21,810 --> 00:24:19,960

if you want to have commerce up and down

582

00:24:23,940 --> 00:24:21,820

the river but they're sort of bad places

583

00:24:26,070 --> 00:24:23,950

to be as the sea level is rising the

584

00:24:27,240 --> 00:24:26,080

other thing that happens is that storm

585

00:24:28,950 --> 00:24:27,250

surges get worse

586

00:24:31,380 --> 00:24:28,960

so when there's a hurricane that pushes

587

00:24:32,970 --> 00:24:31,390

water up on shore if sea level is higher

588

00:24:35,340 --> 00:24:32,980

that storm surge can reach farther

589

00:24:39,000 --> 00:24:35,350

inland so those are the things that we

590

00:24:40,560 --> 00:24:39,010

worry about as sea level rises there are

591

00:24:42,510 --> 00:24:40,570

also some changes that relate to this

592

00:24:45,720 --> 00:24:42,520

changes in sea ice so sea ice has

593

00:24:49,140 --> 00:24:45,730

declined tremendously in the Arctic it

594

00:24:51,510 --> 00:24:49,150

hasn't changed much in the Antarctic but

595

00:24:53,490 --> 00:24:51,520

as sea level goes away that allows more

596

00:24:55,230 --> 00:24:53,500

heat exchange between the ocean and the

597

00:24:58,100 --> 00:24:55,240

atmosphere and that can have a big

598

00:25:00,270 --> 00:24:58,110

effect on changing weather patterns so

599

00:25:03,770 --> 00:25:00,280

there's a big component of ice bridge

600

00:25:06,000 --> 00:25:03,780

that make measures changes in sea ice I

601  
00:25:07,860 --> 00:25:06,010  
some seasons they get about half the

602  
00:25:09,240 --> 00:25:07,870  
flights for the sea ice and that'll also

603  
00:25:13,530 --> 00:25:09,250  
be an important set of measurements that

604  
00:25:16,590 --> 00:25:13,540  
I set to will do when it goes up so

605  
00:25:19,320 --> 00:25:16,600  
we've seen icy ice losses in the Arctic

606  
00:25:25,470 --> 00:25:19,330  
but sea ice gains in the Antarctic why

607  
00:25:28,040 --> 00:25:25,480  
is that the sea ice losses in the Arctic

608  
00:25:29,970 --> 00:25:28,050  
are a combination of warmer weather and

609  
00:25:31,740 --> 00:25:29,980  
changes in the way that the wind is

610  
00:25:34,170 --> 00:25:31,750  
blowing which tend have tended to be

611  
00:25:37,380 --> 00:25:34,180  
more effective at pushing ice out of the

612  
00:25:39,420 --> 00:25:37,390  
Arctic Basin in the Antarctic it's not

613  
00:25:43,070 --> 00:25:39,430

as clear what the change is that's

614

00:25:47,820 --> 00:25:45,420

Antarctic sea ice is different from

615

00:25:50,310 --> 00:25:47,830

arctic sea ice in that it typically only

616

00:25:52,530 --> 00:25:50,320

lasts one year in the Arctic you can

617

00:25:55,590 --> 00:25:52,540

have sea ice that's trapped amongst all

618

00:25:58,650 --> 00:25:55,600

the islands and things that can will

619

00:26:01,980 --> 00:25:58,660

last for decades and so that can be

620

00:26:03,630 --> 00:26:01,990

important in sort of carrying over

621

00:26:05,910 --> 00:26:03,640

temperature changes from one year to the

622

00:26:07,080 --> 00:26:05,920

next and the Antarctic it's purely

623

00:26:08,670 --> 00:26:07,090

determined by the weather this year

624

00:26:11,700 --> 00:26:08,680

because it all goes away at the end of

625

00:26:15,540 --> 00:26:11,710

the year so there are fundamentally

626

00:26:18,720 --> 00:26:15,550

different systems and the the way the

627

00:26:21,320 --> 00:26:18,730

Antarctic is changing is it's a it's an

628

00:26:23,940 --> 00:26:21,330

interesting topic for research right now

629

00:26:27,030 --> 00:26:23,950

by the way we're answering questions

630

00:26:30,030 --> 00:26:27,040

from hashtag ice bridge I have a

631

00:26:33,870 --> 00:26:30,040

question for Ellen water NASA's and your

632

00:26:36,820 --> 00:26:33,880

plans for studying the Earth's climate

633

00:26:38,770 --> 00:26:36,830

you know just this year alone we've we

634

00:26:40,120 --> 00:26:38,780

are launching on five satellites three

635

00:26:42,130 --> 00:26:40,130

of them have already been launched on

636

00:26:44,830 --> 00:26:42,140

the global precipitation mission that's

637

00:26:47,080 --> 00:26:44,840

measuring a precipitation all around the

638

00:26:50,380 --> 00:26:47,090

globe that we joint project we did with

639

00:26:52,660 --> 00:26:50,390

the japanese space agency we've launched

640

00:26:54,400 --> 00:26:52,670

an instrument called rapid scat up to

641

00:26:57,820 --> 00:26:54,410

the International Space Station that's

642

00:26:59,350 --> 00:26:57,830

measuring tropical winds which is

643

00:27:02,050 --> 00:26:59,360

important obviously for studying things

644

00:27:04,270 --> 00:27:02,060

like hurricanes and cyclones on we

645

00:27:07,390 --> 00:27:04,280

launched a mission called the orbiting

646

00:27:09,370 --> 00:27:07,400

carbon Observatory to which is measuring

647

00:27:12,070 --> 00:27:09,380

carbon dioxide concentrations where is

648

00:27:14,350 --> 00:27:12,080

it coming from where is it going uh and

649

00:27:16,150 --> 00:27:14,360

then later this year we are in the next

650

00:27:18,490 --> 00:27:16,160

few months will launch two more missions

651  
00:27:21,100 --> 00:27:18,500  
one to measure soil moisture all around

652  
00:27:22,510 --> 00:27:21,110  
the earth that's important for farmers

653  
00:27:24,280 --> 00:27:22,520  
who want to know about the health of

654  
00:27:25,720 --> 00:27:24,290  
their crops where the plant crops as

655  
00:27:28,120 --> 00:27:25,730  
well as trying to understand the water

656  
00:27:29,800 --> 00:27:28,130  
cycle and we're going to launch another

657  
00:27:32,350 --> 00:27:29,810  
instrument to the space station called

658  
00:27:33,910 --> 00:27:32,360  
cats which is a cloud aerosol little

659  
00:27:36,430 --> 00:27:33,920  
part aerosols or new particles in the

660  
00:27:37,900 --> 00:27:36,440  
atmosphere that actually um help clouds

661  
00:27:39,400 --> 00:27:37,910  
to form and they're important for

662  
00:27:42,250 --> 00:27:39,410  
understanding both weather and climate

663  
00:27:43,690 --> 00:27:42,260

and you might say wow she just listed

664

00:27:45,130 --> 00:27:43,700

all these different missions and they're

665

00:27:47,650 --> 00:27:45,140

measuring this and they're measuring

666

00:27:50,230 --> 00:27:47,660

that that's what we do it now so that's

667

00:27:51,970 --> 00:27:50,240

why we have 17 satellites measuring

668

00:27:54,130 --> 00:27:51,980

different aspects of the earth because

669

00:27:55,720 --> 00:27:54,140

it's a very complex climate so if you're

670

00:27:58,300 --> 00:27:55,730

trying to understand the climb that you

671

00:28:00,130 --> 00:27:58,310

need to understand and measure all of

672

00:28:02,380 --> 00:28:00,140

the inputs into the climate which means

673

00:28:04,210 --> 00:28:02,390

what's the state of the oceans what's

674

00:28:06,130 --> 00:28:04,220

the state of the land what's the state

675

00:28:08,050 --> 00:28:06,140

of the atmosphere which is why we need

676

00:28:10,090 --> 00:28:08,060

so many satellites and then we

677

00:28:13,000 --> 00:28:10,100

supplement that with with aircraft like

678

00:28:15,520 --> 00:28:13,010

ice bridge to really try to understand

679

00:28:19,330 --> 00:28:15,530

the complex system um that causes our

680

00:28:21,310 --> 00:28:19,340

climate function for those of you just

681

00:28:24,390 --> 00:28:21,320

joining us you just heard from here

682

00:28:28,540 --> 00:28:24,400

acids chief scientist dr. Ellen stofan

683

00:28:30,850 --> 00:28:28,550

our next question is for Ben would have

684

00:28:35,260 --> 00:28:30,860

been some of ice bridges early

685

00:28:38,200 --> 00:28:35,270

contributions to polar research ice

686

00:28:40,330 --> 00:28:38,210

bridge has contributed a tremendous

687

00:28:43,660 --> 00:28:40,340

number of measurements of ice thickness

688

00:28:45,700 --> 00:28:43,670

to databases that people have furnished

689

00:28:46,370 --> 00:28:45,710

arctica in Greenland there's been a new

690

00:28:48,800 --> 00:28:46,380

map

691

00:28:51,500 --> 00:28:48,810

of Antarctic bottom Heights that's come

692

00:28:53,600 --> 00:28:51,510

out in the last year last two years that

693

00:28:55,070 --> 00:28:53,610

has really done a great job of showing

694

00:28:57,590 --> 00:28:55,080

some details of the continent that we

695

00:28:59,150 --> 00:28:57,600

didn't have before the same thing for

696

00:29:02,090 --> 00:28:59,160

Greenland people have discovered a

697

00:29:04,390 --> 00:29:02,100

canyon I can't even remember how it

698

00:29:06,860 --> 00:29:04,400

compares to the Grand Canyon it's bigger

699

00:29:09,110 --> 00:29:06,870

yeah under the Greenland ice sheet that

700

00:29:11,420 --> 00:29:09,120

was not evident before we had ice bridge

701  
00:29:13,670 --> 00:29:11,430  
measurements it's also done a good job

702  
00:29:15,200 --> 00:29:13,680  
of showing us the changes that are

703  
00:29:17,390 --> 00:29:15,210  
happening both in Antarctica and

704  
00:29:20,120 --> 00:29:17,400  
Greenland and so there have been some

705  
00:29:22,730 --> 00:29:20,130  
major studies reconciling measurements

706  
00:29:25,220 --> 00:29:22,740  
between a Antarctica in Greenland of

707  
00:29:28,640 --> 00:29:25,230  
elevation change and showing that they

708  
00:29:29,930 --> 00:29:28,650  
agree with other sensors that we have so

709  
00:29:32,150 --> 00:29:29,940  
they've really firmed up our

710  
00:29:36,890 --> 00:29:32,160  
understanding of how the ice sheet is

711  
00:29:44,820 --> 00:29:36,900  
changing and you know just what is going

712  
00:29:50,440 --> 00:29:48,340  
this one is for Ellen what advice do you

713  
00:29:52,810 --> 00:29:50,450

have for someone who would like to be

714

00:29:54,730 --> 00:29:52,820

involved with a mission like this this

715

00:29:58,989 --> 00:29:54,740

is NASA's chief scientist dr. Ellen

716

00:30:00,489 --> 00:29:58,999

stofan you know it's fun to me to see

717

00:30:02,379 --> 00:30:00,499

yesterday I think this is one of the

718

00:30:04,149 --> 00:30:02,389

things that the ambassador and I really

719

00:30:05,489 --> 00:30:04,159

enjoyed yesterday was meeting all the

720

00:30:08,230 --> 00:30:05,499

different people who are involved in

721

00:30:09,730 --> 00:30:08,240

IceBridge on and of course I have a

722

00:30:11,379 --> 00:30:09,740

fortune that meet all the people who

723

00:30:14,110 --> 00:30:11,389

work on different missions of ours like

724

00:30:16,090 --> 00:30:14,120

our Mars missions or astrophysics

725

00:30:17,950 --> 00:30:16,100

missions it's all kinds of different

726

00:30:19,509 --> 00:30:17,960

people you know we have engineers who

727

00:30:21,279 --> 00:30:19,519

helped build the instruments who help

728

00:30:24,149 --> 00:30:21,289

monitor the instruments and take care of

729

00:30:26,619 --> 00:30:24,159

them uh who maybe majored in engineering

730

00:30:29,320 --> 00:30:26,629

studied engineering studied studied

731

00:30:30,840 --> 00:30:29,330

physics maybe we have scientists who

732

00:30:34,210 --> 00:30:30,850

come from all different backgrounds

733

00:30:36,310 --> 00:30:34,220

geology biology people who study

734

00:30:38,169 --> 00:30:36,320

glaciers people who study chemistry in

735

00:30:41,440 --> 00:30:38,179

the atmosphere how it interacts with the

736

00:30:43,359 --> 00:30:41,450

surface um we have of course the pilots

737

00:30:44,499 --> 00:30:43,369

on the plane whoo-hoo these amazing

738

00:30:47,080 --> 00:30:44,509

pilots who did such a great job

739

00:30:49,299 --> 00:30:47,090

following us around yesterday on we have

740

00:30:52,119 --> 00:30:49,309

people who help us tell our story to the

741

00:30:54,759 --> 00:30:52,129

public um who are just as much a part of

742

00:30:57,039 --> 00:30:54,769

the team as everybody else so it's a

743

00:30:58,539 --> 00:30:57,049

huge range of backgrounds on that helped

744

00:31:00,489 --> 00:30:58,549

NASA accomplish the work that it does

745

00:31:03,310 --> 00:31:00,499

every day and it was it was great honor

746

00:31:05,590 --> 00:31:03,320

to be able to hang out yesterday and if

747

00:31:07,600 --> 00:31:05,600

I might add when dr. Stockman was

748

00:31:09,369 --> 00:31:07,610

talking to Chilean students here in pool

749

00:31:10,869 --> 00:31:09,379

deniz you know they're very interested

750

00:31:13,299 --> 00:31:10,879

they wanted to know how to sign up for

751  
00:31:14,799 --> 00:31:13,309  
the next mars mission they wanted to

752  
00:31:16,659 --> 00:31:14,809  
fight figure out you know what it takes

753  
00:31:19,720 --> 00:31:16,669  
to be an astronaut that's really neat

754  
00:31:21,759 --> 00:31:19,730  
you know to have NASA's chief scientist

755  
00:31:24,549 --> 00:31:21,769  
traveling around the world talking to

756  
00:31:26,950 --> 00:31:24,559  
other kids here in Chile about the

757  
00:31:28,840 --> 00:31:26,960  
opportunities and the exciting projects

758  
00:31:30,460 --> 00:31:28,850  
that we have underway one of the things

759  
00:31:32,109 --> 00:31:30,470  
I say to kids all the time and you know

760  
00:31:34,239 --> 00:31:32,119  
we've got really tough things we're

761  
00:31:36,639 --> 00:31:34,249  
trying to accomplish from how do we cope

762  
00:31:38,830 --> 00:31:36,649  
with the changes being caused by climate

763  
00:31:41,039 --> 00:31:38,840

change like sea level rise effects that

764

00:31:43,899 --> 00:31:41,049

we're already seeing around the world um

765

00:31:45,460 --> 00:31:43,909

you know how do we how do we solve the

766

00:31:47,230 --> 00:31:45,470

problems of getting humans down onto the

767

00:31:49,269 --> 00:31:47,240

surface of Mars Mars has a really thin

768

00:31:51,690 --> 00:31:49,279

atmosphere we need all the great minds

769

00:31:53,279 --> 00:31:51,700

in the world from all around the world

770

00:31:54,779 --> 00:31:53,289

is really an international endeavor and

771

00:31:56,990 --> 00:31:54,789

that's why I like to go and be able to

772

00:31:59,879 --> 00:31:57,000

talk to students not just in the US um

773

00:32:01,889 --> 00:31:59,889

but all over the world to try to say hey

774

00:32:06,269 --> 00:32:01,899

you know come on we need help this is an

775

00:32:10,649 --> 00:32:06,279

international endeavor we have a Twitter

776

00:32:14,879 --> 00:32:10,659

question for mr. ambassador Mike Hammer

777

00:32:16,919 --> 00:32:14,889

at vero Clark asks what was the first

778

00:32:21,019 --> 00:32:16,929

thing that came to your mind when you

779

00:32:24,060 --> 00:32:21,029

saw Antarctic soil underneath plane

780

00:32:26,940 --> 00:32:24,070

again it's just truly amazing I mean

781

00:32:28,740 --> 00:32:26,950

you're just it's a long trek even from

782

00:32:30,360 --> 00:32:28,750

here from Punta it not so you're you

783

00:32:32,639 --> 00:32:30,370

know there's great anticipation for two

784

00:32:34,350 --> 00:32:32,649

or three hours and then you see it's

785

00:32:36,659 --> 00:32:34,360

like you're finally here you're seeing

786

00:32:39,240 --> 00:32:36,669

it and it's just tremendous because then

787

00:32:40,769 --> 00:32:39,250

it goes on forever it seems I mean you

788

00:32:42,240 --> 00:32:40,779

don't grasp it up and you see it on a

789

00:32:43,860 --> 00:32:42,250

map and you see that you know

790

00:32:45,840 --> 00:32:43,870

Antarctica's pretty big but when you're

791

00:32:48,690 --> 00:32:45,850

flying for hours and hours and all you

792

00:32:51,149 --> 00:32:48,700

see is a big white sheet of ice it's

793

00:32:53,610 --> 00:32:51,159

really impressive and it just gives you

794

00:32:56,549 --> 00:32:53,620

a much better sort of understanding of

795

00:32:58,110 --> 00:32:56,559

what is out there so again I wish and

796

00:32:59,700 --> 00:32:58,120

again you see it on the images but I

797

00:33:01,649 --> 00:32:59,710

wish everybody could see it because then

798

00:33:03,090 --> 00:33:01,659

you see the natural beauty you see how

799

00:33:04,799 --> 00:33:03,100

important it is to protect our

800

00:33:06,299 --> 00:33:04,809

environment I was struck one of the

801  
00:33:08,730 --> 00:33:06,309  
things I have to say I was hoping I'd

802  
00:33:10,830 --> 00:33:08,740  
see a penguin or something but I didn't

803  
00:33:13,259 --> 00:33:10,840  
know this but NASA takes great care in

804  
00:33:15,750 --> 00:33:13,269  
these ice bridge missions to not go over

805  
00:33:18,450 --> 00:33:15,760  
any penguin colonies and in fact not

806  
00:33:20,820 --> 00:33:18,460  
affect the wildlife in any way so no we

807  
00:33:22,470 --> 00:33:20,830  
didn't see penguins out there but we

808  
00:33:24,240 --> 00:33:22,480  
know they're out there but we didn't see

809  
00:33:26,159 --> 00:33:24,250  
a lot of ice and in fact we can see

810  
00:33:28,169 --> 00:33:26,169  
penguins down here and put that in us

811  
00:33:31,139 --> 00:33:28,179  
just off the coasters and a little nice

812  
00:33:33,110 --> 00:33:31,149  
reserve so again it's really neat to be

813  
00:33:35,100 --> 00:33:33,120

able to you know as an American diplomat

814

00:33:36,570 --> 00:33:35,110

experience something like this and it

815

00:33:38,639 --> 00:33:36,580

makes me really proud to be an American

816

00:33:41,519 --> 00:33:38,649

to see that the kind of work that we're

817

00:33:45,240 --> 00:33:41,529

doing we have another Twitter question

818

00:33:48,360 --> 00:33:45,250

this one's for Ben our senior icebridge

819

00:33:50,669 --> 00:33:48,370

researcher at washington seattle

820

00:33:53,460 --> 00:33:50,679

university of washington seattle twitter

821

00:33:56,159 --> 00:33:53,470

question is from at so bell writing are

822

00:33:58,830 --> 00:33:56,169

any of your data sets being shared with

823

00:34:03,210 --> 00:33:58,840

other programs and you have any

824

00:34:04,989 --> 00:34:03,220

conclusions so all of our data sets are

825

00:34:08,289 --> 00:34:04,999

being shared with other

826

00:34:10,419 --> 00:34:08,299

programs you can get them in one form or

827

00:34:13,809 --> 00:34:10,429

another from the National snow nice data

828

00:34:16,749 --> 00:34:13,819

center so IceBridge has a commitment

829

00:34:18,669 --> 00:34:16,759

that six months after any flight all the

830

00:34:20,680 --> 00:34:18,679

data are become available over the

831

00:34:22,690 --> 00:34:20,690

Internet to anybody who wants it and

832

00:34:25,720 --> 00:34:22,700

that's anybody who wants it so if you

833

00:34:27,609 --> 00:34:25,730

want it you can go get it the data sets

834

00:34:30,220 --> 00:34:27,619

some of them are easier to use some of

835

00:34:31,839 --> 00:34:30,230

them are hard to use but they're in

836

00:34:33,609 --> 00:34:31,849

formats that are designed for scientists

837

00:34:35,589 --> 00:34:33,619

who are really interested in all of the

838

00:34:37,089 --> 00:34:35,599

data and for really being able to

839

00:34:43,569 --> 00:34:37,099

squeeze as much as they can out of these

840

00:34:45,669 --> 00:34:43,579

data sets for conclusions um you know we

841

00:34:48,490 --> 00:34:45,679

had a paper earlier this year that was

842

00:34:50,829 --> 00:34:48,500

looking at Thwaites glacier that built a

843

00:34:52,930 --> 00:34:50,839

model of how weights glacier could

844

00:34:55,089 --> 00:34:52,940

evolve over time we've done the same

845

00:34:57,700 --> 00:34:55,099

thing for Pine Island glacier and for

846

00:35:00,460 --> 00:34:57,710

jakub stopping glaciers in Greenland so

847

00:35:01,690 --> 00:35:00,470

we have some papers that combine the

848

00:35:04,779 --> 00:35:01,700

measurements that we've taken with ice

849

00:35:06,759 --> 00:35:04,789

bridge with computer models to try and

850

00:35:08,230 --> 00:35:06,769

really understand what's going on now

851  
00:35:10,539 --> 00:35:08,240  
and what can happen in the future I

852  
00:35:13,839 --> 00:35:10,549  
think that this is just barely a start

853  
00:35:15,190 --> 00:35:13,849  
and it's also just me talking off the

854  
00:35:17,259 --> 00:35:15,200  
top of my head about the studies that

855  
00:35:19,240 --> 00:35:17,269  
I'm most aware of there are over a

856  
00:35:21,309 --> 00:35:19,250  
hundred and forty ice bridge

857  
00:35:22,539 --> 00:35:21,319  
publications more like 150 ice bridge

858  
00:35:25,720 --> 00:35:22,549  
publications in the scientific

859  
00:35:28,029 --> 00:35:25,730  
literature you can find those like I

860  
00:35:30,190 --> 00:35:28,039  
just did by googling ice bridge

861  
00:35:32,529 --> 00:35:30,200  
publications and you see this really

862  
00:35:34,660 --> 00:35:32,539  
long list of papers that people

863  
00:35:36,910 --> 00:35:34,670

published using these data so they're

864

00:35:39,690 --> 00:35:36,920

really jump-starting a lot of research

865

00:35:42,999 --> 00:35:39,700

by a lot of different researchers

866

00:35:44,230 --> 00:35:43,009

probably half of it or so is American

867

00:35:46,390 --> 00:35:44,240

research but there's also a lot of

868

00:35:49,029 --> 00:35:46,400

European researchers and Japanese

869

00:35:51,130 --> 00:35:49,039

researchers and others who are who are

870

00:35:53,109 --> 00:35:51,140

using these data so it's the start of

871

00:35:56,349 --> 00:35:53,119

collaborations around the world that

872

00:35:59,799 --> 00:35:56,359

we're making with these datasets for

873

00:36:02,890 --> 00:35:59,809

NASA chief scientist Ellen stofan here

874

00:36:05,609 --> 00:36:02,900

we have a question via Google+ from Max

875

00:36:07,930 --> 00:36:05,619

Blum once we've made necessary

876

00:36:09,910 --> 00:36:07,940

observations to achieve a certain

877

00:36:12,730 --> 00:36:09,920

understanding of the health of the polar

878

00:36:16,900 --> 00:36:12,740

bears and oceans what is humans can we

879

00:36:18,309 --> 00:36:16,910

do to remedy those conditions well I

880

00:36:19,630 --> 00:36:18,319

think the most important thing

881

00:36:21,430 --> 00:36:19,640

for all of us to reduce our carbon

882

00:36:23,079 --> 00:36:21,440

footprint and and you know there are

883

00:36:25,269 --> 00:36:23,089

lots of ways individuals can do this

884

00:36:27,880 --> 00:36:25,279

from you know reusing reducing and

885

00:36:29,319 --> 00:36:27,890

recycling our consumption but clearly

886

00:36:30,939 --> 00:36:29,329

it's going to take more than that it's

887

00:36:32,949 --> 00:36:30,949

going to take a worldwide effort of

888

00:36:35,439 --> 00:36:32,959

people changing their behavior and it's

889

00:36:38,170 --> 00:36:35,449

something it's very hard as humans to do

890

00:36:39,519 --> 00:36:38,180

it's hard for all of us to do but

891

00:36:42,309 --> 00:36:39,529

certainly the president has made clear

892

00:36:45,279 --> 00:36:42,319

that it's a priority that that we need

893

00:36:49,509 --> 00:36:45,289

to start dealing with climate change not

894

00:36:51,189 --> 00:36:49,519

only in in preparing um for the effects

895

00:36:54,130 --> 00:36:51,199

of it because I sea level already is

896

00:36:56,049 --> 00:36:54,140

rising it already is affecting towns for

897

00:36:57,400 --> 00:36:56,059

example in Florida that now have to have

898

00:36:59,829 --> 00:36:57,410

high tide they're having a pump out

899

00:37:01,120 --> 00:36:59,839

streets on a regular basis so climate

900

00:37:03,519 --> 00:37:01,130

change isn't something that's in the

901  
00:37:05,859 --> 00:37:03,529  
future is happening right now um and so

902  
00:37:07,689 --> 00:37:05,869  
being able to mitigate the effects that

903  
00:37:09,640 --> 00:37:07,699  
are already occurring as part of it but

904  
00:37:11,920 --> 00:37:09,650  
then changing our behavior so that in

905  
00:37:13,569 --> 00:37:11,930  
the long run we can reduce the amount of

906  
00:37:17,979 --> 00:37:13,579  
heart a carbon dioxide we're putting

907  
00:37:20,469 --> 00:37:17,989  
into the atmosphere is critical for Ben

908  
00:37:27,219 --> 00:37:20,479  
and Ellen what drove you to careers in

909  
00:37:28,539 --> 00:37:27,229  
science LOL won't take that first um you

910  
00:37:30,400 --> 00:37:28,549  
know I'm kind of an unusual story

911  
00:37:32,380 --> 00:37:30,410  
because my father worked for NASA and my

912  
00:37:33,849 --> 00:37:32,390  
mother is a science teacher so I'm my

913  
00:37:36,609 --> 00:37:33,859

sister's a lawyer so it didn't affect

914

00:37:38,620 --> 00:37:36,619

everyone in my family but um you know

915

00:37:39,759 --> 00:37:38,630

for me science was just something always

916

00:37:42,160 --> 00:37:39,769

that I love that was one of those kids

917

00:37:44,199 --> 00:37:42,170

that was picking up every rock and shale

918

00:37:46,390 --> 00:37:44,209

that I could and I always really liked

919

00:37:48,009 --> 00:37:46,400

rocks um these guys can tell you today

920

00:37:51,219 --> 00:37:48,019

we went to a museum and I got to look at

921

00:37:53,229 --> 00:37:51,229

fossils I got really excited um and and

922

00:37:55,239 --> 00:37:53,239

growing up with my father worked working

923

00:37:58,120 --> 00:37:55,249

for NASA I realized I could combine my

924

00:38:00,099 --> 00:37:58,130

love of geology on with space and be

925

00:38:02,140 --> 00:38:00,109

able to study for example I study

926  
00:38:06,249 --> 00:38:02,150  
volcanoes not just on this planet but on

927  
00:38:08,499 --> 00:38:06,259  
planets all around our solar system I've

928  
00:38:12,489 --> 00:38:08,509  
always been interested in science and

929  
00:38:15,249 --> 00:38:12,499  
technology one of my first memories of a

930  
00:38:17,799 --> 00:38:15,259  
science project was that at my preschool

931  
00:38:18,999 --> 00:38:17,809  
we got to take apart a typewriter and it

932  
00:38:20,890 --> 00:38:19,009  
was something that everybody could do

933  
00:38:23,160 --> 00:38:20,900  
but I elbowed every single other kid out

934  
00:38:27,699 --> 00:38:23,170  
of the way so I could do it myself but

935  
00:38:29,829 --> 00:38:27,709  
all through high school and college I've

936  
00:38:32,230 --> 00:38:29,839  
been interested in taking science

937  
00:38:35,860 --> 00:38:32,240  
classes in a lot of different fields

938  
00:38:38,500 --> 00:38:35,870

but it was after i graduated from my

939

00:38:40,450 --> 00:38:38,510

undergrad that I got offered a chance to

940

00:38:43,330 --> 00:38:40,460

go to Antarctica if I would do a

941

00:38:45,340 --> 00:38:43,340

master's degree in glaciology and so I

942

00:38:48,700 --> 00:38:45,350

immediately said yes and then thought

943

00:38:51,340 --> 00:38:48,710

gosh what is glaciology but as I learned

944

00:38:52,990 --> 00:38:51,350

more about it the I quickly got hooked

945

00:38:56,730 --> 00:38:53,000

because it's a great branch of science

946

00:38:58,690 --> 00:38:56,740

it's something where you are looking at

947

00:39:00,850 --> 00:38:58,700

changes in the earth that are happening

948

00:39:03,880 --> 00:39:00,860

as you watch and a lot of people who

949

00:39:07,300 --> 00:39:03,890

study you know precambrian fossils who

950

00:39:08,980 --> 00:39:07,310

study the motion of the plates of the

951  
00:39:11,440 --> 00:39:08,990  
earth can't see the changes happening

952  
00:39:13,930 --> 00:39:11,450  
but we can watch and see in a year or

953  
00:39:16,600 --> 00:39:13,940  
two big changes in individual glaciers

954  
00:39:19,720 --> 00:39:16,610  
and it's really exciting to watch how

955  
00:39:22,270 --> 00:39:19,730  
that happens for you year so it was

956  
00:39:25,240 --> 00:39:22,280  
extremely addictive and I haven't I

957  
00:39:27,700 --> 00:39:25,250  
haven't gotten free of it since we have

958  
00:39:30,310 --> 00:39:27,710  
another question for you been our senior

959  
00:39:33,490 --> 00:39:30,320  
IceBridge researcher and this is from

960  
00:39:35,860 --> 00:39:33,500  
Craig Landon on Twitter how long before

961  
00:39:38,530 --> 00:39:35,870  
you can gauge the state of the West

962  
00:39:42,070 --> 00:39:38,540  
Antarctic Ice Sheet will these flights

963  
00:39:44,980 --> 00:39:42,080

gather more data so these flights are

964

00:39:47,860 --> 00:39:44,990

expected to continue until I SAT two

965

00:39:50,230 --> 00:39:47,870

launches and then they'll go for a year

966

00:39:52,210 --> 00:39:50,240

too so that we have measurements on the

967

00:39:54,520 --> 00:39:52,220

ground at the same time I step two is

968

00:39:56,260 --> 00:39:54,530

making its measurements so we'll be able

969

00:39:57,880 --> 00:39:56,270

to calibrate the satellite and make sure

970

00:40:00,340 --> 00:39:57,890

we understand what it's telling us and

971

00:40:03,670 --> 00:40:00,350

then we'll have a series of continuing

972

00:40:06,070 --> 00:40:03,680

measurements from I set to off for three

973

00:40:07,900 --> 00:40:06,080

or more years but really we need to

974

00:40:09,610 --> 00:40:07,910

watch these ice sheets on an ongoing

975

00:40:12,580 --> 00:40:09,620

basis because there are a lot of

976

00:40:14,470 --> 00:40:12,590

different things that they could do we

977

00:40:16,300 --> 00:40:14,480

have a picture we have snapshots in time

978

00:40:19,360 --> 00:40:16,310

of what the ice sheets are doing right

979

00:40:20,740 --> 00:40:19,370

now we have models that can try to

980

00:40:22,000 --> 00:40:20,750

predict what they're going to do in the

981

00:40:24,910 --> 00:40:22,010

future but one thing that we've learned

982

00:40:26,710 --> 00:40:24,920

is that there are always surprises if

983

00:40:28,660 --> 00:40:26,720

you think that you can predict what the

984

00:40:29,980 --> 00:40:28,670

I she is going to do you often turn out

985

00:40:32,830 --> 00:40:29,990

to be wrong if you wait a couple of

986

00:40:35,140 --> 00:40:32,840

years so it's going to be an ongoing

987

00:40:37,390 --> 00:40:35,150

effort to keep an eye on what these I

988

00:40:39,310 --> 00:40:37,400

sheets are doing and make sure that we

989

00:40:44,530 --> 00:40:39,320

know what this that's going to meet for

990

00:40:45,880 --> 00:40:44,540

for human life now Ellen are NASA's

991

00:40:48,070 --> 00:40:45,890

chief scientist could

992

00:40:53,380 --> 00:40:48,080

tell us a little bit more about i SAT

993

00:40:54,940 --> 00:40:53,390

too well you know it's really exciting

994

00:40:56,920 --> 00:40:54,950

because again obviously being able to

995

00:40:59,100 --> 00:40:56,930

have that global view as opposed to the

996

00:41:01,390 --> 00:40:59,110

ice bridges doing a great job but we're

997

00:41:02,830 --> 00:41:01,400

under the force of the weather so on

998

00:41:05,740 --> 00:41:02,840

days where the weather's bad we actually

999

00:41:07,330 --> 00:41:05,750

can't can't go ahead and fly because we

1000

00:41:10,570 --> 00:41:07,340

need clear weather for our laser

1001  
00:41:12,400 --> 00:41:10,580  
altimeter to be working on and so while

1002  
00:41:14,310 --> 00:41:12,410  
the data were gathering is extremely

1003  
00:41:17,290 --> 00:41:14,320  
important and it does bridge this gap

1004  
00:41:19,540 --> 00:41:17,300  
being able to have a satellite up in

1005  
00:41:22,840 --> 00:41:19,550  
permanent orbit being able to take data

1006  
00:41:25,330 --> 00:41:22,850  
add in both the Arctic and the Antarctic

1007  
00:41:28,450 --> 00:41:25,340  
all the time is critically important and

1008  
00:41:31,540 --> 00:41:28,460  
so we're in the process of building the

1009  
00:41:32,830 --> 00:41:31,550  
instruments on on for i sat to those

1010  
00:41:35,590 --> 00:41:32,840  
instruments will be highly capable

1011  
00:41:38,110 --> 00:41:35,600  
making many of the same intruments that

1012  
00:41:40,870 --> 00:41:38,120  
our ice bridge is making but again now

1013  
00:41:43,120 --> 00:41:40,880

doing it on a much more regular basis as

1014

00:41:46,480 --> 00:41:43,130

Ben said it's really critical to monitor

1015

00:41:48,910 --> 00:41:46,490

this behavior launch month um year to

1016

00:41:50,230 --> 00:41:48,920

year and so getting that satellite up

1017

00:41:54,010 --> 00:41:50,240

there is something totally looking

1018

00:41:58,360 --> 00:41:54,020

forward to and 2017 we have another

1019

00:42:01,480 --> 00:41:58,370

question for Ben from our nasya bia

1020

00:42:03,880 --> 00:42:01,490

twitter what is the importance of ice

1021

00:42:07,300 --> 00:42:03,890

shelves and their buttressing effect in

1022

00:42:11,170 --> 00:42:07,310

tributary glaciers wow that's a good

1023

00:42:13,240 --> 00:42:11,180

question so ice shelves are where you

1024

00:42:15,940 --> 00:42:13,250

have a glacier that flows out onto the

1025

00:42:17,890 --> 00:42:15,950

ocean so if you can imagine a glacier

1026

00:42:20,650 --> 00:42:17,900

flowing downhill until it gets to the

1027

00:42:23,110 --> 00:42:20,660

coast when it gets to the coast it ice

1028

00:42:26,290 --> 00:42:23,120

floats so it will sometimes flow out

1029

00:42:28,210 --> 00:42:26,300

onto the ocean and make a big flat area

1030

00:42:30,430 --> 00:42:28,220

of ice with water underneath it and if

1031

00:42:33,010 --> 00:42:30,440

you look at these animations often it's

1032

00:42:35,410 --> 00:42:33,020

hard to tell from the animation where

1033

00:42:38,710 --> 00:42:35,420

the ice shelf is ah there we go so you

1034

00:42:40,630 --> 00:42:38,720

see that dark line the everything on the

1035

00:42:46,270 --> 00:42:40,640

ocean side of that dark line is floating

1036

00:42:48,160 --> 00:42:46,280

and that ice is plays an important role

1037

00:42:51,250 --> 00:42:48,170

in deciding how fast the glaciers

1038

00:42:52,960 --> 00:42:51,260

upstream flow because for ice to flow

1039

00:42:54,520 --> 00:42:52,970

off the glacier on to the ocean some of

1040

00:42:57,730 --> 00:42:54,530

the ice shelf ice has to get out of the

1041

00:42:59,320 --> 00:42:57,740

way now if the ice shelf gets thinner or

1042

00:43:01,120 --> 00:42:59,330

if it breaks up then it's

1043

00:43:04,230 --> 00:43:01,130

much easier for ice to flow off the

1044

00:43:06,550 --> 00:43:04,240

continent onto the ice shelf and that's

1045

00:43:09,010 --> 00:43:06,560

probably one of the reasons why the

1046

00:43:11,920 --> 00:43:09,020

glaciers have been flowing faster over

1047

00:43:13,990 --> 00:43:11,930

time because the ice shelves have gotten

1048

00:43:15,760 --> 00:43:14,000

out of the way and the ice sheet has an

1049

00:43:17,050 --> 00:43:15,770

easier time with lita the ice has an

1050

00:43:18,910 --> 00:43:17,060

easier time of leading the ice sheet

1051  
00:43:20,800 --> 00:43:18,920  
into the ocean so that's what we call

1052  
00:43:22,330 --> 00:43:20,810  
buttressing when the ice shelves are

1053  
00:43:24,880 --> 00:43:22,340  
preventing ice from flowing utterly

1054  
00:43:27,040 --> 00:43:24,890  
glaciers into the ocean and so we're

1055  
00:43:28,510 --> 00:43:27,050  
keeping a good eye on the ice shelves to

1056  
00:43:34,560 --> 00:43:28,520  
try and see how that might change over

1057  
00:43:37,810 --> 00:43:34,570  
time now I have a question for

1058  
00:43:40,780 --> 00:43:37,820  
ambassador hammer of how did you get

1059  
00:43:43,900 --> 00:43:40,790  
interested in your position well I

1060  
00:43:46,540 --> 00:43:43,910  
actually grew up overseas with my

1061  
00:43:49,330 --> 00:43:46,550  
parents in Latin America and I really

1062  
00:43:51,610 --> 00:43:49,340  
enjoyed living abroad in learning about

1063  
00:43:54,490 --> 00:43:51,620

other cultures learning languages like

1064

00:43:56,620 --> 00:43:54,500

Spanish my mother is from Spain and I

1065

00:43:59,590 --> 00:43:56,630

want to serve the country and I thought

1066

00:44:02,410 --> 00:43:59,600

that'd be really neat to be working at

1067

00:44:05,140 --> 00:44:02,420

our embassies and serving in that way

1068

00:44:06,700 --> 00:44:05,150

and so I went to Georgetown and we have

1069

00:44:08,560 --> 00:44:06,710

programmed international affairs and

1070

00:44:10,180 --> 00:44:08,570

then I went to graduate school and then

1071

00:44:12,370 --> 00:44:10,190

I was lucky i took the foreign service

1072

00:44:14,920 --> 00:44:12,380

exam and let me in and i encourage

1073

00:44:16,990 --> 00:44:14,930

anybody who wants to join the Foreign

1074

00:44:18,700 --> 00:44:17,000

Service to at least take the exam and

1075

00:44:21,190 --> 00:44:18,710

see if perhaps they might offer you a

1076

00:44:23,620 --> 00:44:21,200

job it's really exciting you get to

1077

00:44:25,060 --> 00:44:23,630

travel around the world meet really

1078

00:44:27,340 --> 00:44:25,070

interesting people yes you get a bit

1079

00:44:30,460 --> 00:44:27,350

homesick at times but now through all

1080

00:44:33,760 --> 00:44:30,470

these digital platforms whether it's now

1081

00:44:37,480 --> 00:44:33,770

snapchat FaceTime whatever else you can

1082

00:44:39,580 --> 00:44:37,490

connect with folks back home but it

1083

00:44:42,700 --> 00:44:39,590

really is something that's very special

1084

00:44:45,880 --> 00:44:42,710

in terms of what we're able to do to

1085

00:44:48,610 --> 00:44:45,890

explain America to people around the

1086

00:44:50,260 --> 00:44:48,620

world and frankly I think you know we

1087

00:44:51,990 --> 00:44:50,270

want to see more students American

1088

00:44:54,490 --> 00:44:52,000

students studying abroad as well

1089

00:44:56,410 --> 00:44:54,500

President Obama launched the program is

1090

00:44:58,290 --> 00:44:56,420

called a hundred thousand strong in the

1091

00:45:01,390 --> 00:44:58,300

Americas where he's trying to encourage

1092

00:45:03,460 --> 00:45:01,400

Americans a hundred thousand to go into

1093

00:45:05,890 --> 00:45:03,470

Latin American Caribbean and study and

1094

00:45:08,080 --> 00:45:05,900

also Latin Americans to come to American

1095

00:45:10,660 --> 00:45:08,090

universities because it's those personal

1096

00:45:12,940 --> 00:45:10,670

people-to-people exchanges that promote

1097

00:45:14,859 --> 00:45:12,950

better relationships and so

1098

00:45:16,870 --> 00:45:14,869

in a way when we travel abroad

1099

00:45:19,150 --> 00:45:16,880

everybody's a bit of an ambassador

1100

00:45:20,589 --> 00:45:19,160

representing the country and that's what

1101

00:45:22,420 --> 00:45:20,599

you want to see you want to see a

1102

00:45:25,450 --> 00:45:22,430

promotion of good relations between

1103

00:45:27,579 --> 00:45:25,460

people I very much enjoy it it's a real

1104

00:45:29,530 --> 00:45:27,589

honor to be representing the president

1105

00:45:31,030 --> 00:45:29,540

American people here in Chile it's a

1106

00:45:33,130 --> 00:45:31,040

fantastic place and look at the

1107

00:45:34,990 --> 00:45:33,140

incredible things I get to do go in an

1108

00:45:37,359 --> 00:45:35,000

ice bridge mission before refine

1109

00:45:39,400 --> 00:45:37,369

antartica going to grade the lectures

1110

00:45:41,710 --> 00:45:39,410

with dr. Stoffa and meeting kids who are

1111

00:45:43,660 --> 00:45:41,720

really excited about the prospects of

1112

00:45:45,220 --> 00:45:43,670

science and then working with my

1113

00:45:46,630 --> 00:45:45,230

colleagues here we are in an American

1114

00:45:48,970 --> 00:45:46,640

corner point i dinna so we have our

1115

00:45:50,980 --> 00:45:48,980

Chilean friends who are running this at

1116

00:45:52,650 --> 00:45:50,990

the University of my eye on is and again

1117

00:45:55,120 --> 00:45:52,660

we're connecting with people and

1118

00:45:56,770 --> 00:45:55,130

ultimately we're doing what we can to

1119

00:45:58,510 --> 00:45:56,780

make the world a better place as we

1120

00:46:02,349 --> 00:45:58,520

promote America's interests around the

1121

00:46:04,810 --> 00:46:02,359

globe we have another question for

1122

00:46:09,849 --> 00:46:04,820

NASA's chief scientist dr. Ellen stofan

1123

00:46:13,150 --> 00:46:09,859

from Roberto Flores on Twitter yes can

1124

00:46:18,220 --> 00:46:13,160

NASA detect gold precious metals and

1125

00:46:19,930 --> 00:46:18,230

gems under elf ice shelves no we really

1126

00:46:22,349 --> 00:46:19,940

don't have the ability to do that

1127

00:46:25,750 --> 00:46:22,359

because underneath the ice ice shelf is

1128

00:46:28,000 --> 00:46:25,760

water and and any kind of minerals or

1129

00:46:31,300 --> 00:46:28,010

gems would be at the bottom of the ocean

1130

00:46:33,520 --> 00:46:31,310

and and right now from space most of our

1131

00:46:35,859 --> 00:46:33,530

techniques like radars that get us

1132

00:46:38,770 --> 00:46:35,869

through the ice shelf which is what

1133

00:46:40,510 --> 00:46:38,780

we're using on ice bridge to get as been

1134

00:46:42,579 --> 00:46:40,520

talked about to get that on thickness

1135

00:46:45,760 --> 00:46:42,589

and look at the layering in ice shelves

1136

00:46:47,730 --> 00:46:45,770

or ice sheets on that radar that sees

1137

00:46:51,069 --> 00:46:47,740

through when the radar gets to water um

1138

00:46:53,530 --> 00:46:51,079

it just scatters away and so that you

1139

00:46:56,500 --> 00:46:53,540

can actually penetrate down we use

1140

00:46:58,900 --> 00:46:56,510

different instruments on in different

1141

00:47:01,630 --> 00:46:58,910

parts of the electromagnetic spectrum to

1142

00:47:04,000 --> 00:47:01,640

look on land for different compositions

1143

00:47:05,500 --> 00:47:04,010

um that's hard to do when there's a lot

1144

00:47:07,180 --> 00:47:05,510

of vegetation in the way that's why I

1145

00:47:10,450 --> 00:47:07,190

like looking at planetary surfaces like

1146

00:47:11,980 --> 00:47:10,460

Mars or Venus where there's not all

1147

00:47:13,450 --> 00:47:11,990

these trees and plants all over the

1148

00:47:15,309 --> 00:47:13,460

place that get in the way of looking at

1149

00:47:17,530 --> 00:47:15,319

the rocks the way a geologist wants to

1150

00:47:19,960 --> 00:47:17,540

do um so looking at those compositions

1151

00:47:25,900 --> 00:47:19,970

we can do in some areas but always just

1152

00:47:27,970 --> 00:47:25,910

on land we have another question for Ben

1153

00:47:32,470 --> 00:47:27,980

what are the different types of ice that

1154

00:47:35,940 --> 00:47:32,480

IceBridge looks at so there are two main

1155

00:47:38,680 --> 00:47:35,950

types of ice that we look at there's a

1156

00:47:40,839 --> 00:47:38,690

ice in the ice sheets and ice shelves

1157

00:47:43,450 --> 00:47:40,849

which is ice that's fallen from the sky

1158

00:47:45,309 --> 00:47:43,460

as snow and then over the years gotten

1159

00:47:48,099 --> 00:47:45,319

squished by its own weight until it

1160

00:47:51,099 --> 00:47:48,109

turns into ice but that was snow and now

1161

00:47:54,339 --> 00:47:51,109

it's now ice and they're sea ice which

1162

00:47:56,890 --> 00:47:54,349

is either frozen ocean water or snow

1163

00:47:59,950 --> 00:47:56,900

that's fallen on top of frozen ocean

1164

00:48:02,319 --> 00:47:59,960

water and turn to ice they're quite

1165

00:48:05,589 --> 00:48:02,329

different in a lot of ways sea ice is

1166

00:48:10,329 --> 00:48:05,599

usually much thinner so thick sea ice

1167

00:48:12,670 --> 00:48:10,339

might be 20 feet thick I and we would

1168

00:48:16,720 --> 00:48:12,680

see that guys like that in the Arctic

1169

00:48:19,510 --> 00:48:16,730

primarily whereas ice sheet in ice shelf

1170

00:48:21,579 --> 00:48:19,520

ice sheet ice and ice shelf ice can be

1171

00:48:25,420 --> 00:48:21,589

more than two kilometers more than three

1172

00:48:27,579 --> 00:48:25,430

kilometers that can some cases so um the

1173

00:48:30,309 --> 00:48:27,589

other big difference is that ice sheet

1174

00:48:33,370 --> 00:48:30,319

and ice shelf ice is very fresh so

1175

00:48:34,900 --> 00:48:33,380

there's not a lot of salt in it in fact

1176

00:48:38,410 --> 00:48:34,910

it's some of the cleanest water you're

1177

00:48:42,069 --> 00:48:38,420

likely to find so radar travels through

1178

00:48:44,079 --> 00:48:42,079

it very nicely whereas with sea ice that

1179

00:48:48,039 --> 00:48:44,089

can be almost completely opaque to raid

1180

00:48:49,809 --> 00:48:48,049

our energy so in some cases we send down

1181

00:48:51,309 --> 00:48:49,819

a pulse of radar energy it doesn't make

1182

00:48:52,690 --> 00:48:51,319

it all the way to the bottom of the sea

1183

00:48:55,089 --> 00:48:52,700

ice even though it can make it all the

1184

00:48:58,480 --> 00:48:55,099

way down to kilometers into the ice

1185

00:49:01,180 --> 00:48:58,490

sheet so those those are the main types

1186

00:49:04,029 --> 00:49:01,190

that we see so you're you're just

1187

00:49:05,980 --> 00:49:04,039

hearing from Ben Smith these are senior

1188

00:49:08,740 --> 00:49:05,990

icebridge researcher we have another

1189

00:49:11,170 --> 00:49:08,750

question for you been about the flights

1190

00:49:13,359 --> 00:49:11,180

from Twitter since it's at the bottom of

1191

00:49:16,900 --> 00:49:13,369

the world how do you know which side of

1192

00:49:19,269 --> 00:49:16,910

Antarctica is the west side ah well

1193

00:49:22,569 --> 00:49:19,279

there's a there are two ways that we

1194

00:49:25,059 --> 00:49:22,579

call that two reasons we call that the

1195

00:49:27,670 --> 00:49:25,069

West Antarctica first of all it's in the

1196

00:49:30,430 --> 00:49:27,680

Western Hemisphere so if you draw the

1197

00:49:32,529 --> 00:49:30,440

line for the hemisphere all the way

1198

00:49:34,710 --> 00:49:32,539

around the pole it pretty much splits

1199

00:49:36,910 --> 00:49:34,720

West Antarctica from East Antarctica

1200

00:49:38,950 --> 00:49:36,920

there's also that there's kind of a

1201  
00:49:39,610 --> 00:49:38,960  
standard map do you make of Antarctica

1202  
00:49:42,310 --> 00:49:39,620  
just like

1203  
00:49:44,440 --> 00:49:42,320  
is showing on my screen right now and in

1204  
00:49:46,240 --> 00:49:44,450  
that map West Antarctica is on the west

1205  
00:49:48,490 --> 00:49:46,250  
you know the left side of the map which

1206  
00:49:50,890 --> 00:49:48,500  
corresponds to the west side when you

1207  
00:49:53,110 --> 00:49:50,900  
looking at Northern Hemisphere map so

1208  
00:49:55,060 --> 00:49:53,120  
and the dividing line between West

1209  
00:49:57,100 --> 00:49:55,070  
Antarctica and East Antarctica is the

1210  
00:50:00,250 --> 00:49:57,110  
Transantarctic mountains you can see

1211  
00:50:02,200 --> 00:50:00,260  
those coming up from the bottom of the

1212  
00:50:04,270 --> 00:50:02,210  
screen to the middle of the ice sheet

1213  
00:50:05,830 --> 00:50:04,280

they continue under the ice sheet all

1214

00:50:08,980 --> 00:50:05,840

the way up and become the Antarctic

1215

00:50:10,720 --> 00:50:08,990

Peninsula so that's a major geologic

1216

00:50:15,070 --> 00:50:10,730

division between West Antarctica and

1217

00:50:19,330 --> 00:50:15,080

East Antarctica thank you we have a

1218

00:50:21,940 --> 00:50:19,340

question for mr. ambassador hammer what

1219

00:50:25,870 --> 00:50:21,950

is the position of the US on protecting

1220

00:50:28,120 --> 00:50:25,880

the glaciers well we certainly there's

1221

00:50:30,520 --> 00:50:28,130

an antarctic treaty that were a party to

1222

00:50:32,610 --> 00:50:30,530

and where we work with with other

1223

00:50:36,580 --> 00:50:32,620

countries in terms of trying to preserve

1224

00:50:38,620 --> 00:50:36,590

the purity and the nature of antarctica

1225

00:50:40,240 --> 00:50:38,630

a while at the same time we're doing

1226  
00:50:43,030 --> 00:50:40,250  
research so there are certain protocols

1227  
00:50:44,350 --> 00:50:43,040  
that of course nasa abides by that i

1228  
00:50:46,180 --> 00:50:44,360  
will do in terms of international

1229  
00:50:49,390 --> 00:50:46,190  
cooperation we don't recognize any

1230  
00:50:51,640 --> 00:50:49,400  
claims over sovereignty of parts of

1231  
00:50:54,160 --> 00:50:51,650  
Antarctica but we see it as a way that

1232  
00:50:56,590 --> 00:50:54,170  
again the international community can do

1233  
00:50:59,140 --> 00:50:56,600  
research that allows us to learn about

1234  
00:51:01,930 --> 00:50:59,150  
you know the issues like climate change

1235  
00:51:04,570 --> 00:51:01,940  
so in essence we want to do everything

1236  
00:51:07,090 --> 00:51:04,580  
that we can to preserve it as it is but

1237  
00:51:08,440 --> 00:51:07,100  
to learn from it as it is I don't know

1238  
00:51:11,530 --> 00:51:08,450

if the doctor stolen has anything

1239

00:51:13,210 --> 00:51:11,540

further on that no and certainly on the

1240

00:51:15,190 --> 00:51:13,220

president's extremely concerned about

1241

00:51:16,540 --> 00:51:15,200

climate change and he's been doing a

1242

00:51:18,210 --> 00:51:16,550

number of things he just did the most

1243

00:51:20,590 --> 00:51:18,220

recent climate summit at the UN

1244

00:51:24,040 --> 00:51:20,600

announced five different initiatives um

1245

00:51:25,570 --> 00:51:24,050

to try to to mitigate the effects of

1246

00:51:27,460 --> 00:51:25,580

climate change try to deal with climate

1247

00:51:31,390 --> 00:51:27,470

change it's been a big priority and it

1248

00:51:35,920 --> 00:51:31,400

continues to be we have another question

1249

00:51:39,250 --> 00:51:35,930

for Ben Smith is ice bridge daytime only

1250

00:51:42,580 --> 00:51:39,260

flights or do you get to see Aurora how

1251

00:51:44,860 --> 00:51:42,590

often do ever occur well I have to admit

1252

00:51:49,810 --> 00:51:44,870

that I've never been on an ice bridge

1253

00:51:52,090 --> 00:51:49,820

flight but i was there in Greenland this

1254

00:51:53,650 --> 00:51:52,100

spring where the in the

1255

00:51:56,530 --> 00:51:53,660

pound for the ice bridge plane was base

1256

00:51:59,170 --> 00:51:56,540

and kangaroo swak and I know that they

1257

00:52:00,760 --> 00:51:59,180

did see Aurora the day before I got

1258

00:52:03,250 --> 00:52:00,770

there so I didn't get to see it myself

1259

00:52:06,460 --> 00:52:03,260

and then over the next couple of days

1260

00:52:09,130 --> 00:52:06,470

the days got long enough so that the Sun

1261

00:52:14,170 --> 00:52:09,140

wasn't really setting anymore and at

1262

00:52:15,820 --> 00:52:14,180

that point there was no Aurora so the

1263

00:52:17,560 --> 00:52:15,830

ice bridge starts pretty early in the

1264

00:52:19,930 --> 00:52:17,570

spring and so they must have a chance to

1265

00:52:22,090 --> 00:52:19,940

see the Aurora some of the time but a

1266

00:52:23,680 --> 00:52:22,100

lot of time when I spray just flying the

1267

00:52:25,090 --> 00:52:23,690

Sun is up all day long and all night

1268

00:52:33,340 --> 00:52:25,100

long and they probably don't see a whole

1269

00:52:36,670 --> 00:52:33,350

lot now I have a question for both

1270

00:52:38,170 --> 00:52:36,680

ambassador hammer and dr. Ellen Stefan

1271

00:52:40,800 --> 00:52:38,180

who had the privilege of going on the

1272

00:52:43,210 --> 00:52:40,810

flights how cold were the flights Oh

1273

00:52:44,740 --> 00:52:43,220

their chili all right it's a big

1274

00:52:46,360 --> 00:52:44,750

mountain a little bit warmer your feet

1275

00:52:47,770 --> 00:52:46,370

tend to get a little bit cold but they

1276

00:52:49,270 --> 00:52:47,780

try to make it pretty comfortable and

1277

00:52:51,070 --> 00:52:49,280

there's tons of coffee so you're

1278

00:52:53,620 --> 00:52:51,080

drinking a lot of coffee give me your

1279

00:52:55,360 --> 00:52:53,630

warm so anything you know I didn't think

1280

00:52:56,560 --> 00:52:55,370

it was that bad no it really wasn't that

1281

00:52:59,680 --> 00:52:56,570

bad i must say i had brought some

1282

00:53:01,450 --> 00:52:59,690

mittens along i had an extra jacket if

1283

00:53:03,280 --> 00:53:01,460

you know so I was prepared for it to be

1284

00:53:04,960 --> 00:53:03,290

even colder than it was but cheer up

1285

00:53:07,360 --> 00:53:04,970

moving around the flight was very smooth

1286

00:53:09,060 --> 00:53:07,370

so seatbelt sign wasn't on most of the

1287

00:53:12,010 --> 00:53:09,070

flooded so you could wander around and

1288

00:53:14,050 --> 00:53:12,020

talk to people and as the ambassador's

1289

00:53:15,760 --> 00:53:14,060

then drink a lot of coffee one neat

1290

00:53:17,350 --> 00:53:15,770

thing that we did do is that we did go

1291

00:53:19,330 --> 00:53:17,360

into the belly of the plane it gets they

1292

00:53:22,060 --> 00:53:19,340

call it a pic and we saw how to have

1293

00:53:24,940 --> 00:53:22,070

this laser array and it's really

1294

00:53:28,900 --> 00:53:24,950

incredible to see and there and there it

1295

00:53:30,670 --> 00:53:28,910

was actually rather chilly but you can

1296

00:53:32,710 --> 00:53:30,680

see from the video there are people in

1297

00:53:33,910 --> 00:53:32,720

shirtsleeves some on the airplane some

1298

00:53:35,950 --> 00:53:33,920

people are a little tougher than others

1299

00:53:38,140 --> 00:53:35,960

I I pretty much kept to my multiple

1300

00:53:41,100 --> 00:53:38,150

sweaters on all day um but it wasn't as

1301  
00:53:44,200 --> 00:53:41,110  
bad as I thought it was going to be

1302  
00:53:47,050 --> 00:53:44,210  
alright so we only have a couple minutes

1303  
00:53:50,530 --> 00:53:47,060  
left so I would like to say me vote ask

1304  
00:53:53,890 --> 00:53:50,540  
Ellen what's next or I study for NASA

1305  
00:53:55,180 --> 00:53:53,900  
right well certainly we're looking

1306  
00:53:57,550 --> 00:53:55,190  
forward to the rest of the ice bridge

1307  
00:54:00,100 --> 00:53:57,560  
season we have a lot of tracks left that

1308  
00:54:01,300 --> 00:54:00,110  
we want to fly again today very exciting

1309  
00:54:02,620 --> 00:54:01,310  
they're flying over pi 9

1310  
00:54:04,390 --> 00:54:02,630  
yeah sure which we've been talking about

1311  
00:54:06,670 --> 00:54:04,400  
a fair amount today we have a lot of

1312  
00:54:08,470 --> 00:54:06,680  
tracks left that um you know fingers

1313  
00:54:10,810 --> 00:54:08,480

crossed the weather over Antarctica will

1314

00:54:12,430 --> 00:54:10,820

stay clear um a lot in the in the coming

1315

00:54:15,400 --> 00:54:12,440

weeks and we'll be able to accomplish

1316

00:54:18,010 --> 00:54:15,410

those white lines on right now has been

1317

00:54:21,280 --> 00:54:18,020

mentioned we have ice we have ice bridge

1318

00:54:24,040 --> 00:54:21,290

um flights planned on through at least

1319

00:54:25,540 --> 00:54:24,050

20 18 and that again is going to be

1320

00:54:29,320 --> 00:54:25,550

critically important to bridge this gap

1321

00:54:32,230 --> 00:54:29,330

um until we get I set 02 up and running

1322

00:54:36,580 --> 00:54:32,240

it and so certainly for NASA continuing

1323

00:54:38,560 --> 00:54:36,590

to assess the state of health of the ice

1324

00:54:40,510 --> 00:54:38,570

in Antarctica the ice in the Arctic is

1325

00:54:43,030 --> 00:54:40,520

is something that's a high priority we

1326  
00:54:44,830 --> 00:54:43,040  
will continue to do because I think one

1327  
00:54:46,750 --> 00:54:44,840  
of the things that people don't realize

1328  
00:54:48,370 --> 00:54:46,760  
when when they think about the

1329  
00:54:50,590 --> 00:54:48,380  
measurements we make is how important

1330  
00:54:52,660 --> 00:54:50,600  
that continuity of data sets is you know

1331  
00:54:54,250 --> 00:54:52,670  
you can make a measurement this year but

1332  
00:54:56,230 --> 00:54:54,260  
if you don't know what what the answer

1333  
00:54:58,270 --> 00:54:56,240  
or what it was like five years ago 10

1334  
00:55:00,430 --> 00:54:58,280  
years ago 20 years ago it's a lot harder

1335  
00:55:01,990 --> 00:55:00,440  
to understand what might happen in the

1336  
00:55:04,300 --> 00:55:02,000  
future so the fact that we've been

1337  
00:55:06,520 --> 00:55:04,310  
making ice bridge measurements for so

1338  
00:55:08,740 --> 00:55:06,530

long now we have i SAT before that gives

1339

00:55:12,510 --> 00:55:08,750

us these long-term data sets so it's so

1340

00:55:16,660 --> 00:55:12,520

important to continue those out future

1341

00:55:19,030 --> 00:55:16,670

well thank you so much mr. ambassador

1342

00:55:23,170 --> 00:55:19,040

Michael hammer our US ambassador to

1343

00:55:25,450 --> 00:55:23,180

Chile and dr. Ellen stofan NASA's chief

1344

00:55:28,750 --> 00:55:25,460

scientists both calling in from chilly

1345

00:55:31,320 --> 00:55:28,760

Cuban and thank you Ben Smith our senior

1346

00:55:35,310 --> 00:55:31,330

I screwed researcher calling in from

1347

00:55:37,420 --> 00:55:35,320

University of Washington then a real pro

1348

00:55:40,510 --> 00:55:37,430

doing a real privilege and pleasure

1349

00:55:43,840 --> 00:55:40,520

having you here thanks everyone for

1350

00:55:46,900 --> 00:55:43,850

coming out and for checking out this

1351

00:55:49,090 --> 00:55:46,910

google hangout will be saved forever on