

99 Google+

Witold Krajewski  
Iowa Flood Center



1  
00:00:08,710 --> 00:00:05,829  
hey good afternoon everybody uh so as

2  
00:00:10,310 --> 00:00:08,720  
erie's mentioned i'm i'm walt peterson

3  
00:00:12,629 --> 00:00:10,320  
and uh

4  
00:00:14,470 --> 00:00:12,639  
i'm a gpm ground validation uh science

5  
00:00:15,990 --> 00:00:14,480  
manager actually out here in

6  
00:00:18,470 --> 00:00:16,000  
near treyarch iowa in the middle of a

7  
00:00:20,390 --> 00:00:18,480  
cornfield with uh two radars and i'm

8  
00:00:22,950 --> 00:00:20,400  
just going to show you

9  
00:00:24,950 --> 00:00:22,960  
inside the radar trailer here so way

10  
00:00:26,950 --> 00:00:24,960  
down there at the end is one of my

11  
00:00:29,429 --> 00:00:26,960  
colleagues uh radar engineer from

12  
00:00:30,710 --> 00:00:29,439  
colorado state running our nasa d3r

13  
00:00:35,270 --> 00:00:30,720

radar

14

00:00:38,709 --> 00:00:35,280

things from a display i think you can

15

00:00:41,510 --> 00:00:38,719

see it's our product output window here

16

00:00:43,830 --> 00:00:41,520

this shows doppler velocity and return

17

00:00:46,470 --> 00:00:43,840

power from the radar radar reflectivity

18

00:00:49,190 --> 00:00:46,480

and some other polarimetric variables

19

00:00:50,549 --> 00:00:49,200

and then over here as i swing past my

20

00:00:53,750 --> 00:00:50,559

face

21

00:00:55,430 --> 00:00:53,760

hopefully yes okay so here is a

22

00:00:57,029 --> 00:00:55,440

real-time display

23

00:00:59,029 --> 00:00:57,039

that's what we look at as the radar

24

00:01:00,790 --> 00:00:59,039

spins as it's doing right now actually

25

00:01:02,709 --> 00:01:00,800

it shows us the returns from precip and

26  
00:01:05,030 --> 00:01:02,719  
the real-time display and then we've got

27  
00:01:06,870 --> 00:01:05,040  
some power panels and uh battery

28  
00:01:09,350 --> 00:01:06,880  
packs and that kind of stuff to ensure

29  
00:01:11,990 --> 00:01:09,360  
our backup power

30  
00:01:13,590 --> 00:01:12,000  
look inside the science container and

31  
00:01:16,310 --> 00:01:13,600  
then i'll just put this back down and

32  
00:01:18,630 --> 00:01:16,320  
transfer it back to aries

33  
00:01:20,310 --> 00:01:18,640  
okay

34  
00:01:22,550 --> 00:01:20,320  
thank you so much for that tour of the

35  
00:01:24,710 --> 00:01:22,560  
trailer um let's give a give it right to

36  
00:01:27,190 --> 00:01:24,720  
our honored guest maria larosa from the

37  
00:01:28,390 --> 00:01:27,200  
weather channel um mir you have now a

38  
00:01:31,030 --> 00:01:28,400

panel of

39

00:01:33,030 --> 00:01:31,040  
scientists who study uh rain and

40

00:01:34,870 --> 00:01:33,040  
flooding and flood prediction uh take it

41

00:01:37,190 --> 00:01:34,880  
away

42

00:01:39,350 --> 00:01:37,200  
yeah this is this is fantastic and you

43

00:01:41,270 --> 00:01:39,360  
know obviously flood's something that

44

00:01:43,510 --> 00:01:41,280  
affects people worldwide and so i want

45

00:01:46,069 --> 00:01:43,520  
to bring in uh pedro to talk a little

46

00:01:47,670 --> 00:01:46,079  
bit more about hazards the hazard of

47

00:01:50,389 --> 00:01:47,680  
flood and what kind of impact we're

48

00:01:51,910 --> 00:01:50,399  
talking about worldwide

49

00:01:54,310 --> 00:01:51,920  
thank you maria

50

00:01:55,749 --> 00:01:54,320  
flooding is a serious problem worldwide

51  
00:01:56,710 --> 00:01:55,759  
it is a zero problem in the united

52  
00:01:59,270 --> 00:01:56,720  
states

53  
00:02:02,310 --> 00:01:59,280  
uh among the weather

54  
00:02:04,709 --> 00:02:02,320  
disasters in the u.s it is second only

55  
00:02:06,789 --> 00:02:04,719  
to heat in the number of deaths

56  
00:02:08,630 --> 00:02:06,799  
and it is number one in the number of

57  
00:02:10,070 --> 00:02:08,640  
damages even more than hurricanes and

58  
00:02:12,150 --> 00:02:10,080  
tornadoes

59  
00:02:15,030 --> 00:02:12,160  
this is on the average through the

60  
00:02:16,869 --> 00:02:15,040  
history this is we have a couple of uh

61  
00:02:19,910 --> 00:02:16,879  
visuals to show

62  
00:02:23,510 --> 00:02:19,920  
what the impact is on number of deaths

63  
00:02:27,910 --> 00:02:23,520

and number of damages and value of

64  
00:02:30,630 --> 00:02:27,920  
damages throughout the years since 1903.

65  
00:02:32,949 --> 00:02:30,640  
the uh but it is a worldwide problem

66  
00:02:35,509 --> 00:02:32,959  
walt will be able to talk a little bit

67  
00:02:38,470 --> 00:02:35,519  
more about what the impact is worldwide

68  
00:02:41,750 --> 00:02:38,480  
of flooding for us the weather service

69  
00:02:44,550 --> 00:02:41,760  
having the opportunity to participate on

70  
00:02:46,869 --> 00:02:44,560  
on this experiment and eventually having

71  
00:02:48,309 --> 00:02:46,879  
the opportunity to receive information

72  
00:02:51,750 --> 00:02:48,319  
from the

73  
00:02:55,030 --> 00:02:51,760  
satellite-based gpm it will give us a

74  
00:02:55,990 --> 00:02:55,040  
considerable advantage for improving the

75  
00:02:58,070 --> 00:02:56,000  
uh

76

00:03:00,070 --> 00:02:58,080

river flow forecasting

77

00:03:02,390 --> 00:03:00,080

we have an extensive network of radars

78

00:03:05,670 --> 00:03:02,400

throughout the world and we have another

79

00:03:09,270 --> 00:03:05,680

visual to to to uh display

80

00:03:10,790 --> 00:03:09,280

that even though the network is very

81

00:03:12,790 --> 00:03:10,800

widespread throughout the u.s we have

82

00:03:14,309 --> 00:03:12,800

150 radars

83

00:03:16,869 --> 00:03:14,319

there are gaps in the coverage

84

00:03:18,550 --> 00:03:16,879

especially at the lower elevations that

85

00:03:21,430 --> 00:03:18,560

having the advantage of the satellites

86

00:03:24,229 --> 00:03:21,440

looking from from space down into earth

87

00:03:30,309 --> 00:03:24,239

will help us fill those gaps and improve

88

00:03:34,149 --> 00:03:32,070

wonderful thank you i want to remind our

89

00:03:35,589 --> 00:03:34,159

audience that um you can please ask us

90

00:03:38,789 --> 00:03:35,599

any questions about floods or flood

91

00:03:40,789 --> 00:03:38,799

prediction here in the google chat in on

92

00:03:42,869 --> 00:03:40,799

youtube if you're watching on youtube in

93

00:03:44,470 --> 00:03:42,879

the comments section or if you want to

94

00:03:46,630 --> 00:03:44,480

send us some questions through twitter

95

00:03:49,910 --> 00:03:46,640

just use the hashtag ifleds that's the

96

00:03:52,149 --> 00:03:49,920

letter i and then floods with an s

97

00:03:54,550 --> 00:03:52,159

moving on a little bit i'd like to ask

98

00:03:56,789 --> 00:03:54,560

vitek a question um now

99

00:03:59,110 --> 00:03:56,799

one of the things that this particular

100

00:04:00,390 --> 00:03:59,120

ground campaign is focusing on

101  
00:04:02,390 --> 00:04:00,400  
is iowa

102  
00:04:04,229 --> 00:04:02,400  
and i'm i know you're out there in iowa

103  
00:04:06,550 --> 00:04:04,239  
v tech first of all why are you focusing

104  
00:04:07,830 --> 00:04:06,560  
in iowa of all places and then what is

105  
00:04:09,910 --> 00:04:07,840  
happening out there with this ground

106  
00:04:10,949 --> 00:04:09,920  
campaign

107  
00:04:13,270 --> 00:04:10,959  
yes

108  
00:04:16,710 --> 00:04:13,280  
well this is

109  
00:04:18,390 --> 00:04:16,720  
a natural question you know why iowa

110  
00:04:19,909 --> 00:04:18,400  
well the simple

111  
00:04:22,469 --> 00:04:19,919  
answer would be

112  
00:04:24,870 --> 00:04:22,479  
because we've got floods

113  
00:04:28,469 --> 00:04:24,880

and it is true that

114

00:04:31,189 --> 00:04:28,479

our state got its share of flooding over

115

00:04:33,030 --> 00:04:31,199

the last several years

116

00:04:35,189 --> 00:04:33,040

in 2008

117

00:04:38,390 --> 00:04:35,199

we had an extreme event

118

00:04:40,230 --> 00:04:38,400

um that cost you know the state close to

119

00:04:42,390 --> 00:04:40,240

10 billion dollars

120

00:04:43,189 --> 00:04:42,400

and at that time

121

00:04:45,350 --> 00:04:43,199

um

122

00:04:49,189 --> 00:04:45,360

the value if you will of that you know

123

00:04:52,550 --> 00:04:49,199

disaster ranked the fifth cost dealers

124

00:04:53,350 --> 00:04:52,560

in the history of the united states so

125

00:04:55,990 --> 00:04:53,360

so

126  
00:04:56,710 --> 00:04:56,000  
we're talking you know real money

127  
00:04:59,430 --> 00:04:56,720  
and

128  
00:05:02,870 --> 00:04:59,440  
in particular the city

129  
00:05:05,430 --> 00:05:02,880  
in eastern iowa the city of cedar rapids

130  
00:05:07,909 --> 00:05:06,710  
affected

131  
00:05:09,430 --> 00:05:07,919  
in a

132  
00:05:10,469 --> 00:05:09,440  
terrible way

133  
00:05:11,749 --> 00:05:10,479  
some

134  
00:05:15,510 --> 00:05:11,759  
thousand

135  
00:05:20,070 --> 00:05:15,520  
city blocks were inundated by that flood

136  
00:05:22,550 --> 00:05:20,080  
the flood came on very suddenly

137  
00:05:26,550 --> 00:05:22,560  
it was a case of a traffic jam in the

138  
00:05:29,590 --> 00:05:26,560

river network there was already a flood

139

00:05:32,230 --> 00:05:29,600

flood wave moving downstream and that

140

00:05:33,670 --> 00:05:32,240

coincided with a response to a

141

00:05:35,990 --> 00:05:33,680

torrential

142

00:05:38,469 --> 00:05:36,000

flash flooding you know event

143

00:05:41,670 --> 00:05:38,479

and you know that two collided you can

144

00:05:42,550 --> 00:05:41,680

say downtown cedar rapids and so

145

00:05:44,390 --> 00:05:42,560

um

146

00:05:46,629 --> 00:05:44,400

but this was not the last you know

147

00:05:50,710 --> 00:05:46,639

flooding in iowa uh

148

00:05:52,790 --> 00:05:50,720

um there were floods in 2010 and then

149

00:05:55,430 --> 00:05:52,800

many of us remember the flooding on the

150

00:05:57,590 --> 00:05:55,440

missouri river which is one of our

151  
00:06:00,870 --> 00:05:57,600  
border rivers

152  
00:06:03,670 --> 00:06:00,880  
that lasted for several weeks um and

153  
00:06:05,749 --> 00:06:03,680  
even now as we are in the middle of this

154  
00:06:08,150 --> 00:06:05,759  
field campaign

155  
00:06:10,150 --> 00:06:08,160  
we've got you know flooding

156  
00:06:13,670 --> 00:06:10,160  
over the last you know month in several

157  
00:06:15,749 --> 00:06:13,680  
places in iowa um including you know

158  
00:06:18,309 --> 00:06:15,759  
here in iowa city uh

159  
00:06:21,110 --> 00:06:18,319  
where i'm speaking you know from so

160  
00:06:23,510 --> 00:06:21,120  
um and and still the rivers and streams

161  
00:06:25,830 --> 00:06:23,520  
are you know running you know high uh

162  
00:06:28,870 --> 00:06:25,840  
which of course you know makes uh for a

163  
00:06:29,670 --> 00:06:28,880

good case for scientific you know study

164

00:06:32,309 --> 00:06:29,680

uh

165

00:06:34,710 --> 00:06:32,319

but i wish that that

166

00:06:39,830 --> 00:06:34,720

flooding would stop

167

00:06:43,670 --> 00:06:41,350

excellent thank you so much we're told

168

00:06:45,430 --> 00:06:43,680

i'm wondering so so

169

00:06:47,670 --> 00:06:45,440

what do you need to know to make a flood

170

00:06:50,309 --> 00:06:47,680

forecast what's the exact data that can

171

00:06:51,830 --> 00:06:50,319

lead to being a forecaster and um is

172

00:06:53,350 --> 00:06:51,840

this like the weather forecast we watch

173

00:06:55,350 --> 00:06:53,360

in the nightly news every night you know

174

00:06:58,150 --> 00:06:55,360

where it's like chance of sunny partly

175

00:06:59,510 --> 00:06:58,160

cloudy that type of thing

176

00:07:02,150 --> 00:06:59,520

well you

177

00:07:05,110 --> 00:07:02,160

have to watch the conditions over a

178

00:07:06,950 --> 00:07:05,120

longer you know period of time so

179

00:07:10,950 --> 00:07:06,960

so what is

180

00:07:12,230 --> 00:07:10,960

very important here is the scale so

181

00:07:14,710 --> 00:07:12,240

um

182

00:07:16,950 --> 00:07:14,720

for small scale you know very small you

183

00:07:20,070 --> 00:07:16,960

know watersheds um

184

00:07:21,990 --> 00:07:20,080

there is a very quick response to any

185

00:07:26,150 --> 00:07:22,000

heavy rainfall

186

00:07:29,110 --> 00:07:26,160

but as the scale increases uh then that

187

00:07:32,070 --> 00:07:29,120

connection between you know the rainfall

188

00:07:34,629 --> 00:07:32,080

and the the response and and again you

189

00:07:36,870 --> 00:07:34,639

know the responses in the form of the

190

00:07:38,790 --> 00:07:36,880

amount of water that is you know moving

191

00:07:41,270 --> 00:07:38,800

you know through the system of

192

00:07:43,589 --> 00:07:41,280

streams and rivers

193

00:07:45,670 --> 00:07:43,599

that connection uh

194

00:07:48,790 --> 00:07:45,680

is is a little bit less

195

00:07:52,309 --> 00:07:48,800

obvious and you know i can i can give

196

00:07:57,749 --> 00:07:54,469

example here so

197

00:08:01,029 --> 00:07:57,759

imagine yourself in new orleans

198

00:08:03,990 --> 00:08:01,039

and then there is a severe storm in iowa

199

00:08:07,029 --> 00:08:04,000

um well you don't see the immediate

200

00:08:08,869 --> 00:08:07,039

effect of that storm in iowa when you

201  
00:08:10,950 --> 00:08:08,879  
are

202  
00:08:13,990 --> 00:08:10,960  
hundreds and thousands of miles you know

203  
00:08:17,110 --> 00:08:14,000  
away but the two are connected you know

204  
00:08:19,430 --> 00:08:17,120  
that water eventually will um find its

205  
00:08:21,350 --> 00:08:19,440  
way uh all the way down you know to the

206  
00:08:24,550 --> 00:08:21,360  
outlet of

207  
00:08:27,830 --> 00:08:24,560  
of of the mississippi river basin so um

208  
00:08:30,869 --> 00:08:27,840  
so again it's an issue of scale and of

209  
00:08:32,709 --> 00:08:30,879  
course rainfall especially large amounts

210  
00:08:33,829 --> 00:08:32,719  
of rainfall that's a necessary

211  
00:08:35,110 --> 00:08:33,839  
ingredient

212  
00:08:37,909 --> 00:08:35,120  
um

213  
00:08:40,550 --> 00:08:37,919

and how

214

00:08:42,149 --> 00:08:40,560

the ground responds to that rainfall

215

00:08:45,030 --> 00:08:42,159

whether

216

00:08:47,750 --> 00:08:45,040

or what fraction of it will infiltrate

217

00:08:50,550 --> 00:08:47,760

and what fraction of it

218

00:08:53,030 --> 00:08:50,560

will find its way to streams and rivers

219

00:08:53,910 --> 00:08:53,040

that is you know determined by

220

00:08:57,750 --> 00:08:53,920

um

221

00:09:00,790 --> 00:08:57,760

by land use uh and the soil properties

222

00:09:02,150 --> 00:09:00,800

but after that it is the transport in

223

00:09:08,550 --> 00:09:02,160

that

224

00:09:12,070 --> 00:09:08,560

of the flooding and

225

00:09:14,230 --> 00:09:12,080

its extent so so it's a complicated you

226

00:09:15,509 --> 00:09:14,240

know phenomenon and you have to have a

227

00:09:17,750 --> 00:09:15,519

good handle

228

00:09:21,509 --> 00:09:17,760

on all these you know conditions to be

229

00:09:27,990 --> 00:09:25,190

i wanted to ask vtec and walt and pedro

230

00:09:29,269 --> 00:09:28,000

it's very complicated forecasting floods

231

00:09:31,829 --> 00:09:29,279

what do you

232

00:09:34,230 --> 00:09:31,839

gentlemen see as good aspects to what we

233

00:09:39,269 --> 00:09:34,240

have now and then how can things like

234

00:09:49,110 --> 00:09:41,590

so perhaps perhaps pedro should take

235

00:09:53,350 --> 00:09:50,710

hi pedro take it away i think we're

236

00:09:57,829 --> 00:09:53,360

having a problem with your mic

237

00:10:01,590 --> 00:09:59,190

the uh the main advantage of

238

00:10:03,430 --> 00:10:01,600

precipitation from satellites uh well

239

00:10:05,430 --> 00:10:03,440

there are many advantages one of them is

240

00:10:08,230 --> 00:10:05,440

the global coverage it goes throughout

241

00:10:10,470 --> 00:10:08,240

the most most of the world given that

242

00:10:11,910 --> 00:10:10,480

the satellite constellation has a near

243

00:10:14,870 --> 00:10:11,920

polar orbit

244

00:10:16,150 --> 00:10:14,880

so areas of the world that are not

245

00:10:18,310 --> 00:10:16,160

currently

246

00:10:20,389 --> 00:10:18,320

covered by observational precipitation

247

00:10:22,550 --> 00:10:20,399

especially the oceans or many many many

248

00:10:24,790 --> 00:10:22,560

countries that don't have the radar

249

00:10:27,110 --> 00:10:24,800

network that we have in the u.s now

250

00:10:29,350 --> 00:10:27,120

we'll have the possibility of having

251  
00:10:31,590 --> 00:10:29,360  
near real time coverage of precipitation

252  
00:10:35,910 --> 00:10:31,600  
and severe precipitation issues

253  
00:10:38,389 --> 00:10:35,920  
the uh it also has a an advantage of

254  
00:10:40,389 --> 00:10:38,399  
enabling quantifying the overall water

255  
00:10:42,230 --> 00:10:40,399  
cycle

256  
00:10:45,030 --> 00:10:42,240  
by observing precipitation in areas that

257  
00:10:47,190 --> 00:10:45,040  
have not been observed so far

258  
00:10:49,750 --> 00:10:47,200  
they will be able to tell how much

259  
00:10:53,110 --> 00:10:49,760  
precipitation uh what intensity the

260  
00:10:55,990 --> 00:10:53,120  
precipitation is and how often the

261  
00:10:58,310 --> 00:10:56,000  
precipitation is happening and then

262  
00:11:01,269 --> 00:10:58,320  
use that to corroborate the predictions

263  
00:11:02,710 --> 00:11:01,279

that the global climate change models

264

00:11:04,630 --> 00:11:02,720

are coming up with

265

00:11:07,350 --> 00:11:04,640

so the the uh

266

00:11:09,430 --> 00:11:07,360

the advantages are absolutely multiple

267

00:11:11,269 --> 00:11:09,440

and even in the us with all our network

268

00:11:17,590 --> 00:11:11,279

and our sensor we will be able to take

269

00:11:21,750 --> 00:11:19,990

and now how does that lead into this

270

00:11:23,430 --> 00:11:21,760

upcoming nasa mission that we have

271

00:11:25,829 --> 00:11:23,440

launching the global precipitation

272

00:11:27,670 --> 00:11:25,839

measurement mission or gpm

273

00:11:28,790 --> 00:11:27,680

yeah that's actually a perfect lead into

274

00:11:30,069 --> 00:11:28,800

gpm

275

00:11:32,389 --> 00:11:30,079

so the global

276

00:11:34,470 --> 00:11:32,399

precipitation measurement mission is an

277

00:11:35,910 --> 00:11:34,480

international mission satellite mission

278

00:11:38,630 --> 00:11:35,920

actually uh

279

00:11:40,710 --> 00:11:38,640

slated to launch the core satellite in

280

00:11:43,269 --> 00:11:40,720

february of next year

281

00:11:45,190 --> 00:11:43,279

and so the gpm mission is really

282

00:11:47,750 --> 00:11:45,200

designed to do the global energy and

283

00:11:50,710 --> 00:11:47,760

water cycle and to

284

00:11:53,350 --> 00:11:50,720

by virtue of our enhanced ability to

285

00:11:55,190 --> 00:11:53,360

measure precipitation in a global sense

286

00:11:57,509 --> 00:11:55,200

enable us to do a better job of

287

00:12:00,389 --> 00:11:57,519

predicting natural hazards like flooding

288

00:12:02,550 --> 00:12:00,399

so there's the water cycle aspect and

289

00:12:05,430 --> 00:12:02,560

importantly also a weather and climate

290

00:12:06,470 --> 00:12:05,440

aspect to gpm so the information that we

291

00:12:08,389 --> 00:12:06,480

collect

292

00:12:11,670 --> 00:12:08,399

from the satellite mission itself is

293

00:12:13,509 --> 00:12:11,680

used to improve our ability to do

294

00:12:15,910 --> 00:12:13,519

numerical weather prediction which is

295

00:12:18,310 --> 00:12:15,920

important to be able to sort of

296

00:12:19,269 --> 00:12:18,320

describe conditions upstream so that you

297

00:12:21,430 --> 00:12:19,279

do a better

298

00:12:22,870 --> 00:12:21,440

job of predicting downstream

299

00:12:25,190 --> 00:12:22,880

in an atmospheric sense when you're

300

00:12:28,230 --> 00:12:25,200

going to have heavy rain events and that

301  
00:12:30,150 --> 00:12:28,240  
and then also our ability to well our

302  
00:12:31,509 --> 00:12:30,160  
improved technology and instrumentation

303  
00:12:34,150 --> 00:12:31,519  
that will be

304  
00:12:35,829 --> 00:12:34,160  
on the satellite itself will enable us

305  
00:12:38,550 --> 00:12:35,839  
to do a better job of accurately

306  
00:12:40,150 --> 00:12:38,560  
measuring rainfall rates

307  
00:12:42,470 --> 00:12:40,160  
and of course this all goes back to

308  
00:12:44,710 --> 00:12:42,480  
societal applications and and our

309  
00:12:46,230 --> 00:12:44,720  
ability to take the information

310  
00:12:48,790 --> 00:12:46,240  
and better help

311  
00:12:51,670 --> 00:12:48,800  
decision makers and

312  
00:12:52,870 --> 00:12:51,680  
people that issue warnings and or

313  
00:12:55,829 --> 00:12:52,880

decide whether or not they're going to

314

00:12:58,150 --> 00:12:55,839

irrigate their field today for example

315

00:13:00,150 --> 00:12:58,160

that's what gpm will uh

316

00:13:02,470 --> 00:13:00,160

the capability that gpm will provide us

317

00:13:03,829 --> 00:13:02,480

and and do so over sort of a more global

318

00:13:05,829 --> 00:13:03,839

scale um

319

00:13:09,190 --> 00:13:05,839

pedro talked about the issues of

320

00:13:11,910 --> 00:13:09,200

flooding and some statistics in terms of

321

00:13:13,750 --> 00:13:11,920

impacts in the united states and

322

00:13:15,990 --> 00:13:13,760

we do see though that the the largest

323

00:13:18,710 --> 00:13:16,000

impacts in flooding are really more out

324

00:13:21,110 --> 00:13:18,720

there in the developing world

325

00:13:22,790 --> 00:13:21,120

in particular you know tens of thousands

326

00:13:25,430 --> 00:13:22,800

of people annually

327

00:13:27,190 --> 00:13:25,440

uh lose their lives to flooding um

328

00:13:28,550 --> 00:13:27,200

the overwhelming majority of that being

329

00:13:31,670 --> 00:13:28,560

in the third world

330

00:13:34,069 --> 00:13:31,680

and um and it's also from a dollar a

331

00:13:36,150 --> 00:13:34,079

sort of a dollar a cost perspective much

332

00:13:38,230 --> 00:13:36,160

more much larger impact

333

00:13:40,150 --> 00:13:38,240

in developing nations

334

00:13:43,110 --> 00:13:40,160

mainly because i think really of the

335

00:13:44,230 --> 00:13:43,120

warning aspect and the ability to inform

336

00:13:46,389 --> 00:13:44,240

people ahead of time and when we're

337

00:13:48,550 --> 00:13:46,399

going to have flooding issues so

338

00:13:50,870 --> 00:13:48,560

gpm will help with some of that

339

00:13:52,470 --> 00:13:50,880

and i don't know if at this point you

340

00:13:54,629 --> 00:13:52,480

you want me to describe more about the

341

00:13:55,509 --> 00:13:54,639

mission itself um

342

00:13:57,590 --> 00:13:55,519

well

343

00:13:59,670 --> 00:13:57,600

actually i was wondering as part of

344

00:14:01,750 --> 00:13:59,680

talking about the mission itself gpm we

345

00:14:03,829 --> 00:14:01,760

said it's new but it's actually the next

346

00:14:05,990 --> 00:14:03,839

generation of a previous satellite right

347

00:14:07,910 --> 00:14:06,000

out there something called a trim the

348

00:14:10,870 --> 00:14:07,920

tropical rainfall measurement mission am

349

00:14:13,269 --> 00:14:10,880

i right that's correct actually gpm will

350

00:14:15,990 --> 00:14:13,279

uh significantly extend the capabilities

351  
00:14:18,949 --> 00:14:16,000  
that we developed with the trim mission

352  
00:14:21,350 --> 00:14:18,959  
the trim measurements involve

353  
00:14:24,150 --> 00:14:21,360  
both a precipitation radar a single

354  
00:14:26,790 --> 00:14:24,160  
frequency precipitation radar and

355  
00:14:29,110 --> 00:14:26,800  
an advanced multi-frequency radiometer

356  
00:14:31,030 --> 00:14:29,120  
and those things have worked great

357  
00:14:32,949 --> 00:14:31,040  
basically letting us see

358  
00:14:34,710 --> 00:14:32,959  
rainfall in the tropics

359  
00:14:36,949 --> 00:14:34,720  
and in fact a lot of those information

360  
00:14:37,990 --> 00:14:36,959  
are used in real time to improve for

361  
00:14:40,550 --> 00:14:38,000  
example

362  
00:14:43,030 --> 00:14:40,560  
tropical cyclone fixes so when the

363  
00:14:45,030 --> 00:14:43,040

satellite flies over you get a really

364

00:14:47,509 --> 00:14:45,040

precise fix on the center of a tropical

365

00:14:48,629 --> 00:14:47,519

cyclone or even a developing tropical

366

00:14:51,509 --> 00:14:48,639

cyclone

367

00:14:53,189 --> 00:14:51,519

um the radar itself allows us to map the

368

00:14:54,870 --> 00:14:53,199

depth the three-dimensional depth of

369

00:14:56,710 --> 00:14:54,880

precipitation

370

00:14:58,310 --> 00:14:56,720

and from that we get some indication as

371

00:15:00,150 --> 00:14:58,320

to whether things are developing or

372

00:15:01,030 --> 00:15:00,160

intensifying even more

373

00:15:03,750 --> 00:15:01,040

uh

374

00:15:06,790 --> 00:15:03,760

in a tropical cyclone so gpm kind of

375

00:15:08,550 --> 00:15:06,800

follows on um the trend mission and uh

376

00:15:10,790 --> 00:15:08,560

and then extends it by virtue of the new

377

00:15:12,870 --> 00:15:10,800

technology and also the fact that now

378

00:15:15,750 --> 00:15:12,880

we're talking about a constellation of

379

00:15:17,430 --> 00:15:15,760

satellites and gpm so gpm the core

380

00:15:19,269 --> 00:15:17,440

satellite is one platform that we

381

00:15:21,990 --> 00:15:19,279

launched next february but there are

382

00:15:23,189 --> 00:15:22,000

actually already uh satellite platforms

383

00:15:25,350 --> 00:15:23,199

up there that will join the

384

00:15:28,310 --> 00:15:25,360

constellation of uh

385

00:15:30,710 --> 00:15:28,320

of the uh well that comprised the gpm

386

00:15:33,030 --> 00:15:30,720

constellation with the core satellite

387

00:15:35,430 --> 00:15:33,040

acting as the on orbit calibrator of

388

00:15:37,509 --> 00:15:35,440

that entire constellation and then we

389

00:15:39,829 --> 00:15:37,519

increase our sampling to like one to

390

00:15:41,910 --> 00:15:39,839

three hours for global precipitation

391

00:15:44,230 --> 00:15:41,920

maps compared to trim right now which

392

00:15:48,629 --> 00:15:44,240

gives us sampling in most locations on

393

00:15:51,829 --> 00:15:50,310

fantastic i just wanted to jump in and

394

00:15:53,430 --> 00:15:51,839

we're going to be seeing your questions

395

00:15:54,870 --> 00:15:53,440

that are coming in through youtube

396

00:15:57,030 --> 00:15:54,880

through google plus and also through

397

00:15:58,310 --> 00:15:57,040

twitter and in just a few minutes if

398

00:16:00,710 --> 00:15:58,320

you're following along i want to ask a

399

00:16:02,550 --> 00:16:00,720

question on twitter it's hashtag ifloods

400

00:16:04,870 --> 00:16:02,560

that's the letter i and the word floods

401  
00:16:06,710 --> 00:16:04,880  
with an s and after this hangout airs

402  
00:16:08,389 --> 00:16:06,720  
live it's going to be rebroadcast and

403  
00:16:09,269 --> 00:16:08,399  
archived on the goddard's youtube

404  
00:16:10,949 --> 00:16:09,279  
channel

405  
00:16:12,949 --> 00:16:10,959  
which is nasa explorer and we'll provide

406  
00:16:14,550 --> 00:16:12,959  
those links as well we'll also provide

407  
00:16:15,990 --> 00:16:14,560  
some links to all the different videos

408  
00:16:17,749 --> 00:16:16,000  
and things that we're showing throughout

409  
00:16:20,310 --> 00:16:17,759  
this hangout

410  
00:16:23,030 --> 00:16:20,320  
and joining us just right now we've got

411  
00:16:25,670 --> 00:16:23,040  
walt peterson who's with nasa goddard

412  
00:16:27,430 --> 00:16:25,680  
walt's flight facility and if watt looks

413  
00:16:29,350 --> 00:16:27,440

a little darkly lit it's because he's

414

00:16:30,949 --> 00:16:29,360

sitting in a trailer out in the field

415

00:16:32,790 --> 00:16:30,959

doing a ground campaign for this new

416

00:16:35,110 --> 00:16:32,800

satellite that we're discussing

417

00:16:37,990 --> 00:16:35,120

that is going to hopefully give us

418

00:16:39,829 --> 00:16:38,000

really great insights into rainfall and

419

00:16:41,749 --> 00:16:39,839

be able to connect it back to floods

420

00:16:43,030 --> 00:16:41,759

there's a lot of flooding going on here

421

00:16:44,870 --> 00:16:43,040

on the east coast right now is the

422

00:16:47,030 --> 00:16:44,880

remnants of hurricane i'm sorry a

423

00:16:49,509 --> 00:16:47,040

tropical storm tropical storm andrea

424

00:16:50,870 --> 00:16:49,519

goes up and i know in europe in germany

425

00:16:53,189 --> 00:16:50,880

and eastern europe are having the worst

426  
00:16:54,870 --> 00:16:53,199  
flooding they've had in decades um so

427  
00:16:56,790 --> 00:16:54,880  
i'm going to give it back to walt talk a

428  
00:16:57,910 --> 00:16:56,800  
little bit more about this mission and

429  
00:16:59,189 --> 00:16:57,920  
how

430  
00:17:01,749 --> 00:16:59,199  
the details that it's going to be

431  
00:17:05,029 --> 00:17:01,759  
collecting will help feed into for flood

432  
00:17:06,630 --> 00:17:05,039  
forecast predictions

433  
00:17:09,829 --> 00:17:06,640  
oh we were you going to hand that back

434  
00:17:11,189 --> 00:17:09,839  
to me or to pedro or maybe vtec

435  
00:17:12,470 --> 00:17:11,199  
why don't you start walton then we'll go

436  
00:17:13,350 --> 00:17:12,480  
down the line

437  
00:17:14,949 --> 00:17:13,360  
okay

438  
00:17:16,789 --> 00:17:14,959

so the information that the mission

439

00:17:19,029 --> 00:17:16,799

collects you know the fundamental

440

00:17:20,789 --> 00:17:19,039

measurement is the rainfall rate the

441

00:17:23,429 --> 00:17:20,799

rainfall rate is kind of a fundamental

442

00:17:25,429 --> 00:17:23,439

input into a flood forecast model

443

00:17:28,630 --> 00:17:25,439

the flood forecast model uses other

444

00:17:29,990 --> 00:17:28,640

information as well as the rainfall rate

445

00:17:32,310 --> 00:17:30,000

things like the

446

00:17:34,710 --> 00:17:32,320

state of the ground um you know how

447

00:17:36,789 --> 00:17:34,720

moist the ground is which determines how

448

00:17:37,909 --> 00:17:36,799

much runoff or filtration you have and

449

00:17:40,390 --> 00:17:37,919

actually

450

00:17:43,110 --> 00:17:40,400

uh possibly uh vtec

451  
00:17:46,230 --> 00:17:43,120  
might want to to chime in on that aspect

452  
00:17:50,310 --> 00:17:46,240  
of things being a hydrologist and flood

453  
00:17:53,909 --> 00:17:51,270  
yeah

454  
00:17:55,750 --> 00:17:53,919  
let me let me uh continue

455  
00:17:59,750 --> 00:17:55,760  
um so

456  
00:18:01,350 --> 00:17:59,760  
the the the big issue here is that

457  
00:18:02,870 --> 00:18:01,360  
although

458  
00:18:05,430 --> 00:18:02,880  
gpm

459  
00:18:07,190 --> 00:18:05,440  
satellites will provide

460  
00:18:10,390 --> 00:18:07,200  
estimates of

461  
00:18:13,830 --> 00:18:11,190  
these

462  
00:18:16,710 --> 00:18:13,840  
estimates are just you know that

463  
00:18:19,750 --> 00:18:16,720

estimates and so so then there is a

464

00:18:22,230 --> 00:18:19,760

question how good are they and

465

00:18:25,110 --> 00:18:22,240

what kind of capabilities

466

00:18:26,150 --> 00:18:25,120

will we have with

467

00:18:28,549 --> 00:18:26,160

using

468

00:18:32,070 --> 00:18:28,559

then hydrologic you know models and that

469

00:18:34,950 --> 00:18:32,080

gpm rainfall input into

470

00:18:36,470 --> 00:18:34,960

prediction of flats so um because as we

471

00:18:41,190 --> 00:18:36,480

all know

472

00:18:46,070 --> 00:18:44,070

predicting what nature will do is not

473

00:18:47,990 --> 00:18:46,080

always you know that easy quite

474

00:18:51,430 --> 00:18:48,000

challenging in fact so

475

00:18:54,710 --> 00:18:51,440

um so one big you know goal for the

476  
00:18:58,310 --> 00:18:54,720  
research associated with the gpm is to

477  
00:19:02,310 --> 00:18:58,320  
figure out at what scale

478  
00:19:05,830 --> 00:19:02,320  
the gpm rainfall estimates or maps

479  
00:19:08,230 --> 00:19:05,840  
will be appropriate to make skillful

480  
00:19:11,830 --> 00:19:08,240  
predictions of you know floods and other

481  
00:19:13,029 --> 00:19:11,840  
natural rainfall induced hazards such as

482  
00:19:15,510 --> 00:19:13,039  
landslides

483  
00:19:18,789 --> 00:19:15,520  
um so so this is this is a big goal and

484  
00:19:20,950 --> 00:19:18,799  
that's why it is important to have a

485  
00:19:22,230 --> 00:19:20,960  
good reference you know data set on

486  
00:19:25,029 --> 00:19:22,240  
rainfall

487  
00:19:27,669 --> 00:19:25,039  
all the way from tiny little you know

488  
00:19:30,390 --> 00:19:27,679

scales at a single you know hill slope

489

00:19:32,870 --> 00:19:30,400

all the way to the scale of uh several

490

00:19:34,950 --> 00:19:32,880

thousand you know square kilometers and

491

00:19:37,430 --> 00:19:34,960

and this is what we've got you know here

492

00:19:40,070 --> 00:19:37,440

in iowa we have very well instrumented

493

00:19:41,909 --> 00:19:40,080

you know watersheds we have

494

00:19:43,350 --> 00:19:41,919

a plethora of

495

00:19:46,230 --> 00:19:43,360

instruments

496

00:19:48,310 --> 00:19:46,240

and not only nasa riders but

497

00:19:50,070 --> 00:19:48,320

other radars

498

00:19:53,350 --> 00:19:50,080

that are operated by the national

499

00:19:56,230 --> 00:19:53,360

weather service some additional research

500

00:19:58,390 --> 00:19:56,240

you know radars um a bunch of other

501  
00:19:59,510 --> 00:19:58,400  
instruments

502  
00:20:02,230 --> 00:19:59,520  
measuring

503  
00:20:03,990 --> 00:20:02,240  
not only rainfall but also stream flow

504  
00:20:06,789 --> 00:20:04,000  
and soil moisture

505  
00:20:07,669 --> 00:20:06,799  
and it is with all these ingredients

506  
00:20:11,270 --> 00:20:07,679  
then

507  
00:20:13,590 --> 00:20:11,280  
um hydrology researchers uh who develop

508  
00:20:15,830 --> 00:20:13,600  
and test hydrologic you know models will

509  
00:20:16,789 --> 00:20:15,840  
be able to to answer you know this

510  
00:20:19,430 --> 00:20:16,799  
question

511  
00:20:23,029 --> 00:20:19,440  
um so for example you know right now you

512  
00:20:25,990 --> 00:20:23,039  
are looking at this you know graphic of

513  
00:20:28,310 --> 00:20:26,000

how water travels through a watershed so

514

00:20:30,950 --> 00:20:28,320

we see here um

515

00:20:33,430 --> 00:20:30,960

the sida river basin and

516

00:20:35,110 --> 00:20:33,440

to the north the larger one and the iowa

517

00:20:35,909 --> 00:20:35,120

river basin

518

00:20:38,950 --> 00:20:35,919

and

519

00:20:41,350 --> 00:20:38,960

the the zone of the travel time if you

520

00:20:43,190 --> 00:20:41,360

will so it takes if you count the

521

00:20:46,310 --> 00:20:43,200

different you know colors

522

00:20:48,870 --> 00:20:46,320

it takes about a week eight days for

523

00:20:50,870 --> 00:20:48,880

rainfall to travel across you know this

524

00:20:54,070 --> 00:20:50,880

this watershed

525

00:20:59,830 --> 00:20:56,710

with all this information that we have

526

00:21:02,630 --> 00:20:59,840

been collecting here in iowa uh then a

527

00:21:03,750 --> 00:21:02,640

much larger community

528

00:21:07,190 --> 00:21:03,760

will

529

00:21:08,390 --> 00:21:07,200

analyze you know the data and

530

00:21:09,190 --> 00:21:08,400

improve

531

00:21:14,230 --> 00:21:09,200

the

532

00:21:18,789 --> 00:21:17,590

i do have a question for um pedro walt

533

00:21:21,830 --> 00:21:18,799

and v-tech

534

00:21:23,990 --> 00:21:21,840

uh you guys are talking about the global

535

00:21:25,270 --> 00:21:24,000

scale and what this will mean for global

536

00:21:26,950 --> 00:21:25,280

flood prediction but you guys are

537

00:21:28,630 --> 00:21:26,960

starting on a smaller scale in iowa

538

00:21:31,430 --> 00:21:28,640

we've been talking about that can you

539

00:21:33,750 --> 00:21:31,440

guys go uh go into some detail of the

540

00:21:36,710 --> 00:21:33,760

actual components you guys are using the

541

00:21:38,870 --> 00:21:36,720

rain gauges um and how you're how you're

542

00:21:40,549 --> 00:21:38,880

using all that information ground truth

543

00:21:43,270 --> 00:21:40,559

versus what you are seeing on the

544

00:21:45,669 --> 00:21:43,280

satellites right now

545

00:21:49,830 --> 00:21:45,679

right um so

546

00:21:51,830 --> 00:21:49,840

the idea here is that um you know

547

00:21:54,230 --> 00:21:51,840

we're proclaiming that we're going to

548

00:21:56,710 --> 00:21:54,240

make these measurements globally and of

549

00:21:59,510 --> 00:21:56,720

course um that also means locally by

550

00:22:02,070 --> 00:21:59,520

implication um the question is how

551  
00:22:03,750 --> 00:22:02,080  
accurate are those measurements and uh

552  
00:22:05,510 --> 00:22:03,760  
and then going beyond how accurate are

553  
00:22:06,870 --> 00:22:05,520  
those measurements if they're not that

554  
00:22:09,350 --> 00:22:06,880  
accurate how do we make them better how

555  
00:22:11,430 --> 00:22:09,360  
do we improve them um so we do field

556  
00:22:14,070 --> 00:22:11,440  
campaigns like what we're doing in iowa

557  
00:22:16,149 --> 00:22:14,080  
right now and and vtec discussed um a

558  
00:22:18,149 --> 00:22:16,159  
bit of uh about the instrumentation

559  
00:22:20,149 --> 00:22:18,159  
there but the idea is to really connect

560  
00:22:21,909 --> 00:22:20,159  
what we're measuring at the ground to

561  
00:22:23,110 --> 00:22:21,919  
what we're uh what we're seeing in from

562  
00:22:25,750 --> 00:22:23,120  
space

563  
00:22:27,510 --> 00:22:25,760

and uh so here in iowa we've deployed a

564

00:22:30,149 --> 00:22:27,520

bunch of instrumentation in addition to

565

00:22:32,149 --> 00:22:30,159

what the iowa thought center and other

566

00:22:35,190 --> 00:22:32,159

agencies like noaa the national weather

567

00:22:36,710 --> 00:22:35,200

service the u.s geological survey etc

568

00:22:38,789 --> 00:22:36,720

already have in place

569

00:22:40,230 --> 00:22:38,799

and those include things like like rain

570

00:22:42,710 --> 00:22:40,240

gauges and there's an image right now

571

00:22:44,789 --> 00:22:42,720

that you see that has um those are dual

572

00:22:46,310 --> 00:22:44,799

rain gauge platforms that we're using

573

00:22:48,310 --> 00:22:46,320

we've deployed

574

00:22:50,710 --> 00:22:48,320

a large number of those actually in

575

00:22:52,549 --> 00:22:50,720

networks around iowa and specific river

576

00:22:54,950 --> 00:22:52,559

basins like the turkey river basin up to

577

00:22:57,029 --> 00:22:54,960

the northeast on the south fork basin

578

00:23:00,310 --> 00:22:57,039

which is part of the iowa

579

00:23:02,870 --> 00:23:00,320

basin to the west the idea there is to

580

00:23:04,789 --> 00:23:02,880

use these gauge systems with

581

00:23:06,710 --> 00:23:04,799

also attached

582

00:23:09,990 --> 00:23:06,720

soil moisture probes and temperature

583

00:23:11,669 --> 00:23:10,000

probes to connect the rainfall at a very

584

00:23:13,750 --> 00:23:11,679

uh local scale

585

00:23:16,870 --> 00:23:13,760

or or sort of use it as a calibration

586

00:23:20,470 --> 00:23:16,880

source if you like at a local scale

587

00:23:22,710 --> 00:23:20,480

to uh compare to a broader measurement

588

00:23:24,630 --> 00:23:22,720

which we which we do with radars and so

589

00:23:27,430 --> 00:23:24,640

there's an example of one of the

590

00:23:29,590 --> 00:23:27,440

university of iowa expo radars so this

591

00:23:31,669 --> 00:23:29,600

is one of the radars that we have in the

592

00:23:34,549 --> 00:23:31,679

current network and then

593

00:23:37,430 --> 00:23:34,559

um the nasa radars that we've deployed

594

00:23:39,029 --> 00:23:37,440

include the nasa and pole raider and i

595

00:23:42,149 --> 00:23:39,039

don't know we'll be able to get the

596

00:23:43,510 --> 00:23:42,159

graphic up there or not of those radars

597

00:23:45,590 --> 00:23:43,520

but either way

598

00:23:48,230 --> 00:23:45,600

we use the rain gauges as kind of this

599

00:23:50,070 --> 00:23:48,240

point measurement source that we take as

600

00:23:51,830 --> 00:23:50,080

well almost the gold standard when we

601  
00:23:53,830 --> 00:23:51,840  
have those two rain gauges together then

602  
00:23:55,990 --> 00:23:53,840  
we know that we're getting an accurate

603  
00:23:57,750 --> 00:23:56,000  
measurement of the

604  
00:23:59,990 --> 00:23:57,760  
of the of the rain at the rain gauge

605  
00:24:02,390 --> 00:24:00,000  
location and then we scale up with the

606  
00:24:05,190 --> 00:24:02,400  
radar so uh for example the end pole

607  
00:24:06,390 --> 00:24:05,200  
radar which is shown there

608  
00:24:08,789 --> 00:24:06,400  
i don't know if the movie will work

609  
00:24:11,590 --> 00:24:08,799  
there but we we use the radars like

610  
00:24:13,990 --> 00:24:11,600  
endpoint radar um in the network to scan

611  
00:24:15,830 --> 00:24:14,000  
on a much broader domain so the impul

612  
00:24:18,710 --> 00:24:15,840  
radar is looking out at scales on the

613  
00:24:19,909 --> 00:24:18,720

order of 100 miles or so

614

00:24:23,029 --> 00:24:19,919

to map

615

00:24:24,630 --> 00:24:23,039

the rainfall near the surface

616

00:24:27,110 --> 00:24:24,640

on a scale of say

617

00:24:29,430 --> 00:24:27,120

one kilometer or so

618

00:24:31,430 --> 00:24:29,440

and we use that measurement

619

00:24:33,590 --> 00:24:31,440

we use the rain gauges with some other

620

00:24:35,590 --> 00:24:33,600

measurements we're making individual for

621

00:24:38,390 --> 00:24:35,600

example raindrops

622

00:24:40,710 --> 00:24:38,400

to reference the radar so here this is

623

00:24:43,110 --> 00:24:40,720

an example of the radar scanning in what

624

00:24:45,190 --> 00:24:43,120

we call a ppi mode so here's how we

625

00:24:46,870 --> 00:24:45,200

would map it in the horizontal

626  
00:24:48,470 --> 00:24:46,880  
by spinning the radar around on the

627  
00:24:50,710 --> 00:24:48,480  
horizontal plane

628  
00:24:52,549 --> 00:24:50,720  
to map the rainfall

629  
00:24:54,390 --> 00:24:52,559  
we make a rainfall estimate from this

630  
00:24:56,070 --> 00:24:54,400  
radar this is a dual polarimetric radar

631  
00:24:57,510 --> 00:24:56,080  
which makes fairly accurate measurements

632  
00:25:00,310 --> 00:24:57,520  
of rain

633  
00:25:02,870 --> 00:25:00,320  
on the order of 10 to 20 for example on

634  
00:25:05,590 --> 00:25:02,880  
an hourly accumulation basis then we

635  
00:25:08,149 --> 00:25:05,600  
take those estimates as a reference

636  
00:25:11,029 --> 00:25:08,159  
um and we run them into a hydrologic

637  
00:25:12,310 --> 00:25:11,039  
model that for example vtec or pedro

638  
00:25:14,710 --> 00:25:12,320

would run

639

00:25:16,230 --> 00:25:14,720

and that gives you kind of a stream flow

640

00:25:19,669 --> 00:25:16,240

an estimate of the stream flow or an

641

00:25:23,830 --> 00:25:21,909

it's called that a reference screen flow

642

00:25:25,750 --> 00:25:23,840

based on our reference rainfall estimate

643

00:25:26,630 --> 00:25:25,760

that we assume to be accurate within

644

00:25:31,669 --> 00:25:26,640

some

645

00:25:33,350 --> 00:25:31,679

satellites that are currently overflying

646

00:25:35,669 --> 00:25:33,360

the site you know every day several

647

00:25:37,590 --> 00:25:35,679

times a day several satellites

648

00:25:39,269 --> 00:25:37,600

and and from those measurements then we

649

00:25:40,870 --> 00:25:39,279

can connect the accuracy with what we

650

00:25:43,669 --> 00:25:40,880

get at the ground what we're seeing from

651  
00:25:46,230 --> 00:25:43,679  
space and say all right um you know well

652  
00:25:47,669 --> 00:25:46,240  
we're off by maybe 50

653  
00:25:48,950 --> 00:25:47,679  
from space we don't we don't know that

654  
00:25:51,269 --> 00:25:48,960  
yet of course we haven't finished the

655  
00:25:53,269 --> 00:25:51,279  
experiment but uh but if we're off so

656  
00:25:55,430 --> 00:25:53,279  
much we might be able to estimate you

657  
00:25:57,590 --> 00:25:55,440  
know sort of why or yes and why we're

658  
00:26:00,070 --> 00:25:57,600  
off so much and here's an example of a

659  
00:26:01,350 --> 00:26:00,080  
graphic that shows uh in the top

660  
00:26:03,510 --> 00:26:01,360  
um a

661  
00:26:05,669 --> 00:26:03,520  
satellite estimate from

662  
00:26:08,549 --> 00:26:05,679  
the case we sampled actually on may the

663  
00:26:11,029 --> 00:26:08,559

20th uh during the iflitz field campaign

664

00:26:12,789 --> 00:26:11,039

compared to the ground estimate

665

00:26:14,390 --> 00:26:12,799

provided by the iowa flood center and

666

00:26:16,789 --> 00:26:14,400

you can see that you know the

667

00:26:19,350 --> 00:26:16,799

comparisons are you know broadly

668

00:26:21,029 --> 00:26:19,360

consistent but but in fact there's a big

669

00:26:22,470 --> 00:26:21,039

difference in resolution between what

670

00:26:24,230 --> 00:26:22,480

the satellite sees and what we measure

671

00:26:26,470 --> 00:26:24,240

at the ground and then there's also some

672

00:26:28,310 --> 00:26:26,480

some basic differences in amounts

673

00:26:30,870 --> 00:26:28,320

that indicate you know hey we can do

674

00:26:33,269 --> 00:26:30,880

better from space and so as we make the

675

00:26:36,149 --> 00:26:33,279

measurement uh at the ground here with

676  
00:26:37,510 --> 00:26:36,159  
the radars for example if we interrogate

677  
00:26:40,390 --> 00:26:37,520  
the storms a little bit more with the

678  
00:26:41,909 --> 00:26:40,400  
radar sampling in the vertical plane

679  
00:26:43,990 --> 00:26:41,919  
we start to learn about how the storms

680  
00:26:45,350 --> 00:26:44,000  
are are constructed

681  
00:26:46,710 --> 00:26:45,360  
in the vertical and that's very

682  
00:26:48,070 --> 00:26:46,720  
important from the perspective of

683  
00:26:49,590 --> 00:26:48,080  
satellite because the satellite is

684  
00:26:52,390 --> 00:26:49,600  
looking downward at the surface of the

685  
00:26:53,669 --> 00:26:52,400  
earth so what it's seeing is uh is the

686  
00:26:55,909 --> 00:26:53,679  
surface of the earth and then everything

687  
00:26:57,430 --> 00:26:55,919  
in the column that's between it and what

688  
00:26:59,669 --> 00:26:57,440

the satellite measures and so with the

689

00:27:02,230 --> 00:26:59,679

radars with research radars we do a lot

690

00:27:04,549 --> 00:27:02,240

of work looking at the clouds a great

691

00:27:06,390 --> 00:27:04,559

bit of detail on the vertical to

692

00:27:08,310 --> 00:27:06,400

to learn about what what the what the

693

00:27:10,710 --> 00:27:08,320

precipitation is constructed of whether

694

00:27:12,710 --> 00:27:10,720

it's ice or rain and how the process

695

00:27:14,470 --> 00:27:12,720

works to make the rain

696

00:27:16,230 --> 00:27:14,480

and a lot of that contributes to some of

697

00:27:18,390 --> 00:27:16,240

the differences that you see in in the

698

00:27:20,390 --> 00:27:18,400

rainfall maps there and so that's what

699

00:27:21,750 --> 00:27:20,400

we're trying to achieve here in if you

700

00:27:23,190 --> 00:27:21,760

connect everything that we see at the

701  
00:27:25,190 --> 00:27:23,200  
ground which you consider you know

702  
00:27:27,350 --> 00:27:25,200  
basically that's reality to what the

703  
00:27:28,310 --> 00:27:27,360  
satellite is inferring is going on from

704  
00:27:29,750 --> 00:27:28,320  
space

705  
00:27:31,190 --> 00:27:29,760  
you take all that information and put it

706  
00:27:33,909 --> 00:27:31,200  
together and that should help us really

707  
00:27:36,549 --> 00:27:33,919  
improve our ability to use those

708  
00:27:39,510 --> 00:27:36,559  
spaceborne estimates worldwide so

709  
00:27:41,029 --> 00:27:39,520  
it's the global local application but uh

710  
00:27:43,029 --> 00:27:41,039  
or the local study by global

711  
00:27:44,950 --> 00:27:43,039  
applications so we truth ourselves here

712  
00:27:47,430 --> 00:27:44,960  
in iowa and then hopefully do a much

713  
00:27:49,350 --> 00:27:47,440

better job globally especially in

714

00:27:51,430 --> 00:27:49,360

countries that don't have access to all

715

00:27:54,789 --> 00:27:51,440

the resources that you know that we do

716

00:27:58,310 --> 00:27:56,470

excellent um that leads really well into

717

00:28:00,950 --> 00:27:58,320

one of the first questions we got um

718

00:28:02,950 --> 00:28:00,960

from online if anyone's watching please

719

00:28:04,870 --> 00:28:02,960

put questions in youtube comments or on

720

00:28:07,750 --> 00:28:04,880

the google plus page or go ahead and use

721

00:28:09,830 --> 00:28:07,760

the hashtag ifloods that's the letter i

722

00:28:12,230 --> 00:28:09,840

the word flood with an s

723

00:28:14,230 --> 00:28:12,240

and um the question i've got right here

724

00:28:17,190 --> 00:28:14,240

it's by anil and it came in through

725

00:28:19,750 --> 00:28:17,200

youtube and are you going to be her

726

00:28:21,830 --> 00:28:19,760

question is does the flood data get fed

727

00:28:24,070 --> 00:28:21,840

into a public information system or is

728

00:28:26,149 --> 00:28:24,080

it given to weather channels i know what

729

00:28:27,909 --> 00:28:26,159

you talked about this a little bit are

730

00:28:29,909 --> 00:28:27,919

you going to be setting up a whole new

731

00:28:31,269 --> 00:28:29,919

system for flooding or is it going to be

732

00:28:34,230 --> 00:28:31,279

feeding into

733

00:28:35,590 --> 00:28:34,240

to places just for scientists to see or

734

00:28:37,510 --> 00:28:35,600

are you going to be feeding it to like

735

00:28:39,029 --> 00:28:37,520

people like our guest maria larosa from

736

00:28:41,269 --> 00:28:39,039

the weather channel so they can go ahead

737

00:28:42,950 --> 00:28:41,279

and give people um straight out flood

738

00:28:45,430 --> 00:28:42,960

predictions

739

00:28:47,990 --> 00:28:45,440

right so so all of the information

740

00:28:50,070 --> 00:28:48,000

that's collected by analysis by the by

741

00:28:53,269 --> 00:28:50,080

the gpm satellite actually will feed

742

00:28:55,190 --> 00:28:53,279

into um will feed into our national uh

743

00:28:58,149 --> 00:28:55,200

flood prediction systems to folks like

744

00:28:59,990 --> 00:28:58,159

pedro and vtec actually those data are

745

00:29:02,230 --> 00:29:00,000

available or will be publicly available

746

00:29:04,950 --> 00:29:02,240

to just about anybody that wants them

747

00:29:07,110 --> 00:29:04,960

online there's about a myers standing is

748

00:29:08,549 --> 00:29:07,120

about a one hour lag roughly between the

749

00:29:10,470 --> 00:29:08,559

time that they are collected and

750

00:29:12,389 --> 00:29:10,480

products are made and distributed

751  
00:29:14,549 --> 00:29:12,399  
and then they would get shifted off to

752  
00:29:16,710 --> 00:29:14,559  
um to uh

753  
00:29:18,389 --> 00:29:16,720  
uh folks like pedro for for putting into

754  
00:29:20,149 --> 00:29:18,399  
their models and i don't know if

755  
00:29:21,750 --> 00:29:20,159  
maybe pedro uh

756  
00:29:23,750 --> 00:29:21,760  
would comment on how that would work

757  
00:29:25,750 --> 00:29:23,760  
once the data was handed off to

758  
00:29:27,750 --> 00:29:25,760  
noah

759  
00:29:28,470 --> 00:29:27,760  
yes

760  
00:29:31,430 --> 00:29:28,480  
the

761  
00:29:34,310 --> 00:29:31,440  
right now we get information from

762  
00:29:36,950 --> 00:29:34,320  
our network operators from rain gauges

763  
00:29:38,710 --> 00:29:36,960

on the ground that are operated soon by

764

00:29:41,430 --> 00:29:38,720

us but the majority are operated by the

765

00:29:43,029 --> 00:29:41,440

united states geological survey shown by

766

00:29:45,830 --> 00:29:43,039

the core of engineers

767

00:29:47,590 --> 00:29:45,840

and so on by other federal state and

768

00:29:49,909 --> 00:29:47,600

municipal agencies that share that

769

00:29:53,190 --> 00:29:49,919

information with us we also have a

770

00:29:55,590 --> 00:29:53,200

network of cooperative observers that

771

00:29:57,110 --> 00:29:55,600

take daily precipitation data and send

772

00:29:59,830 --> 00:29:57,120

that information to us that's part of

773

00:30:02,070 --> 00:29:59,840

the ground validation for not only the

774

00:30:04,950 --> 00:30:02,080

uh satellite but also for our own radars

775

00:30:08,630 --> 00:30:04,960

and our systems once we get information

776  
00:30:10,710 --> 00:30:08,640  
from gpm that information is merged with

777  
00:30:12,870 --> 00:30:10,720  
the rest of the of the observations that

778  
00:30:15,190 --> 00:30:12,880  
we have from the ground and from the our

779  
00:30:17,430 --> 00:30:15,200  
network already into a single coherent

780  
00:30:19,590 --> 00:30:17,440  
product in what we call multi-sensor

781  
00:30:21,430 --> 00:30:19,600  
precipitation estimation and there are

782  
00:30:23,430 --> 00:30:21,440  
several

783  
00:30:25,190 --> 00:30:23,440  
versions of it one is being developed by

784  
00:30:27,990 --> 00:30:25,200  
the national severe storm laboratory in

785  
00:30:30,470 --> 00:30:28,000  
norman oklahoma that takes precipitation

786  
00:30:33,029 --> 00:30:30,480  
from satellites merged with uh with the

787  
00:30:34,070 --> 00:30:33,039  
with the raiders and so on

788  
00:30:37,430 --> 00:30:34,080

that

789

00:30:39,669 --> 00:30:37,440

having one hour lag is really not a big

790

00:30:42,230 --> 00:30:39,679

deal for us we have we issue our

791

00:30:43,990 --> 00:30:42,240

precipitation forecasts every six hours

792

00:30:45,430 --> 00:30:44,000

during flooding condition we may issue

793

00:30:48,710 --> 00:30:45,440

more of them depending on the

794

00:30:50,630 --> 00:30:48,720

circumstances and so the one hour just

795

00:30:52,630 --> 00:30:50,640

fits perfectly well within the time

796

00:30:55,269 --> 00:30:52,640

frame that we have to to get our

797

00:30:56,710 --> 00:30:55,279

forecasts out so

798

00:30:58,389 --> 00:30:56,720

again

799

00:31:00,310 --> 00:30:58,399

filling the gaps

800

00:31:02,389 --> 00:31:00,320

having information that before the

801  
00:31:03,190 --> 00:31:02,399  
saturday we are not able to get because

802  
00:31:05,990 --> 00:31:03,200  
of the

803  
00:31:07,990 --> 00:31:06,000  
lack of courage by the raiders by

804  
00:31:10,070 --> 00:31:08,000  
mountains being on the way and obscuring

805  
00:31:11,909 --> 00:31:10,080  
parts of the radar being

806  
00:31:16,070 --> 00:31:11,919  
it is most welcome for for us to improve

807  
00:31:19,990 --> 00:31:18,389  
great um just reminding everybody i'm

808  
00:31:21,190 --> 00:31:20,000  
aries keck i'm here at nasa goddard

809  
00:31:22,710 --> 00:31:21,200  
space flight center in greenville

810  
00:31:24,950 --> 00:31:22,720  
maryland and we're talking about floods

811  
00:31:26,630 --> 00:31:24,960  
and flood prediction with our panel of

812  
00:31:28,549 --> 00:31:26,640  
scientists and maria larosa from the

813  
00:31:30,310 --> 00:31:28,559

weather channel um you can send us

814

00:31:32,470 --> 00:31:30,320

questions through youtube comments on

815

00:31:34,950 --> 00:31:32,480

twitter at hashtag ifloods that's the

816

00:31:36,549 --> 00:31:34,960

letter i floods with an s or on the

817

00:31:39,350 --> 00:31:36,559

google plus hangout

818

00:31:41,990 --> 00:31:39,360

we got a question here from uh youtube

819

00:31:42,950 --> 00:31:42,000

comments uh gt stomach um

820

00:31:46,389 --> 00:31:42,960

asked

821

00:31:48,950 --> 00:31:46,399

why is gpm not geosynchronous and what

822

00:31:52,389 --> 00:31:48,960

advantage does this give it um vtec i

823

00:31:54,470 --> 00:31:52,399

know that your uh your specialty is

824

00:31:55,990 --> 00:31:54,480

using uh precipitation radar and

825

00:31:58,149 --> 00:31:56,000

satellites could you answer that

826

00:32:00,630 --> 00:31:58,159

question and first remind people who may

827

00:32:05,269 --> 00:32:00,640

not be uh you know scientists what we

828

00:32:08,230 --> 00:32:06,070

yes

829

00:32:10,870 --> 00:32:08,240

well this would be a very good question

830

00:32:12,230 --> 00:32:10,880

for forward but i'll you know give it

831

00:32:14,710 --> 00:32:12,240

you know a shot

832

00:32:19,509 --> 00:32:14,720

um so uh

833

00:32:22,149 --> 00:32:19,519

different uh satellite platforms uh are

834

00:32:23,909 --> 00:32:22,159

at you know different you know distance

835

00:32:27,990 --> 00:32:23,919

from from the earth

836

00:32:29,990 --> 00:32:28,000

and the sensors that they have on board

837

00:32:34,310 --> 00:32:30,000

operate at different you know

838

00:32:35,190 --> 00:32:34,320

frequencies um and then the resolution

839

00:32:37,110 --> 00:32:35,200

of

840

00:32:39,669 --> 00:32:37,120

data collected

841

00:32:42,230 --> 00:32:39,679

and of course we are interested in

842

00:32:44,710 --> 00:32:42,240

in the resolution near the earth you

843

00:32:47,430 --> 00:32:44,720

know surface uh depends on those two

844

00:32:49,350 --> 00:32:47,440

factors you know how far you are or

845

00:32:52,549 --> 00:32:49,360

how high in this case

846

00:32:54,789 --> 00:32:52,559

and what exactly is the the frequency

847

00:32:57,430 --> 00:32:54,799

um that that you are

848

00:32:58,870 --> 00:32:57,440

listening you know to so to speak

849

00:32:59,750 --> 00:32:58,880

um so

850

00:33:01,990 --> 00:32:59,760

so

851  
00:33:04,789 --> 00:33:02,000  
but there is a another you know factor

852  
00:33:07,509 --> 00:33:04,799  
and depending on that you know

853  
00:33:10,870 --> 00:33:07,519  
frequency that your sensor operates

854  
00:33:13,590 --> 00:33:10,880  
uh you see different you know things and

855  
00:33:16,230 --> 00:33:13,600  
so so for example uh

856  
00:33:18,549 --> 00:33:16,240  
if you are operating at the

857  
00:33:22,149 --> 00:33:18,559  
visible light you know frequency well

858  
00:33:23,990 --> 00:33:22,159  
you see what we see with our own eyes so

859  
00:33:25,990 --> 00:33:24,000  
you see for example that there are you

860  
00:33:27,110 --> 00:33:26,000  
know clouds you know there but you do

861  
00:33:29,990 --> 00:33:27,120  
not see

862  
00:33:31,990 --> 00:33:30,000  
what is below the clouds and so

863  
00:33:34,470 --> 00:33:32,000

now if you are

864

00:33:37,110 --> 00:33:34,480

working at another you know frequency

865

00:33:38,950 --> 00:33:37,120

that the the infrared frequencies so we

866

00:33:40,549 --> 00:33:38,960

know that that is

867

00:33:42,950 --> 00:33:40,559

um

868

00:33:45,590 --> 00:33:42,960

that the signal corresponds to to the

869

00:33:47,669 --> 00:33:45,600

temperature so now if you are looking

870

00:33:49,909 --> 00:33:47,679

with such a sensor

871

00:33:52,389 --> 00:33:49,919

at the cloud systems you can tell you

872

00:33:55,430 --> 00:33:52,399

know a little bit about the

873

00:33:58,070 --> 00:33:55,440

temperature of the cloud tops so again

874

00:34:00,549 --> 00:33:58,080

that gives you some information about

875

00:34:03,909 --> 00:34:00,559

how high the clouds are and therefore

876

00:34:06,470 --> 00:34:03,919

how vigorous are the processes below the

877

00:34:08,869 --> 00:34:06,480

clouds so that may give you some you

878

00:34:10,710 --> 00:34:08,879

know hint you know regarding the the

879

00:34:14,069 --> 00:34:10,720

possible amount of rainfall that is

880

00:34:16,869 --> 00:34:14,079

below the clouds uh but but you don't

881

00:34:19,510 --> 00:34:16,879

really know that you know very well uh

882

00:34:21,990 --> 00:34:19,520

so so then

883

00:34:24,230 --> 00:34:22,000

there is another uh range of frequencies

884

00:34:27,990 --> 00:34:24,240

that the microwave frequencies that

885

00:34:28,790 --> 00:34:28,000

correspond to the signal that is emitted

886

00:34:32,869 --> 00:34:28,800

by

887

00:34:35,990 --> 00:34:32,879

uh liquid water or or or ice and and

888

00:34:37,510 --> 00:34:36,000

so so now you are really below you know

889

00:34:39,990 --> 00:34:37,520

the clouds

890

00:34:43,190 --> 00:34:40,000

but because of that you know frequency

891

00:34:45,109 --> 00:34:43,200

if you were in a geostationary satellite

892

00:34:47,349 --> 00:34:45,119

your resolution would be extremely you

893

00:34:48,629 --> 00:34:47,359

know poor so you want to get closer you

894

00:34:51,030 --> 00:34:48,639

know to

895

00:34:53,190 --> 00:34:51,040

to the earth you know surface to have

896

00:34:55,750 --> 00:34:53,200

you know decent resolution like

897

00:34:58,710 --> 00:34:55,760

you know few few kilometers you know on

898

00:35:00,470 --> 00:34:58,720

the side so so those are

899

00:35:02,550 --> 00:35:00,480

the interplay of all those you know

900

00:35:04,390 --> 00:35:02,560

factors you know determines you know the

901  
00:35:07,910 --> 00:35:04,400  
choice for the

902  
00:35:09,750 --> 00:35:07,920  
um for the location of the satellite and

903  
00:35:12,550 --> 00:35:09,760  
but but here i would

904  
00:35:15,670 --> 00:35:12,560  
like to add that

905  
00:35:18,390 --> 00:35:15,680  
uh we still have a geostationary you

906  
00:35:20,790 --> 00:35:18,400  
know satellites up there and it is the

907  
00:35:22,390 --> 00:35:20,800  
combination of the data from

908  
00:35:25,430 --> 00:35:22,400  
uh all these

909  
00:35:28,870 --> 00:35:25,440  
sensors that makes for the best you know

910  
00:35:33,510 --> 00:35:28,880  
possible uh rainfall mapping so i i hope

911  
00:35:37,750 --> 00:35:35,910  
uh i have another question uh i think

912  
00:35:39,589 --> 00:35:37,760  
one of the great things about being a

913  
00:35:42,230 --> 00:35:39,599

scientist is getting excited about

914

00:35:44,630 --> 00:35:42,240

things that perhaps you didn't expect so

915

00:35:46,069 --> 00:35:44,640

is there anything in the data so far

916

00:35:48,230 --> 00:35:46,079

that's been coming in that you guys have

917

00:35:49,589 --> 00:35:48,240

been looking at analyzing that has

918

00:35:50,870 --> 00:35:49,599

surprised you

919

00:35:53,270 --> 00:35:50,880

excited you about any kind of

920

00:35:55,109 --> 00:35:53,280

breakthrough about what the technology

921

00:35:58,790 --> 00:35:55,119

is going to do for the future pedro or

922

00:36:01,910 --> 00:36:01,030

why don't you take it away

923

00:36:06,630 --> 00:36:01,920

okay

924

00:36:08,069 --> 00:36:06,640

i think one thing uh that's been kind of

925

00:36:10,069 --> 00:36:08,079

interesting about this particular

926  
00:36:12,390 --> 00:36:10,079  
experiment at least is

927  
00:36:15,510 --> 00:36:12,400  
that we came out here um with

928  
00:36:17,349 --> 00:36:15,520  
aspirations of sampling heavy rain

929  
00:36:19,670 --> 00:36:17,359  
and we certainly have had that there's

930  
00:36:22,310 --> 00:36:19,680  
no question um i don't know that we've

931  
00:36:24,870 --> 00:36:22,320  
seen anything surprising in the ask

932  
00:36:27,190 --> 00:36:24,880  
with respect to what we expected to see

933  
00:36:29,109 --> 00:36:27,200  
for the rainfall process itself but i

934  
00:36:31,109 --> 00:36:29,119  
will say this

935  
00:36:33,510 --> 00:36:31,119  
when we came out here we brought

936  
00:36:34,870 --> 00:36:33,520  
multiple frequency radars here we've got

937  
00:36:35,990 --> 00:36:34,880  
you know all kinds of frequencies and

938  
00:36:38,069 --> 00:36:36,000

radars

939

00:36:39,910 --> 00:36:38,079

and so we came out you know to sample

940

00:36:41,829 --> 00:36:39,920

rain and we started off however with a

941

00:36:43,349 --> 00:36:41,839

historic snowstorm

942

00:36:45,670 --> 00:36:43,359

and um

943

00:36:47,910 --> 00:36:45,680

and that that actually gave us a great

944

00:36:49,670 --> 00:36:47,920

opportunity believe it or not um you

945

00:36:51,430 --> 00:36:49,680

know we were just up in canada a year

946

00:36:53,589 --> 00:36:51,440

ago doing the snowfall experiment

947

00:36:55,910 --> 00:36:53,599

because of course gpm is going to do

948

00:36:57,030 --> 00:36:55,920

snowfall as well

949

00:36:58,790 --> 00:36:57,040

but

950

00:37:00,230 --> 00:36:58,800

this was the first time that we actually

951  
00:37:02,630 --> 00:37:00,240  
could sample

952  
00:37:04,470 --> 00:37:02,640  
an event with snow mixtures of snow and

953  
00:37:05,430 --> 00:37:04,480  
rain mixtures of ice pellets and snow

954  
00:37:07,589 --> 00:37:05,440  
and rain

955  
00:37:10,069 --> 00:37:07,599  
a really complex weather event actually

956  
00:37:12,310 --> 00:37:10,079  
right when we got out here with our uh

957  
00:37:13,829 --> 00:37:12,320  
with our dual frequency radar at the

958  
00:37:15,670 --> 00:37:13,839  
same frequencies actually that will be

959  
00:37:17,190 --> 00:37:15,680  
flying on a satellite in

960  
00:37:19,349 --> 00:37:17,200  
february

961  
00:37:21,349 --> 00:37:19,359  
and uh and a radar like the end pole

962  
00:37:23,270 --> 00:37:21,359  
which uh which has a completely or a

963  
00:37:25,670 --> 00:37:23,280

much lower uh frequency and longer

964

00:37:27,270 --> 00:37:25,680

wavelength and uh and that's really

965

00:37:29,030 --> 00:37:27,280

important because it enabled us to see

966

00:37:31,510 --> 00:37:29,040

some interesting um

967

00:37:32,710 --> 00:37:31,520

signatures in the precipitation itself

968

00:37:34,950 --> 00:37:32,720

and the different layering of the

969

00:37:36,790 --> 00:37:34,960

precipitation the complexity actually in

970

00:37:39,109 --> 00:37:36,800

the vertical that's going to be actually

971

00:37:41,190 --> 00:37:39,119

quite critical to how we interpret what

972

00:37:42,310 --> 00:37:41,200

it is we're seeing from space with the

973

00:37:44,710 --> 00:37:42,320

radar

974

00:37:46,150 --> 00:37:44,720

in space and i think that perhaps that

975

00:37:48,470 --> 00:37:46,160

that will be an event that we weren't

976

00:37:50,069 --> 00:37:48,480

anticipating but that will be very

977

00:37:51,270 --> 00:37:50,079

useful to us in terms of trying to

978

00:37:52,470 --> 00:37:51,280

figure out how we deal with

979

00:37:54,230 --> 00:37:52,480

precipitation like that in the

980

00:37:55,670 --> 00:37:54,240

mid-latitudes

981

00:37:57,990 --> 00:37:55,680

on both the northern and southern

982

00:38:01,270 --> 00:37:58,000

hemispheres so that was actually kind of

983

00:38:07,270 --> 00:38:02,550

well

984

00:38:10,310 --> 00:38:07,280

let me just add that this has been

985

00:38:12,470 --> 00:38:10,320

an extremely busy you know campaign

986

00:38:14,310 --> 00:38:12,480

um so

987

00:38:16,829 --> 00:38:14,320

we had very few

988

00:38:19,670 --> 00:38:16,839

days with no rain

989

00:38:21,910 --> 00:38:19,680

um uh during the last you know five or

990

00:38:23,910 --> 00:38:21,920

six weeks um

991

00:38:27,589 --> 00:38:23,920

and but when we were planning you know

992

00:38:30,950 --> 00:38:27,599

the campaign when uh nasa was making the

993

00:38:31,829 --> 00:38:30,960

final decision uh when and where to host

994

00:38:38,550 --> 00:38:31,839

it

995

00:38:42,950 --> 00:38:38,560

were in a severe drought

996

00:38:48,230 --> 00:38:45,349

what i was saying you know earlier that

997

00:38:51,430 --> 00:38:48,240

here in iowa we've got you know floods

998

00:38:53,829 --> 00:38:51,440

so last year it was not true at all

999

00:38:55,670 --> 00:38:53,839

we were in a severe you know drought

1000

00:38:57,670 --> 00:38:55,680

um so so

1001

00:38:59,030 --> 00:38:57,680

things turned that out

1002

00:39:01,990 --> 00:38:59,040

quite a bit

1003

00:39:04,790 --> 00:39:02,000

and again not only that we got you know

1004

00:39:07,670 --> 00:39:04,800

plenty of rainfall you know data

1005

00:39:10,470 --> 00:39:07,680

um but you also got some flooding so so

1006

00:39:13,030 --> 00:39:10,480

we will have a very good information

1007

00:39:17,190 --> 00:39:13,040

um to

1008

00:39:19,430 --> 00:39:17,200

analyze that entire you know cycle from

1009

00:39:20,870 --> 00:39:19,440

from rainfall

1010

00:39:24,150 --> 00:39:20,880

all the way to

1011

00:39:25,910 --> 00:39:24,160

uh to flooding so

1012

00:39:27,829 --> 00:39:25,920

um we're getting a number of questions

1013

00:39:30,230 --> 00:39:27,839

on on youtube and other social media

1014

00:39:32,630 --> 00:39:30,240

channels more sort of asking shouldn't

1015

00:39:34,390 --> 00:39:32,640

people just move and i'm wondering you

1016

00:39:36,230 --> 00:39:34,400

know it's not exactly a question for

1017

00:39:38,630 --> 00:39:36,240

exactly your rainfall studies but i'm

1018

00:39:40,950 --> 00:39:38,640

wondering if you see places that do get

1019

00:39:42,790 --> 00:39:40,960

flooded time and time again i mean how

1020

00:39:44,710 --> 00:39:42,800

good is prediction if you can't really

1021

00:39:46,310 --> 00:39:44,720

well move your house around i'm

1022

00:39:48,150 --> 00:39:46,320

wondering people know that you study

1023

00:39:49,270 --> 00:39:48,160

flooding do you get those questions

1024

00:39:52,069 --> 00:39:49,280

quite a bit

1025

00:39:58,310 --> 00:39:52,079

on on just that aspect of where people

1026

00:40:07,670 --> 00:40:01,270

i'll throw it to pedro first

1027

00:40:10,870 --> 00:40:09,589

i personally would not live in an area

1028

00:40:13,030 --> 00:40:10,880

which is

1029

00:40:17,109 --> 00:40:13,040

prone to flooding okay i would not live

1030

00:40:20,230 --> 00:40:17,119

in an area that is downstream of a dam

1031

00:40:21,430 --> 00:40:20,240

right from the expert oh yes

1032

00:40:23,109 --> 00:40:21,440

oh yes

1033

00:40:25,670 --> 00:40:23,119

and if the

1034

00:40:27,030 --> 00:40:25,680

predictions from the climate change come

1035

00:40:29,109 --> 00:40:27,040

through

1036

00:40:31,430 --> 00:40:29,119

we are going to see more incidents of

1037

00:40:32,390 --> 00:40:31,440

flooding although there is no evidence

1038

00:40:34,310 --> 00:40:32,400

yet

1039

00:40:37,030 --> 00:40:34,320

that we are seeing that the frequency of

1040

00:40:39,430 --> 00:40:37,040

flooding has increased but it has the

1041

00:40:41,270 --> 00:40:39,440

center the century goes on if those

1042

00:40:44,230 --> 00:40:41,280

traditions come through we're going to

1043

00:40:47,349 --> 00:40:44,240

see more incidents of flooding

1044

00:40:49,670 --> 00:40:47,359

a single event just cannot tell you that

1045

00:40:51,430 --> 00:40:49,680

climate change is being confirmed but

1046

00:40:53,829 --> 00:40:51,440

once you start to see

1047

00:40:56,470 --> 00:40:53,839

that that frequency again still being

1048

00:40:58,870 --> 00:40:56,480

repeating every 20 years or every 50

1049

00:41:02,790 --> 00:40:58,880

years they come every 10 years every 15

1050

00:41:04,950 --> 00:41:02,800

years and so on then it tells you that

1051

00:41:06,790 --> 00:41:04,960

you have to take other actions

1052

00:41:09,030 --> 00:41:06,800

protect your

1053

00:41:10,630 --> 00:41:09,040

permanent protections for property in

1054

00:41:12,950 --> 00:41:10,640

the forms of levies

1055

00:41:14,790 --> 00:41:12,960

has some advantages but it also has some

1056

00:41:17,349 --> 00:41:14,800

real advantages

1057

00:41:19,430 --> 00:41:17,359

the fact is that it actually creates a

1058

00:41:21,030 --> 00:41:19,440

super highway for the flood to go

1059

00:41:23,510 --> 00:41:21,040

through instead of having the flood

1060

00:41:25,670 --> 00:41:23,520

spreading through the floodplain it just

1061

00:41:27,990 --> 00:41:25,680

goes through it goes much faster and

1062

00:41:30,550 --> 00:41:28,000

again it is stronger so there are plus

1063

00:41:31,910 --> 00:41:30,560

and minuses of those uh defenses

1064

00:41:34,069 --> 00:41:31,920

and uh

1065

00:41:35,589 --> 00:41:34,079

there are other possibilities like for

1066

00:41:37,109 --> 00:41:35,599

example what the dodge

1067

00:41:39,990 --> 00:41:37,119

uh do

1068

00:41:42,470 --> 00:41:40,000

they have been fighting as we know

1069

00:41:44,790 --> 00:41:42,480

the sea for four centuries

1070

00:41:47,829 --> 00:41:44,800

and uh in their case when they have

1071

00:41:49,109 --> 00:41:47,839

river flooding they know which areas

1072

00:41:52,069 --> 00:41:49,119

will be

1073

00:41:54,390 --> 00:41:52,079

deliberately flooded to prevent further

1074

00:41:56,390 --> 00:41:54,400

damage downstream so the people who live

1075

00:41:58,309 --> 00:41:56,400

in those areas already know that what is

1076

00:42:00,230 --> 00:41:58,319

going to happen they are prepared and

1077

00:42:03,190 --> 00:42:00,240

they are also prepared to be compensated

1078

00:42:05,190 --> 00:42:03,200

by the damages that they they occur

1079

00:42:08,390 --> 00:42:05,200

if you remember on the mississippi river

1080

00:42:10,710 --> 00:42:08,400

last year there was on purpose that one

1081

00:42:13,109 --> 00:42:10,720

of those levees was breached and it

1082

00:42:15,510 --> 00:42:13,119

actually you could see how the

1083

00:42:17,510 --> 00:42:15,520

the surface of the water dropped in

1084

00:42:19,109 --> 00:42:17,520

response to that so this is another

1085

00:42:21,109 --> 00:42:19,119

management technique

1086

00:42:23,190 --> 00:42:21,119

but uh

1087

00:42:25,109 --> 00:42:23,200

if i were to answer the question if i

1088

00:42:26,790 --> 00:42:25,119

were living there i would move to higher

1089

00:42:27,910 --> 00:42:26,800

ground

1090

00:42:28,870 --> 00:42:27,920

we have a

1091

00:42:30,710 --> 00:42:28,880

question

1092

00:42:32,390 --> 00:42:30,720

from a teacher

1093

00:42:34,550 --> 00:42:32,400

i hope she's still watching i'm going to

1094

00:42:37,670 --> 00:42:34,560

unfortunately i'm sure butcher her name

1095

00:42:39,030 --> 00:42:37,680

maria lorraine de ruiz alma

1096

00:42:40,870 --> 00:42:39,040

and she says that she believes in the

1097

00:42:42,950 --> 00:42:40,880

power of community and is wondering if

1098

00:42:45,430 --> 00:42:42,960

we can locate lots of rain gauges in

1099

00:42:47,510 --> 00:42:45,440

areas around rivers that of places that

1100

00:42:49,589 --> 00:42:47,520

can be affected by floods you'll be

1101  
00:42:51,270 --> 00:42:49,599  
having more accurate data and that will

1102  
00:42:53,430 --> 00:42:51,280  
represent all the micro climate

1103  
00:42:55,910 --> 00:42:53,440  
variables and will help the community

1104  
00:42:58,950 --> 00:42:55,920  
make better and faster

1105  
00:43:01,349 --> 00:42:58,960  
decisions and actions well i know that

1106  
00:43:03,349 --> 00:43:01,359  
one of the reasons that the gpm

1107  
00:43:06,150 --> 00:43:03,359  
the global precipitation measurement

1108  
00:43:08,069 --> 00:43:06,160  
mission is deemed so exciting is because

1109  
00:43:09,829 --> 00:43:08,079  
people think of rain gauges as being

1110  
00:43:11,430 --> 00:43:09,839  
everywhere but they're actually if you

1111  
00:43:14,550 --> 00:43:11,440  
look at it worldwide there's not many

1112  
00:43:16,150 --> 00:43:14,560  
rain gauges anywhere and hopefully using

1113  
00:43:17,510 --> 00:43:16,160

a satellite which actually circles the

1114

00:43:19,030 --> 00:43:17,520

earth will be able to give us more data

1115

00:43:21,430 --> 00:43:19,040

can you sort of draw that out a little

1116

00:43:22,390 --> 00:43:21,440

bit more sure sure

1117

00:43:27,270 --> 00:43:22,400

so

1118

00:43:31,910 --> 00:43:30,230

for this uh this type of application um

1119

00:43:33,270 --> 00:43:31,920

interesting thing though is is uh you

1120

00:43:35,430 --> 00:43:33,280

know you're talking about you know a

1121

00:43:37,190 --> 00:43:35,440

four inch to eight inch type

1122

00:43:38,829 --> 00:43:37,200

type gauge and if you took all those

1123

00:43:41,349 --> 00:43:38,839

reporting gauges

1124

00:43:43,670 --> 00:43:41,359

globally um and you sort of gathered

1125

00:43:45,829 --> 00:43:43,680

them all together um basically you'd

1126  
00:43:48,790 --> 00:43:45,839  
fill up about two basketball courts of

1127  
00:43:50,390 --> 00:43:48,800  
area which you know that's not

1128  
00:43:51,589 --> 00:43:50,400  
you know that's a relatively small

1129  
00:43:55,270 --> 00:43:51,599  
fraction of the earth that you're

1130  
00:43:56,069 --> 00:43:55,280  
sampling with just three gauges okay

1131  
00:43:57,670 --> 00:43:56,079  
this is

1132  
00:43:59,990 --> 00:43:57,680  
two basketball courts that's all

1133  
00:44:01,349 --> 00:44:00,000  
everything in the entire world well yeah

1134  
00:44:02,710 --> 00:44:01,359  
that's you know that's the gauges we

1135  
00:44:05,030 --> 00:44:02,720  
know about of course there are others

1136  
00:44:07,270 --> 00:44:05,040  
and actually you know one gauge is

1137  
00:44:09,670 --> 00:44:07,280  
really actually representative of a

1138  
00:44:11,510 --> 00:44:09,680

different sized area depending on

1139

00:44:13,430 --> 00:44:11,520

the amount of time that you accumulate a

1140

00:44:14,950 --> 00:44:13,440

rainfall estimate for example but really

1141

00:44:16,710 --> 00:44:14,960

it's a very small fraction of the

1142

00:44:17,990 --> 00:44:16,720

earth's surface and then of course you

1143

00:44:19,829 --> 00:44:18,000

have to account for the fact that you

1144

00:44:20,710 --> 00:44:19,839

know three quarters of your surface is

1145

00:44:22,550 --> 00:44:20,720

ocean

1146

00:44:24,470 --> 00:44:22,560

and we don't have that many rain gauges

1147

00:44:27,190 --> 00:44:24,480

sitting out there on the ocean you know

1148

00:44:28,870 --> 00:44:27,200

there's some on buoys and such but um

1149

00:44:30,790 --> 00:44:28,880

but there's not a lot of rain gauges out

1150

00:44:33,109 --> 00:44:30,800

there so you go from a rain gauge which

1151

00:44:35,109 --> 00:44:33,119

is your point estimate to uh to a radar

1152

00:44:36,870 --> 00:44:35,119

which gives you a much broader

1153

00:44:40,150 --> 00:44:36,880

uh area measurement over you know a

1154

00:44:43,349 --> 00:44:40,160

domain about 10 000 square kilometers

1155

00:44:45,030 --> 00:44:43,359

um and at a relatively fine resolution

1156

00:44:47,349 --> 00:44:45,040

but you have issues sometimes with

1157

00:44:48,470 --> 00:44:47,359

accuracy and a radar estimate and then

1158

00:44:50,470 --> 00:44:48,480

you move up you know if you want

1159

00:44:52,790 --> 00:44:50,480

something globally the only answer to

1160

00:44:55,190 --> 00:44:52,800

really get you to that global scale is

1161

00:44:57,030 --> 00:44:55,200

is a satellite and really to give you

1162

00:44:58,630 --> 00:44:57,040

that uniform measurement also it's a

1163

00:44:59,750 --> 00:44:58,640

satellite that's what you what you have

1164

00:45:02,069 --> 00:44:59,760

to use

1165

00:45:03,670 --> 00:45:02,079

and so that's kind of how that works and

1166

00:45:05,270 --> 00:45:03,680

you know rain gauges

1167

00:45:07,109 --> 00:45:05,280

rain gauges are great as long as you

1168

00:45:09,430 --> 00:45:07,119

take very good care of them check them

1169

00:45:10,150 --> 00:45:09,440

regularly you know because they get um

1170

00:45:12,630 --> 00:45:10,160

uh

1171

00:45:13,990 --> 00:45:12,640

filled up with leaves and birds tend to

1172

00:45:15,829 --> 00:45:14,000

like them for you know using the

1173

00:45:18,390 --> 00:45:15,839

bathroom in for example

1174

00:45:20,230 --> 00:45:18,400

making nests and things like that you

1175

00:45:21,829 --> 00:45:20,240

really have to pay attention to what you

1176

00:45:23,349 --> 00:45:21,839

what you do with your rain gauge where

1177

00:45:25,670 --> 00:45:23,359

you locate your rain gauges very

1178

00:45:27,670 --> 00:45:25,680

specific things

1179

00:45:29,430 --> 00:45:27,680

that actually make a rain gauge or help

1180

00:45:31,030 --> 00:45:29,440

rain gauge give you to get a valid

1181

00:45:33,510 --> 00:45:31,040

measurement so

1182

00:45:36,150 --> 00:45:33,520

these are all things that argue for for

1183

00:45:38,309 --> 00:45:36,160

a remote sensing application like

1184

00:45:40,150 --> 00:45:38,319

a satellite

1185

00:45:42,069 --> 00:45:40,160

and walt just showed some of the the

1186

00:45:43,990 --> 00:45:42,079

beauty of being on a field campaign of

1187

00:45:46,390 --> 00:45:44,000

emptying out rain gauges full of birds

1188

00:45:49,109 --> 00:45:46,400

nests and and other things

1189

00:45:51,829 --> 00:45:49,119

we have a question that came in um from

1190

00:45:54,790 --> 00:45:51,839

youtube by uh jason blumfeld and i

1191

00:45:57,270 --> 00:45:54,800

believe it's it's more for uh vtech

1192

00:46:00,550 --> 00:45:57,280

his question is could the excess flood

1193

00:46:03,670 --> 00:46:00,560

water that comes in during a flood be

1194

00:46:06,550 --> 00:46:03,680

filter infiltrated into aquifers or help

1195

00:46:08,309 --> 00:46:06,560

irrigation in dry areas is it possible

1196

00:46:10,550 --> 00:46:08,319

to manipulate water on such a large

1197

00:46:12,950 --> 00:46:10,560

scale i mean we know that we have dams

1198

00:46:15,190 --> 00:46:12,960

all across the world but we don't i'm

1199

00:46:17,589 --> 00:46:15,200

not necessarily sure if we use dams to

1200

00:46:19,990 --> 00:46:17,599

work with flooding uh v-tech is that a

1201

00:46:22,470 --> 00:46:20,000

question for you or maybe pedro

1202

00:46:26,829 --> 00:46:22,480

yeah i'll be i'll be happy to

1203

00:46:33,190 --> 00:46:29,190

so there are

1204

00:46:34,230 --> 00:46:33,200

many um reservoirs that are built around

1205

00:46:37,510 --> 00:46:34,240

the world

1206

00:46:40,710 --> 00:46:37,520

um specifically for this purpose so

1207

00:46:42,550 --> 00:46:40,720

there are reservoirs that are built for

1208

00:46:43,990 --> 00:46:42,560

flat protection

1209

00:46:47,270 --> 00:46:44,000

and

1210

00:46:51,030 --> 00:46:47,280

but many of them have multiple purposes

1211

00:46:57,190 --> 00:46:52,790

electricity

1212

00:46:58,550 --> 00:46:57,200

or for providing water for irrigation

1213

00:47:01,030 --> 00:46:58,560

providing

1214

00:47:03,190 --> 00:47:01,040

water for recreation

1215

00:47:04,470 --> 00:47:03,200

so these are

1216

00:47:06,870 --> 00:47:04,480

very

1217

00:47:09,670 --> 00:47:06,880

large and complex and expensive you know

1218

00:47:10,870 --> 00:47:09,680

systems that help us manage water

1219

00:47:12,470 --> 00:47:10,880

resources

1220

00:47:15,510 --> 00:47:12,480

um and so

1221

00:47:18,950 --> 00:47:15,520

um we have many of those in the united

1222

00:47:21,589 --> 00:47:18,960

states and and there are many uh famous

1223

00:47:24,390 --> 00:47:21,599

ones around the world so um so that

1224

00:47:28,230 --> 00:47:24,400

concept is is not new

1225

00:47:33,510 --> 00:47:30,470

i myself you know thought about you know

1226

00:47:35,190 --> 00:47:33,520

this this very question uh a couple of

1227

00:47:38,470 --> 00:47:35,200

years ago

1228

00:47:39,910 --> 00:47:38,480

we were experiencing uh

1229

00:47:42,390 --> 00:47:39,920

a prolonged

1230

00:47:45,910 --> 00:47:42,400

flood on the missouri river

1231

00:47:49,589 --> 00:47:45,920

at the same time when texas was

1232

00:47:52,870 --> 00:47:49,599

experiencing an extreme you know drought

1233

00:47:54,950 --> 00:47:52,880

and i thought that the states that

1234

00:47:57,750 --> 00:47:54,960

border the missouri

1235

00:47:59,190 --> 00:47:57,760

river you know south dakota nebraska

1236

00:48:01,270 --> 00:47:59,200

iowa

1237

00:48:03,829 --> 00:48:01,280

you know missouri that they could have

1238

00:48:07,910 --> 00:48:03,839

made a lot of you know money if they

1239

00:48:13,589 --> 00:48:10,550

but but of course you know such a system

1240

00:48:14,790 --> 00:48:13,599

is is not you know in place so

1241

00:48:18,950 --> 00:48:14,800

um

1242

00:48:24,630 --> 00:48:22,069

you know detrimental to to to think of

1243

00:48:26,390 --> 00:48:24,640

this for many other you know reasons

1244

00:48:27,510 --> 00:48:26,400

that we really don't have the time to go

1245

00:48:30,309 --> 00:48:27,520

into but

1246

00:48:35,829 --> 00:48:30,319

but we do have such systems that help us

1247

00:48:40,790 --> 00:48:38,710

i have a question or slash statement and

1248

00:48:42,710 --> 00:48:40,800

kind of want to see what you gentlemen

1249

00:48:44,870 --> 00:48:42,720

are thinking about uh we were talking

1250

00:48:47,270 --> 00:48:44,880

with pedro talking about you know do we

1251  
00:48:49,510 --> 00:48:47,280  
move people who are in these flooded

1252  
00:48:50,950 --> 00:48:49,520  
areas do you choose to live there do we

1253  
00:48:52,470 --> 00:48:50,960  
force people out

1254  
00:48:54,710 --> 00:48:52,480  
and but also v-tech you were talking

1255  
00:48:56,630 --> 00:48:54,720  
about cedar rapids several years ago

1256  
00:48:58,549 --> 00:48:56,640  
with the big flood there and having a

1257  
00:49:00,150 --> 00:48:58,559  
little bit more time with a better

1258  
00:49:01,190 --> 00:49:00,160  
forecast could have saved billions of

1259  
00:49:03,270 --> 00:49:01,200  
dollars

1260  
00:49:06,069 --> 00:49:03,280  
i immediately thought about the red

1261  
00:49:09,109 --> 00:49:06,079  
river flooding this year in fargo where

1262  
00:49:11,190 --> 00:49:09,119  
the forecast was very high

1263  
00:49:13,829 --> 00:49:11,200

near record

1264

00:49:16,790 --> 00:49:13,839

it ended up being several feet below and

1265

00:49:18,790 --> 00:49:16,800

instead of losing money due to loss of

1266

00:49:21,270 --> 00:49:18,800

property because now the flood wasn't as

1267

00:49:24,069 --> 00:49:21,280

bad you were losing money because you

1268

00:49:26,309 --> 00:49:24,079

had all these man hours put into

1269

00:49:28,069 --> 00:49:26,319

making all these millions of sandbags

1270

00:49:30,230 --> 00:49:28,079

that never got used

1271

00:49:31,190 --> 00:49:30,240

perhaps lost tourism that kind of thing

1272

00:49:33,990 --> 00:49:31,200

um

1273

00:49:35,910 --> 00:49:34,000

how do you feel about the importance of

1274

00:49:38,230 --> 00:49:35,920

better forecasting in that regard not so

1275

00:49:40,710 --> 00:49:38,240

much saving property from flood waters

1276

00:49:42,630 --> 00:49:40,720

but actually saving man hours and

1277

00:49:44,309 --> 00:49:42,640

and that kind of aspect

1278

00:49:46,790 --> 00:49:44,319

yeah i think this is an excellent

1279

00:49:49,109 --> 00:49:46,800

question for pedro

1280

00:49:50,230 --> 00:49:49,119

i agree

1281

00:49:51,270 --> 00:49:50,240

well i'm glad you asked the question

1282

00:49:54,549 --> 00:49:51,280

maria

1283

00:49:58,549 --> 00:49:54,559

the uh the river forecast uh

1284

00:50:00,710 --> 00:49:58,559

in fargo is probably the most difficult

1285

00:50:03,030 --> 00:50:00,720

that we have in the entire area and we

1286

00:50:04,710 --> 00:50:03,040

have a very large area to cover

1287

00:50:06,150 --> 00:50:04,720

the problem in fargo

1288

00:50:10,549 --> 00:50:06,160

for the red river

1289

00:50:11,750 --> 00:50:10,559

is that the hydrology is uh complicated

1290

00:50:13,270 --> 00:50:11,760

because you have the problem of the

1291

00:50:15,750 --> 00:50:13,280

frozen ground

1292

00:50:19,589 --> 00:50:15,760

we have the problem of uh

1293

00:50:22,549 --> 00:50:19,599

a drought preceding the uh during the

1294

00:50:26,390 --> 00:50:22,559

summer and and the fall then we have a

1295

00:50:27,510 --> 00:50:26,400

considerable amount of snow in the uh in

1296

00:50:30,390 --> 00:50:27,520

the spring

1297

00:50:32,790 --> 00:50:30,400

and in the winter and spring and uh

1298

00:50:34,069 --> 00:50:32,800

there was no way for our models to be

1299

00:50:36,549 --> 00:50:34,079

able to consider those particular

1300

00:50:39,190 --> 00:50:36,559

circumstances

1301  
00:50:40,710 --> 00:50:39,200  
we don't know some of the effects that

1302  
00:50:42,790 --> 00:50:40,720  
of the

1303  
00:50:44,230 --> 00:50:42,800  
man-made modifications to the watershed

1304  
00:50:47,190 --> 00:50:44,240  
for example

1305  
00:50:49,829 --> 00:50:47,200  
there's an extensive

1306  
00:50:52,630 --> 00:50:49,839  
practice right now of installing

1307  
00:50:55,030 --> 00:50:52,640  
field drains at farms we do not

1308  
00:50:57,349 --> 00:50:55,040  
understand what the effect of that is on

1309  
00:50:59,430 --> 00:50:57,359  
on the mall on the uh of the hydrology

1310  
00:51:01,270 --> 00:50:59,440  
and our models certainly don't have that

1311  
00:51:03,589 --> 00:51:01,280  
for you to have an idea

1312  
00:51:06,470 --> 00:51:03,599  
one of the small watersheds on the red

1313  
00:51:07,430 --> 00:51:06,480

river the headwaters the uh boiled soil

1314

00:51:09,670 --> 00:51:07,440

river

1315

00:51:12,390 --> 00:51:09,680

that's the only one that really requires

1316

00:51:14,870 --> 00:51:12,400

pyramid for distillation of uh of fuel

1317

00:51:17,910 --> 00:51:14,880

field of tile drains

1318

00:51:20,309 --> 00:51:17,920

on that watershed alone in the year 2012

1319

00:51:22,710 --> 00:51:20,319

there were seven thousand miles of

1320

00:51:24,549 --> 00:51:22,720

thousands installed if you can see

1321

00:51:28,230 --> 00:51:24,559

compare that with the size of the city

1322

00:51:29,270 --> 00:51:28,240

of fargo which has about 500 500

1323

00:51:32,870 --> 00:51:29,280

some

1324

00:51:37,990 --> 00:51:32,880

odd miles of streets that tell you give

1325

00:51:40,870 --> 00:51:38,000

you a a a a way to compare how large and

1326  
00:51:41,990 --> 00:51:40,880  
how what a great impact those uh drains

1327  
00:51:43,589 --> 00:51:42,000  
could be

1328  
00:51:46,870 --> 00:51:43,599  
we are working with the core of

1329  
00:51:49,589 --> 00:51:46,880  
engineers in uh improving the uh our

1330  
00:51:52,150 --> 00:51:49,599  
ability to forecast on the red river and

1331  
00:51:54,309 --> 00:51:52,160  
you're absolutely correct savings is not

1332  
00:51:57,030 --> 00:51:54,319  
only a property that you say but also

1333  
00:51:59,750 --> 00:51:57,040  
the amount power that you save by not

1334  
00:52:01,190 --> 00:51:59,760  
having to fill those uh those uh

1335  
00:52:02,790 --> 00:52:01,200  
sandbags

1336  
00:52:05,910 --> 00:52:02,800  
the city of fargo spent three million

1337  
00:52:07,190 --> 00:52:05,920  
dollars on and this decor of engineers

1338  
00:52:09,589 --> 00:52:07,200

and other three billion dollars in

1339

00:52:11,829 --> 00:52:09,599

temporary protection because our models

1340

00:52:13,750 --> 00:52:11,839

were forecast in a much higher crest

1341

00:52:15,750 --> 00:52:13,760

than what actually was observed so

1342

00:52:18,230 --> 00:52:15,760

hopefully in the coming years we'll be

1343

00:52:20,230 --> 00:52:18,240

able to improve our models and improve

1344

00:52:22,870 --> 00:52:20,240

our knowledge of the conditions there so

1345

00:52:24,309 --> 00:52:22,880

we can save the city of fargo and the

1346

00:52:26,549 --> 00:52:24,319

old communities not only on the red

1347

00:52:30,790 --> 00:52:26,559

river but also across the board

1348

00:52:34,630 --> 00:52:32,710

protection measures

1349

00:52:37,910 --> 00:52:34,640

the other side of the coin though is if

1350

00:52:40,069 --> 00:52:37,920

we had on the forecast and the river had

1351

00:52:42,069 --> 00:52:40,079

gone way over

1352

00:52:43,829 --> 00:52:42,079

too late for any protective measures

1353

00:52:45,829 --> 00:52:43,839

then the damage would have been not only

1354

00:52:47,589 --> 00:52:45,839

in the millions but also in the billions

1355

00:52:55,190 --> 00:52:47,599

which is what happened in grand forks

1356

00:52:58,870 --> 00:52:57,349

excellent um we have time for just i

1357

00:53:00,870 --> 00:52:58,880

think two more questions we've been

1358

00:53:03,109 --> 00:53:00,880

getting questions in through uh youtube

1359

00:53:05,030 --> 00:53:03,119

through google plus through twitter at

1360

00:53:05,990 --> 00:53:05,040

our ifloods hashtag and then of course

1361

00:53:07,670 --> 00:53:06,000

from our

1362

00:53:10,150 --> 00:53:07,680

guest maria larosa from the weather

1363

00:53:11,589 --> 00:53:10,160

channel um one of the questions that we

1364

00:53:14,549 --> 00:53:11,599

have that we wanted to make sure we get

1365

00:53:16,549 --> 00:53:14,559

to i know we're almost out of time but

1366

00:53:18,470 --> 00:53:16,559

it's a question for pedro and it's heavy

1367

00:53:20,390 --> 00:53:18,480

rain is the cause of most flooding

1368

00:53:22,870 --> 00:53:20,400

obviously but and this is going to be

1369

00:53:25,190 --> 00:53:22,880

predicting flooding what's the status of

1370

00:53:27,829 --> 00:53:25,200

predicting landsat landslides that are

1371

00:53:29,829 --> 00:53:27,839

triggered by rain landslides are are

1372

00:53:32,470 --> 00:53:29,839

clearly one of the most deadly aspects

1373

00:53:34,790 --> 00:53:32,480

of this especially in the developing

1374

00:53:37,109 --> 00:53:34,800

world pedro how can you possibly use

1375

00:53:38,870 --> 00:53:37,119

this to work in predicting or

1376

00:53:40,870 --> 00:53:38,880

determining or even just studying

1377

00:53:42,710 --> 00:53:40,880

landslides they're very sudden uh

1378

00:53:44,630 --> 00:53:42,720

effects as far as i can tell

1379

00:53:47,030 --> 00:53:44,640

well it is a very good question too and

1380

00:53:50,230 --> 00:53:47,040

it is a very difficult problem

1381

00:53:52,870 --> 00:53:50,240

we have uh we have jointly with with the

1382

00:53:55,349 --> 00:53:52,880

usgs a program for forecasting debris

1383

00:53:56,870 --> 00:53:55,359

flows which is the technical name for

1384

00:54:00,390 --> 00:53:56,880

what people

1385

00:54:02,950 --> 00:54:00,400

know more commonly as mudslides

1386

00:54:05,750 --> 00:54:02,960

the brief laws are the type of landslide

1387

00:54:08,150 --> 00:54:05,760

that occur suddenly

1388

00:54:10,470 --> 00:54:08,160

during heavy precipitation events

1389

00:54:11,270 --> 00:54:10,480

but it is particularly serious

1390

00:54:13,510 --> 00:54:11,280

for

1391

00:54:15,510 --> 00:54:13,520

the areas that have been subjected to

1392

00:54:18,390 --> 00:54:15,520

forest fires mountainous areas of the

1393

00:54:21,270 --> 00:54:18,400

forest fires because the

1394

00:54:23,190 --> 00:54:21,280

ground is left without protection and

1395

00:54:25,510 --> 00:54:23,200

the the heavy precipitation that will

1396

00:54:28,150 --> 00:54:25,520

fall on the uh

1397

00:54:30,390 --> 00:54:28,160

burned area will cause landslides what

1398

00:54:31,190 --> 00:54:30,400

makes it very difficult to forecast is

1399

00:54:32,870 --> 00:54:31,200

that

1400

00:54:35,190 --> 00:54:32,880

in contrast with

1401  
00:54:37,270 --> 00:54:35,200  
flash floods or common floods where we

1402  
00:54:38,630 --> 00:54:37,280  
know that the flood occurs at the bottom

1403  
00:54:41,750 --> 00:54:38,640  
of the valley

1404  
00:54:43,589 --> 00:54:41,760  
landslides occur anywhere on the side of

1405  
00:54:45,270 --> 00:54:43,599  
the mountain of the hill

1406  
00:54:46,950 --> 00:54:45,280  
it can occur anywhere so it is very

1407  
00:54:48,470 --> 00:54:46,960  
difficult to forecast where exactly

1408  
00:54:50,870 --> 00:54:48,480  
that's going to happen it is in fact

1409  
00:54:53,670 --> 00:54:50,880  
many factors so the usgs is currently

1410  
00:54:55,430 --> 00:54:53,680  
working in improving the models that

1411  
00:54:57,270 --> 00:54:55,440  
will be able to tell

1412  
00:55:00,390 --> 00:54:57,280  
working jointly with us with not only

1413  
00:55:08,470 --> 00:55:00,400

with observation but also be forecast

1414

00:55:11,829 --> 00:55:10,150

wonderful and then i'm wondering that

1415

00:55:13,109 --> 00:55:11,839

falls nicely into and we've talked about

1416

00:55:14,710 --> 00:55:13,119

this a little bit but how this

1417

00:55:16,470 --> 00:55:14,720

information is going to get out to the

1418

00:55:18,309 --> 00:55:16,480

to emergency management people to

1419

00:55:20,390 --> 00:55:18,319

weather forecasters to things like that

1420

00:55:22,230 --> 00:55:20,400

we've talked a lot about how gpm the g

1421

00:55:24,790 --> 00:55:22,240

stands for global and then this

1422

00:55:27,430 --> 00:55:24,800

particular uh ground validation campaign

1423

00:55:29,190 --> 00:55:27,440

is very very local right there in iowa

1424

00:55:30,390 --> 00:55:29,200

how are we going to go back and forth

1425

00:55:33,030 --> 00:55:30,400

and pedro it looks like you've got an

1426

00:55:35,589 --> 00:55:33,040

answer uh yeah well i forgot to mention

1427

00:55:37,750 --> 00:55:35,599

too for landslides because that was the

1428

00:55:39,829 --> 00:55:37,760

connection to the question gpa is going

1429

00:55:42,309 --> 00:55:39,839

to be viral for landslide forecasting

1430

00:55:44,150 --> 00:55:42,319

because it is going to be covering areas

1431

00:55:46,230 --> 00:55:44,160

in the mountains that are not currently

1432

00:55:49,190 --> 00:55:46,240

covered by the by the raiders

1433

00:55:51,430 --> 00:55:49,200

okay now about the forecast globally

1434

00:55:53,030 --> 00:55:51,440

worldwide we have at the weather service

1435

00:55:55,109 --> 00:55:53,040

we have a

1436

00:55:57,109 --> 00:55:55,119

contact with uh the weather services or

1437

00:55:58,230 --> 00:55:57,119

essentially of all over the world

1438

00:56:01,589 --> 00:55:58,240

through the world meteorological

1439

00:56:04,230 --> 00:56:01,599

organization and i'm sure that nasa will

1440

00:56:06,309 --> 00:56:04,240

have something similar to on the ability

1441

00:56:09,430 --> 00:56:06,319

to get the forecast and the observations

1442

00:56:10,710 --> 00:56:09,440

on time so let wait uh complete that uh

1443

00:56:12,710 --> 00:56:10,720

response

1444

00:56:15,349 --> 00:56:12,720

yeah actually i would just add to

1445

00:56:18,309 --> 00:56:15,359

pedro's response there that in fact nasa

1446

00:56:20,789 --> 00:56:18,319

precipitation measurement missions uh

1447

00:56:22,309 --> 00:56:20,799

science team actually has funded a

1448

00:56:24,390 --> 00:56:22,319

couple of studies a couple of

1449

00:56:26,069 --> 00:56:24,400

researchers to look at actually

1450

00:56:27,910 --> 00:56:26,079

constructing

1451

00:56:29,910 --> 00:56:27,920

landslide models

1452

00:56:32,230 --> 00:56:29,920

for more global applications and i think

1453

00:56:34,870 --> 00:56:32,240

um that application right now is in its

1454

00:56:36,870 --> 00:56:34,880

infancy but uh but actually the systems

1455

00:56:39,030 --> 00:56:36,880

are somewhat together and so as we move

1456

00:56:41,190 --> 00:56:39,040

along here with gpm

1457

00:56:43,109 --> 00:56:41,200

and get and get better with things uh i

1458

00:56:44,390 --> 00:56:43,119

believe we'll have these global

1459

00:56:46,150 --> 00:56:44,400

landslide

1460

00:56:47,910 --> 00:56:46,160

monitoring and prediction systems in

1461

00:56:49,829 --> 00:56:47,920

place which is

1462

00:56:51,589 --> 00:56:49,839

fairly important even though we're not

1463

00:56:52,549 --> 00:56:51,599

maybe that great at forecasting it now

1464

00:56:54,069 --> 00:56:52,559

we will get better and the

1465

00:56:55,030 --> 00:56:54,079

infrastructure will already be in place

1466

00:56:57,510 --> 00:56:55,040

to do it

1467

00:57:00,630 --> 00:56:57,520

so that is something that nasa is always

1468

00:57:03,190 --> 00:57:01,990

well thank you so much everyone thank

1469

00:57:05,589 --> 00:57:03,200

you everyone who's been watching this

1470

00:57:07,910 --> 00:57:05,599

hangout as it's been airing live on on

1471

00:57:09,670 --> 00:57:07,920

google plus and on youtube um this

1472

00:57:11,750 --> 00:57:09,680

hangout is going to be archived in

1473

00:57:13,910 --> 00:57:11,760

youtube at the goddard youtube channel

1474

00:57:15,750 --> 00:57:13,920

so anyone watching this later thanks for

1475

00:57:17,190 --> 00:57:15,760

watching it later after the fact we've

1476

00:57:19,430 --> 00:57:17,200

been talking about floods and flood

1477

00:57:21,829 --> 00:57:19,440

prediction i'm here in this hangout and

1478

00:57:24,150 --> 00:57:21,839

joining us has been vita krajewski from

1479

00:57:26,710 --> 00:57:24,160

iowa city he's the director of the iowa

1480

00:57:28,870 --> 00:57:26,720

flood center in minneapolis minnesota's

1481

00:57:31,190 --> 00:57:28,880

pedro rostopo the hydraulic

1482

00:57:34,549 --> 00:57:31,200

hydrologist in charge for the national

1483

00:57:37,670 --> 00:57:34,559

weather service's north central river

1484

00:57:39,910 --> 00:57:37,680

forecast center and then

1485

00:57:42,789 --> 00:57:39,920

walt peterson who is leading our nasa

1486

00:57:45,190 --> 00:57:42,799

team out in iowa walt's been joining us

1487

00:57:46,630 --> 00:57:45,200

from a research trailer in iowa so if

1488

00:57:48,549 --> 00:57:46,640

his video has been a little sticky

1489

00:57:50,630 --> 00:57:48,559

that's why and then also we've been

1490

00:57:52,710 --> 00:57:50,640

joined by maria larosa from the weather

1491

00:57:54,390 --> 00:57:52,720

channel you can follow along on

1492

00:57:56,630 --> 00:57:54,400

everything happening with the ifloods

1493

00:57:58,309 --> 00:57:56,640

campaign and everything else that nasa's

1494

00:58:01,270 --> 00:57:58,319

been doing and studying

1495

00:58:03,670 --> 00:58:01,280

storms and rainfall and snow from space

1496

00:58:05,750 --> 00:58:03,680

and from ground validation programs at

1497

00:58:08,710 --> 00:58:05,760

nasa goddard we also have a particular

1498

00:58:12,150 --> 00:58:08,720

twitter channel that focuses on rain

1499

00:58:14,950 --> 00:58:12,160

it's called it's at the at sign nasa

1500

00:58:16,789 --> 00:58:14,960

underscore rain again that's at nasa

1501

00:58:19,670 --> 00:58:16,799

underscore rain and even though we

1502

00:58:21,349 --> 00:58:19,680

called it rain it also covers snow hail

1503

00:58:22,470 --> 00:58:21,359

and all kinds grapple all kinds of other

1504

00:58:24,150 --> 00:58:22,480

precipitation

1505

00:58:25,910 --> 00:58:24,160

thanks so much for everyone joining us

1506

00:58:30,470 --> 00:58:25,920

and uh thanks again for joining this