

Lassen Astrobiology Intern Recognition Night and Lecture

Monday, May 23, 2022

Livestream URL for online broadcast:

<https://livestream.com/accounts/1831184/redbluff>

7:00 – 7:05 PM Welcome, Dave Michael, Science Instructor/Lassen Mentor

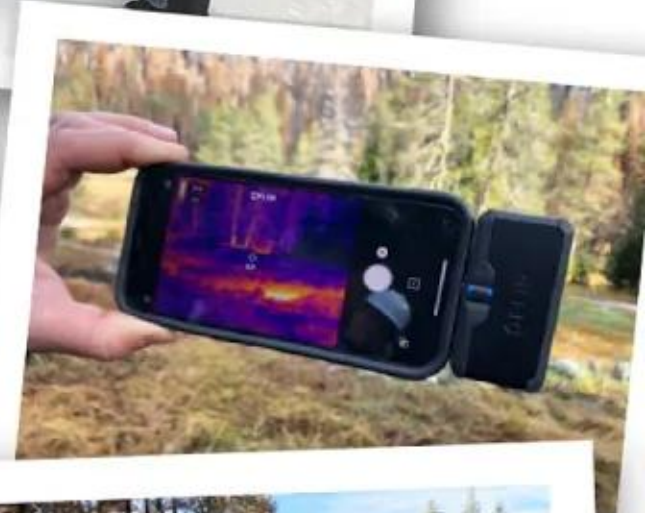
7:05 – 7:10 PM Lassen Volcanic National Park Interpretation Programs
Mr. Kevin Sweeney, National Park Service

7:10 – 7:15 PM “Mars Exploration, Lassen and Life,” Dr. David Des Marais,
Space Scientist, NASA Ames Research Center

7:15 – 7:45 PM Presentation by Lassen Astrobiology Student Interns

7:45 – 8:00 PM Questions and answers fielded by Interns,
Dr. David Des Marais, Dr. Niki Parenteau

8:00 – 8:15 PM Student recognition and certificate presentation,
Mike Kubo, NASA Ames Research Center



1
00:00:00,520 --> 00:00:03,350
[Music]

2
00:00:09,350 --> 00:00:07,030
this is the 2022

3
00:00:11,910 --> 00:00:09,360
red bluff high school nasa lassen

4
00:00:14,390 --> 00:00:11,920
volcanic national park astrobiology

5
00:00:16,470 --> 00:00:14,400
presentation of findings and so

6
00:00:17,430 --> 00:00:16,480
um what you're here for today

7
00:00:19,109 --> 00:00:17,440
is

8
00:00:21,269 --> 00:00:19,119
a presentation by

9
00:00:23,029 --> 00:00:21,279
red bluff high school students who have

10
00:00:26,310 --> 00:00:23,039
worked really really hard this entire

11
00:00:28,870 --> 00:00:26,320
year to study some of what's going on up

12
00:00:31,029 --> 00:00:28,880
at lassen volcanic national park and

13
00:00:33,190 --> 00:00:31,039

they've done this under the guidance of

14

00:00:35,510 --> 00:00:33,200

some very influential

15

00:00:36,389 --> 00:00:35,520

and special nasa scientists

16

00:00:38,630 --> 00:00:36,399

um

17

00:00:40,150 --> 00:00:38,640

this program has has been around for a

18

00:00:42,150 --> 00:00:40,160

couple years now actually more than a

19

00:00:44,229 --> 00:00:42,160

couple i'm over 10

20

00:00:45,430 --> 00:00:44,239

in one capacity or another at red bluff

21

00:00:47,910 --> 00:00:45,440

high school

22

00:00:50,389 --> 00:00:47,920

um i have been a part of this program

23

00:00:51,830 --> 00:00:50,399

since its inception and have really seen

24

00:00:54,869 --> 00:00:51,840

it grow

25

00:00:56,869 --> 00:00:54,879

from an after school program to a class

26

00:00:58,630 --> 00:00:56,879

that we now offer

27

00:01:00,630 --> 00:00:58,640

up to 20 students

28

00:01:03,189 --> 00:01:00,640

every single year and these 20 students

29

00:01:05,670 --> 00:01:03,199

get a real unique opportunity to not

30

00:01:08,390 --> 00:01:05,680

just learn about science but to actually

31

00:01:09,270 --> 00:01:08,400

go out and do science which is something

32

00:01:11,350 --> 00:01:09,280

that

33

00:01:14,310 --> 00:01:11,360

is very very

34

00:01:16,390 --> 00:01:14,320

of it's very interesting to them and

35

00:01:18,310 --> 00:01:16,400

very applicable to them not just this

36

00:01:20,630 --> 00:01:18,320

year and their studies but hopefully

37

00:01:21,510 --> 00:01:20,640

later on in life also

38

00:01:23,190 --> 00:01:21,520

um

39

00:01:26,070 --> 00:01:23,200

tonight what we hope to to share with

40

00:01:28,230 --> 00:01:26,080

you is some of what they did

41

00:01:30,390 --> 00:01:28,240

i would be lying to you if it wasn't a

42

00:01:33,590 --> 00:01:30,400

challenge this year

43

00:01:35,749 --> 00:01:33,600

based on just situations as we all know

44

00:01:37,830 --> 00:01:35,759

we are still dealing with the pandemic

45

00:01:40,870 --> 00:01:37,840

on one level or another and the

46

00:01:41,990 --> 00:01:40,880

restrictions that that has placed on us

47

00:01:44,230 --> 00:01:42,000

both

48

00:01:46,230 --> 00:01:44,240

in the school and in the field has

49

00:01:48,149 --> 00:01:46,240

definitely been felt

50

00:01:49,910 --> 00:01:48,159

in addition lassen volcanic national

51

00:01:53,030 --> 00:01:49,920

park last summer

52

00:01:55,590 --> 00:01:53,040

was impacted greatly by a wildfire the

53

00:01:57,910 --> 00:01:55,600

dixie wildfire tore through

54

00:02:00,389 --> 00:01:57,920

much of the area the park that we

55

00:02:03,109 --> 00:02:00,399

tend to focus on and perform some of our

56

00:02:04,950 --> 00:02:03,119

research in and that really also

57

00:02:06,550 --> 00:02:04,960

impacted some of what we were able to do

58

00:02:09,669 --> 00:02:06,560

this year

59

00:02:11,830 --> 00:02:09,679

but as a testament to these students we

60

00:02:14,470 --> 00:02:11,840

persevered we carried on

61

00:02:16,390 --> 00:02:14,480

and we were able to still get the job

62

00:02:19,830 --> 00:02:16,400

done and you're going to be able to see

63

00:02:21,510 --> 00:02:19,840

just how how much they were able to

64

00:02:22,550 --> 00:02:21,520

learn how much they were able to

65

00:02:25,270 --> 00:02:22,560

actually

66

00:02:26,949 --> 00:02:25,280

to study and and conclude based on this

67

00:02:29,190 --> 00:02:26,959

research that was done under extremely

68

00:02:31,350 --> 00:02:29,200

difficult circumstances because of that

69

00:02:33,910 --> 00:02:31,360

i couldn't be more proud of this group

70

00:02:35,670 --> 00:02:33,920

and i'm just excited to share with you

71

00:02:36,470 --> 00:02:35,680

and for you to have the opportunity

72

00:02:38,550 --> 00:02:36,480

today

73

00:02:41,430 --> 00:02:38,560

to see exactly what they've done

74

00:02:43,589 --> 00:02:41,440

and so with that being said i'm gonna

75

00:02:47,270 --> 00:02:43,599

pause my comments for now and i'm gonna

76

00:02:49,270 --> 00:02:47,280

pass it along to um

77

00:02:50,550 --> 00:02:49,280

to ranger sweeney um ranger kevin

78

00:02:52,070 --> 00:02:50,560

sweeney is

79

00:02:54,070 --> 00:02:52,080

our contact with lassen volcanic

80

00:02:57,350 --> 00:02:54,080

national national park and he's going to

81

00:02:59,190 --> 00:02:57,360

tell you a little bit about how the park

82

00:03:02,949 --> 00:02:59,200

is influential and is impacted by this

83

00:03:05,270 --> 00:03:02,959

program as well so ranger sweeney

84

00:03:07,350 --> 00:03:05,280

well thank you mike and our david and

85

00:03:09,350 --> 00:03:07,360

and it is really a testament to these

86

00:03:12,470 --> 00:03:09,360

students to overcome all of the

87

00:03:14,630 --> 00:03:12,480

challenges uh of both covid and the

88

00:03:17,190 --> 00:03:14,640

dixie fire and still being able to come

89

00:03:19,830 --> 00:03:17,200

up and do these field experiences uh and

90

00:03:22,070 --> 00:03:19,840

experiments um this course really

91

00:03:25,990 --> 00:03:22,080

emphasized hands-on experiments and it

92

00:03:27,910 --> 00:03:26,000

emphasizes in the field science it uh it

93

00:03:30,070 --> 00:03:27,920

emphasizes hands-on science which i

94

00:03:32,070 --> 00:03:30,080

think is so important that we get a

95

00:03:33,910 --> 00:03:32,080

tangible opportunity for these students

96

00:03:35,030 --> 00:03:33,920

to go and connect with the park connect

97

00:03:37,430 --> 00:03:35,040

with science

98

00:03:39,830 --> 00:03:37,440

in addition to in working with these

99

00:03:41,350 --> 00:03:39,840

wonderful people from nasa who can show

100

00:03:43,589 --> 00:03:41,360

that science is a wonderful career and a

101
00:03:46,149 --> 00:03:43,599
wonderful opportunity for them

102
00:03:48,470 --> 00:03:46,159
it opens doors that are unmanageable for

103
00:03:50,789 --> 00:03:48,480
a lot of folks in northern california

104
00:03:52,550 --> 00:03:50,799
and to be able to have this opportunity

105
00:03:54,229 --> 00:03:52,560
to work with nasa to work with the

106
00:03:57,030 --> 00:03:54,239
national park service to get this kind

107
00:03:58,470 --> 00:03:57,040
of exposure um it's just an

108
00:03:59,830 --> 00:03:58,480
absolutely incredible

109
00:04:00,949 --> 00:03:59,840
experience

110
00:04:02,710 --> 00:04:00,959
personally

111
00:04:05,830 --> 00:04:02,720
i just had a blast hanging out with you

112
00:04:08,869 --> 00:04:05,840
guys in the park uh collecting samples

113
00:04:11,190 --> 00:04:08,879

and boy every time you guys came to the

114

00:04:13,750 --> 00:04:11,200

park it was freezing rain and snowing

115

00:04:15,670 --> 00:04:13,760

and just the best most wonderful weather

116

00:04:17,830 --> 00:04:15,680

as we've been going through droughts so

117

00:04:19,349 --> 00:04:17,840

cheers to you uh let's have you guys

118

00:04:20,870 --> 00:04:19,359

come up for the rest of the summer if we

119

00:04:22,950 --> 00:04:20,880

can because it seemed like every time

120

00:04:25,110 --> 00:04:22,960

you guys came up we got some some big

121

00:04:26,790 --> 00:04:25,120

rain or big snow and um you guys

122

00:04:29,030 --> 00:04:26,800

persevered through it i couldn't be more

123

00:04:31,430 --> 00:04:29,040

proud of you and um thank you so much

124

00:04:34,310 --> 00:04:31,440

for allowing me to be part of it i i

125

00:04:35,830 --> 00:04:34,320

really appreciate it um please know

126

00:04:37,830 --> 00:04:35,840

both red bluff

127

00:04:42,390 --> 00:04:37,840

high school both the students and the

128

00:04:43,110 --> 00:04:42,400

staff and nasa ames folks um you guys

129

00:04:44,629 --> 00:04:43,120

are

130

00:04:46,469 --> 00:04:44,639

something that we're really proud of at

131

00:04:48,469 --> 00:04:46,479

lassen and i speak for superintendent

132

00:04:50,150 --> 00:04:48,479

richardson when i say that this program

133

00:04:52,390 --> 00:04:50,160

um is something that we brag about quite

134

00:04:55,189 --> 00:04:52,400

a bit um it really combines all the best

135

00:04:56,790 --> 00:04:55,199

aspects of national parks partnering

136

00:04:58,790 --> 00:04:56,800

with our local communities and other

137

00:04:59,990 --> 00:04:58,800

government organizations to show that

138

00:05:02,070 --> 00:05:00,000

national parks are these living

139

00:05:04,550 --> 00:05:02,080

laboratories not just places to go and

140

00:05:06,710 --> 00:05:04,560

set up a tent and and relax which they

141

00:05:09,189 --> 00:05:06,720

are certainly that and it is important

142

00:05:11,110 --> 00:05:09,199

that there are those um but as places

143

00:05:13,110 --> 00:05:11,120

where we can study and learn about other

144

00:05:15,430 --> 00:05:13,120

worlds learn about other planets

145

00:05:18,150 --> 00:05:15,440

question things that are happening on

146

00:05:19,990 --> 00:05:18,160

our own planet and be curious and one of

147

00:05:22,230 --> 00:05:20,000

my favorite things about this class and

148

00:05:24,070 --> 00:05:22,240

about having students come up is it just

149

00:05:25,430 --> 00:05:24,080

encourages that critical thinking that

150

00:05:28,790 --> 00:05:25,440

kind of

151

00:05:31,189 --> 00:05:28,800

curiosity that is is so important

152

00:05:33,110 --> 00:05:31,199

in making the world a better place so

153

00:05:34,070 --> 00:05:33,120

red bluff high school students great job

154

00:05:35,909 --> 00:05:34,080

this year

155

00:05:38,629 --> 00:05:35,919

i hope your feet have finally dried out

156

00:05:41,110 --> 00:05:38,639

and thanks for all the hard work and and

157

00:05:43,189 --> 00:05:41,120

perseverance on uh the great hikes that

158

00:05:46,390 --> 00:05:43,199

we did and your frozen fingers

159

00:05:52,550 --> 00:05:46,400

collecting samples good job guys and uh

160

00:05:56,230 --> 00:05:54,469

thank you very much angel sweeney it's

161

00:05:59,990 --> 00:05:56,240

uh it's really been a joy for us to work

162

00:06:01,510 --> 00:06:00,000

with you as well um the students have uh

163

00:06:03,830 --> 00:06:01,520

have amazing stories that they share

164

00:06:06,790 --> 00:06:03,840

just about the time up there obviously

165

00:06:08,710 --> 00:06:06,800

the cold time but um it was a

166

00:06:10,150 --> 00:06:08,720

pretty uh just some

167

00:06:12,070 --> 00:06:10,160

some very special trips that we had up

168

00:06:14,710 --> 00:06:12,080

there so thank you for for making that

169

00:06:18,150 --> 00:06:14,720

happen and making uh this program such a

170

00:06:19,430 --> 00:06:18,160

uh make us all feel so welcome up there

171

00:06:20,790 --> 00:06:19,440

um

172

00:06:22,710 --> 00:06:20,800

right now i think what i'd like to do is

173

00:06:25,270 --> 00:06:22,720

introduce you a little bit to

174

00:06:27,510 --> 00:06:25,280

the chat room and and just so you know

175

00:06:30,309 --> 00:06:27,520

where to ask questions and what to do

176

00:06:31,270 --> 00:06:30,319

and so if you look um on this live

177

00:06:35,029 --> 00:06:31,280

stream

178

00:06:36,790 --> 00:06:35,039

up upper right hand corner on my tab

179

00:06:39,430 --> 00:06:36,800

right below the tab it says go live and

180

00:06:42,390 --> 00:06:39,440

below that there's a little circle that

181

00:06:44,309 --> 00:06:42,400

has like a talking arrow in it and if

182

00:06:46,070 --> 00:06:44,319

you click on that it'll open up a chat

183

00:06:48,710 --> 00:06:46,080

and if you open up that chat you can

184

00:06:50,469 --> 00:06:48,720

then type in things at the bottom of it

185

00:06:52,950 --> 00:06:50,479

and so we'd like to kind of reserve this

186

00:06:54,309 --> 00:06:52,960

for for questions at this time and so if

187

00:06:56,870 --> 00:06:54,319

questions come up just go ahead and

188

00:06:58,390 --> 00:06:56,880

please enter them into this chat and we

189

00:07:00,309 --> 00:06:58,400

will get to those

190

00:07:02,150 --> 00:07:00,319

towards the end of our

191

00:07:03,350 --> 00:07:02,160

presentation but i want to make sure

192

00:07:04,790 --> 00:07:03,360

that you're aware of that so if a

193

00:07:06,870 --> 00:07:04,800

question comes up you can type it in

194

00:07:08,150 --> 00:07:06,880

there and just

195

00:07:11,270 --> 00:07:08,160

not have to worry about forgetting it

196

00:07:13,589 --> 00:07:11,280

type of thing so anyway um our next

197

00:07:15,510 --> 00:07:13,599

speaker tonight is going to be dr dave

198

00:07:16,790 --> 00:07:15,520

damery and he's going to talk to us a

199

00:07:19,670 --> 00:07:16,800

little bit about

200

00:07:22,070 --> 00:07:19,680

not not really last in part but how the

201
00:07:24,790 --> 00:07:22,080
research that's being done up at lassen

202
00:07:27,110 --> 00:07:24,800
park can be tied to some of the research

203
00:07:28,550 --> 00:07:27,120
that's currently being done up on mars

204
00:07:30,309 --> 00:07:28,560
so he's going to share a little bit

205
00:07:31,830 --> 00:07:30,319
about the information as far as the

206
00:07:34,309 --> 00:07:31,840
research that's being done up on mars

207
00:07:38,309 --> 00:07:36,390
thanks a lot dave um

208
00:07:40,790 --> 00:07:38,319
yeah i'd just like to start by saying

209
00:07:44,070 --> 00:07:40,800
that uh we're just in a golden age of

210
00:07:46,790 --> 00:07:44,080
exploration in space mars and beyond and

211
00:07:48,150 --> 00:07:46,800
then all the amazing telescopes the

212
00:07:49,990 --> 00:07:48,160
launch of

213
00:07:52,309 --> 00:07:50,000

which of which is going to just look way

214

00:07:53,350 --> 00:07:52,319

back in time and deep into the uh

215

00:07:55,270 --> 00:07:53,360

universe

216

00:07:57,350 --> 00:07:55,280

it's really quite remarkable

217

00:07:58,869 --> 00:07:57,360

uh and of course this is all enabled by

218

00:08:00,469 --> 00:07:58,879

new technologies that have been

219

00:08:03,029 --> 00:08:00,479

developed and of course that has really

220

00:08:04,390 --> 00:08:03,039

accelerated over the last few decades

221

00:08:06,390 --> 00:08:04,400

and not only

222

00:08:07,430 --> 00:08:06,400

does the new technology make it easier

223

00:08:09,350 --> 00:08:07,440

to

224

00:08:11,270 --> 00:08:09,360

you know do these missions but it also

225

00:08:13,990 --> 00:08:11,280

allows the public to become much more

226

00:08:16,309 --> 00:08:14,000

engaged uh actually almost in real time

227

00:08:17,670 --> 00:08:16,319

as as these missions unfold

228

00:08:19,430 --> 00:08:17,680

uh and so

229

00:08:21,670 --> 00:08:19,440

you know because of all these missions

230

00:08:23,589 --> 00:08:21,680

and and now just focusing on mars

231

00:08:27,110 --> 00:08:23,599

because of all we've learned about mars

232

00:08:28,790 --> 00:08:27,120

over the last you know 20 30 years uh

233

00:08:30,469 --> 00:08:28,800

we uh

234

00:08:32,310 --> 00:08:30,479

basically took advantage of this

235

00:08:34,389 --> 00:08:32,320

strategy called follow the water and

236

00:08:36,389 --> 00:08:34,399

that is you know if you need have to if

237

00:08:38,630 --> 00:08:36,399

you're gonna ever have life on mars you

238

00:08:41,110 --> 00:08:38,640

need water and so we're just trying to

239

00:08:42,870 --> 00:08:41,120

see is there any evidence that water was

240

00:08:46,310 --> 00:08:42,880

at all abundant in mars and was

241

00:08:48,790 --> 00:08:46,320

sufficient perhaps to support life

242

00:08:51,110 --> 00:08:48,800

and what that succeeded in doing is

243

00:08:52,150 --> 00:08:51,120

documenting that yes indeed water really

244

00:08:54,389 --> 00:08:52,160

was

245

00:08:55,350 --> 00:08:54,399

very widespread especially on ancient

246

00:08:56,389 --> 00:08:55,360

mars

247

00:08:58,310 --> 00:08:56,399

uh but it

248

00:09:00,070 --> 00:08:58,320

led to sort of a problem and that is

249

00:09:02,470 --> 00:09:00,080

that uh or a challenge i should say and

250

00:09:04,230 --> 00:09:02,480

that is that there's so much evidence of

251

00:09:06,470 --> 00:09:04,240

water all over the place which of the

252

00:09:07,990 --> 00:09:06,480

places should we land you know how do we

253

00:09:10,150 --> 00:09:08,000

choose between

254

00:09:11,910 --> 00:09:10,160

a place that's more promising or places

255

00:09:13,350 --> 00:09:11,920

that are less promising

256

00:09:15,990 --> 00:09:13,360

and so

257

00:09:17,910 --> 00:09:16,000

for this we need to

258

00:09:19,829 --> 00:09:17,920

do what's called site selection we need

259

00:09:21,350 --> 00:09:19,839

to be very careful about which sites we

260

00:09:23,350 --> 00:09:21,360

pick because we don't get very many

261

00:09:26,310 --> 00:09:23,360

chances to go to the surface

262

00:09:28,550 --> 00:09:26,320

and for this then we have to study these

263

00:09:30,389 --> 00:09:28,560

areas in more detail beyond just the

264

00:09:32,870 --> 00:09:30,399

water you know is are there other things

265

00:09:34,550 --> 00:09:32,880

there that could have supported life

266

00:09:36,630 --> 00:09:34,560

which might be the best places that

267

00:09:37,750 --> 00:09:36,640

could preserve evidence of it if it was

268

00:09:39,030 --> 00:09:37,760

ever there

269

00:09:41,030 --> 00:09:39,040

and so

270

00:09:42,550 --> 00:09:41,040

it really invokes a lot of the field

271

00:09:44,710 --> 00:09:42,560

work very tech

272

00:09:48,230 --> 00:09:44,720

advanced field work that we've people

273

00:09:53,590 --> 00:09:50,870

biology and biology and some very

274

00:09:55,670 --> 00:09:53,600

advanced methods have been developed for

275

00:09:57,509 --> 00:09:55,680

our field work on the earth

276

00:09:59,990 --> 00:09:57,519

but the the problem is of course the

277

00:10:00,790 --> 00:10:00,000

challenges of space flight really cuts

278

00:10:02,790 --> 00:10:00,800

down

279

00:10:05,509 --> 00:10:02,800

our ability to take advantage of a lot

280

00:10:07,750 --> 00:10:05,519

of that we really have to pare down to

281

00:10:10,949 --> 00:10:07,760

a more more uh simple and

282

00:10:13,509 --> 00:10:10,959

straightforward and possible approach

283

00:10:15,350 --> 00:10:13,519

but the key thing is that we can still

284

00:10:17,190 --> 00:10:15,360

employ strategies that were developed

285

00:10:19,350 --> 00:10:17,200

long ago by earth scientists and that

286

00:10:21,910 --> 00:10:19,360

were proven to be very effective with

287

00:10:23,990 --> 00:10:21,920

not nearly the technology uh in terms of

288

00:10:26,790 --> 00:10:24,000

observations that you know you're able

289

00:10:28,630 --> 00:10:26,800

to do walking out in the field yourself

290

00:10:30,550 --> 00:10:28,640

and so these are sort of time-honored

291

00:10:32,870 --> 00:10:30,560

exploration strategies

292

00:10:35,590 --> 00:10:32,880

and then starting with for example doing

293

00:10:37,509 --> 00:10:35,600

reconnaissance of a field area to grasp

294

00:10:40,069 --> 00:10:37,519

sort of the geographic context and to

295

00:10:42,710 --> 00:10:40,079

develop initial impressions about what

296

00:10:44,630 --> 00:10:42,720

what went on there in terms also the

297

00:10:46,870 --> 00:10:44,640

potential to support life

298

00:10:49,509 --> 00:10:46,880

secondly then you visit certain key

299

00:10:51,910 --> 00:10:49,519

locations to make uh additional

300

00:10:54,230 --> 00:10:51,920

observations and take samples which

301

00:10:57,030 --> 00:10:54,240

allow us to maybe start formulating

302

00:10:59,190 --> 00:10:57,040

hypotheses about what uh what what

303

00:11:01,110 --> 00:10:59,200

occurred there and then of course you

304

00:11:03,590 --> 00:11:01,120

come back to the lab you analyze the

305

00:11:06,389 --> 00:11:03,600

samples you do experiments in the lab to

306

00:11:08,550 --> 00:11:06,399

try to test these hypotheses see if your

307

00:11:10,630 --> 00:11:08,560

experiments can give you more insight

308

00:11:12,630 --> 00:11:10,640

about what's going on there

309

00:11:14,389 --> 00:11:12,640

and then of course very importantly you

310

00:11:16,470 --> 00:11:14,399

have to write up your results you have

311

00:11:17,910 --> 00:11:16,480

to put them into the scientific

312

00:11:20,470 --> 00:11:17,920

literature

313

00:11:21,670 --> 00:11:20,480

and also you give oral presentations in

314

00:11:23,509 --> 00:11:21,680

order to

315

00:11:25,190 --> 00:11:23,519

you know disseminate that to a wider

316

00:11:27,110 --> 00:11:25,200

audience and to get very important

317

00:11:29,269 --> 00:11:27,120

feedback

318

00:11:31,590 --> 00:11:29,279

now the interesting thing is that uh

319

00:11:34,550 --> 00:11:31,600

this course

320

00:11:35,750 --> 00:11:34,560

in astrobiology at Lassen at Red Bluff

321

00:11:37,670 --> 00:11:35,760

high school

322

00:11:39,350 --> 00:11:37,680

thought we we that's the structure of

323

00:11:41,509 --> 00:11:39,360

the course what I just described to you

324

00:11:43,509 --> 00:11:41,519

is these steps that we do as fundamental

325

00:11:45,190 --> 00:11:43,519

scientific approach and it's the

326

00:11:47,430 --> 00:11:45,200

backbone of how we do science

327

00:11:49,350 --> 00:11:47,440

exploration on these missions that's the

328

00:11:52,069 --> 00:11:49,360

template for this course

329

00:11:54,870 --> 00:11:52,079

and we have selected a couple of uh

330

00:11:56,550 --> 00:11:54,880

several sites up in lassen particularly

331

00:11:59,269 --> 00:11:56,560

in the sulfur works area and the warner

332

00:12:01,350 --> 00:11:59,279

valley area because they provide sort of

333

00:12:04,310 --> 00:12:01,360

modern and accessible sites that

334

00:12:05,910 --> 00:12:04,320

resemble very promising sites on mars

335

00:12:07,110 --> 00:12:05,920

they share many of the features that we

336

00:12:09,110 --> 00:12:07,120

think might have

337

00:12:11,030 --> 00:12:09,120

that might have been active features

338

00:12:13,030 --> 00:12:11,040

long ago on mars

339

00:12:14,389 --> 00:12:13,040
and so as a result of this these

340

00:12:16,790 --> 00:12:14,399
students have really gained a

341

00:12:19,829 --> 00:12:16,800
perspective about you know our approach

342

00:12:22,150 --> 00:12:19,839
to mars and and the basic

343

00:12:24,870 --> 00:12:22,160
basic challenge and that is given an

344

00:12:26,710 --> 00:12:24,880
environment can life exist there and if

345

00:12:28,230 --> 00:12:26,720
it does what kind of life would there be

346

00:12:30,230 --> 00:12:28,240
there so this environment life

347

00:12:32,790 --> 00:12:30,240
connection is what this course really

348

00:12:35,350 --> 00:12:32,800
stresses and that's exactly the strategy

349

00:12:37,910 --> 00:12:35,360
that we need in order to determine which

350

00:12:39,590 --> 00:12:37,920
sites to select on mars and and then

351
00:12:40,629 --> 00:12:39,600
what to do when we get there what do we

352
00:12:43,350 --> 00:12:40,639
measure

353
00:12:45,590 --> 00:12:43,360
and so in a way uh the achievements of

354
00:12:48,790 --> 00:12:45,600
this class and the perspectives they've

355
00:12:50,949 --> 00:12:48,800
gained has developed critical thinking

356
00:12:52,870 --> 00:12:50,959
skills and also just

357
00:12:55,430 --> 00:12:52,880
you know basically

358
00:12:57,430 --> 00:12:55,440
analytical skills which i think will

359
00:12:59,269 --> 00:12:57,440
serve them very well and of course

360
00:13:01,910 --> 00:12:59,279
nasa has a vested interest in this

361
00:13:03,269 --> 00:13:01,920
because ultimately this next generation

362
00:13:05,430 --> 00:13:03,279
is going to be

363
00:13:07,350 --> 00:13:05,440

take ownership of space exploration and

364

00:13:09,990 --> 00:13:07,360

for that matter many of the other things

365

00:13:12,069 --> 00:13:10,000

that are so important for our society

366

00:13:13,750 --> 00:13:12,079

down the road so thank you very much

367

00:13:15,110 --> 00:13:13,760

look forward to seeing this year's

368

00:13:15,910 --> 00:13:15,120

version

369

00:13:22,150 --> 00:13:15,920

and

370

00:13:25,590 --> 00:13:23,829

thank you dave very much

371

00:13:28,870 --> 00:13:25,600

um

372

00:13:30,710 --> 00:13:28,880

and and as dave pointed out we are very

373

00:13:31,590 --> 00:13:30,720

interested in certain areas of lassen

374

00:13:34,389 --> 00:13:31,600

park

375

00:13:36,389 --> 00:13:34,399

and if you remember i said earlier how

376

00:13:37,110 --> 00:13:36,399

how impacted we were

377

00:13:42,230 --> 00:13:37,120

in

378

00:13:44,310 --> 00:13:42,240

next

379

00:13:46,069 --> 00:13:44,320

are the interns in their research but

380

00:13:48,470 --> 00:13:46,079

i'd like to let just kind of set the

381

00:13:49,750 --> 00:13:48,480

foundation for this a little bit and

382

00:13:51,670 --> 00:13:49,760

talk a little bit about some of the

383

00:13:53,030 --> 00:13:51,680

challenges that we faced

384

00:13:54,710 --> 00:13:53,040

um

385

00:13:56,150 --> 00:13:54,720

we do follow the scientific method

386

00:13:58,470 --> 00:13:56,160

that's what this entire class this

387

00:14:00,949 --> 00:13:58,480

entire program is based on you know

388

00:14:02,389 --> 00:14:00,959

identifying a problem and then once we

389

00:14:04,230 --> 00:14:02,399

identify it try to come up with a

390

00:14:05,910 --> 00:14:04,240

solution and then conduct some

391

00:14:07,670 --> 00:14:05,920

experiments that help us to kind of

392

00:14:10,150 --> 00:14:07,680

better understand

393

00:14:12,150 --> 00:14:10,160

those solutions and then try to go back

394

00:14:14,470 --> 00:14:12,160

then and see was

395

00:14:15,430 --> 00:14:14,480

our interpretation of this problem

396

00:14:16,629 --> 00:14:15,440

correct

397

00:14:18,790 --> 00:14:16,639

um

398

00:14:21,189 --> 00:14:18,800

that's easier to do if you can actually

399

00:14:23,829 --> 00:14:21,199

fully get your hands on the problem and

400

00:14:25,670 --> 00:14:23,839

fully experience it

401
00:14:27,110 --> 00:14:25,680
this year we tasked these students in

402
00:14:29,430 --> 00:14:27,120
looking at some of these sites some of

403
00:14:31,750 --> 00:14:29,440
these very interesting important sites

404
00:14:33,350 --> 00:14:31,760
of lassen park without the ability to

405
00:14:35,670 --> 00:14:33,360
get there

406
00:14:39,030 --> 00:14:35,680
we were able to substitute other sites

407
00:14:40,949 --> 00:14:39,040
for this but in the end it just it

408
00:14:42,069 --> 00:14:40,959
became um

409
00:14:43,910 --> 00:14:42,079
just a

410
00:14:46,069 --> 00:14:43,920
i don't want it wasn't impossible don't

411
00:14:48,790 --> 00:14:46,079
get me wrong but it became difficult for

412
00:14:50,230 --> 00:14:48,800
them and so i am very very excited to

413
00:14:52,150 --> 00:14:50,240

share with you what they came up with

414

00:14:54,310 --> 00:14:52,160

what they are able to discover

415

00:14:56,069 --> 00:14:54,320

um well overcoming

416

00:14:57,670 --> 00:14:56,079

just the challenges of the situation

417

00:14:59,189 --> 00:14:57,680

that they are dealing with

418

00:15:00,550 --> 00:14:59,199

and so um

419

00:15:01,990 --> 00:15:00,560

without with that being said i'm just

420

00:15:04,790 --> 00:15:02,000

going to kind of

421

00:15:06,470 --> 00:15:04,800

let this go they have come up with with

422

00:15:09,110 --> 00:15:06,480

a presentation now that basically

423

00:15:11,350 --> 00:15:09,120

explains beginning to end all the

424

00:15:13,590 --> 00:15:11,360

research and work they did this year and

425

00:15:15,269 --> 00:15:13,600

so feel free to just kind of follow

426
00:15:17,829 --> 00:15:15,279
along and if there's questions that come

427
00:15:19,590 --> 00:15:17,839
up i told you where that chat window is

428
00:15:20,949 --> 00:15:19,600
feel free to type those questions in and

429
00:15:23,990 --> 00:15:20,959
we will address them once the

430
00:15:25,590 --> 00:15:24,000
presentation is over so thank you

431
00:15:27,750 --> 00:15:25,600
hello everyone and welcome to our

432
00:15:29,670 --> 00:15:27,760
cumulative presentation for the

433
00:15:32,550 --> 00:15:29,680
2021-2022

434
00:15:34,310 --> 00:15:32,560
nasa astrobiology internship program i

435
00:15:35,910 --> 00:15:34,320
am cameron beeman second year in the

436
00:15:38,310 --> 00:15:35,920
program and i will be the master of

437
00:15:40,150 --> 00:15:38,320
ceremonies tonight this program is a

438
00:15:42,629 --> 00:15:40,160

collaborative effort between lassen

439

00:15:44,550 --> 00:15:42,639

volcanic national park nasa's ames

440

00:15:46,310 --> 00:15:44,560

research center and red bluff high

441

00:15:48,069 --> 00:15:46,320

school to go beyond standard science

442

00:15:50,470 --> 00:15:48,079

classes and provide a unique learning

443

00:15:52,629 --> 00:15:50,480

experience tonight we will be reviewing

444

00:15:54,710 --> 00:15:52,639

all that we have done in the program

445

00:15:57,110 --> 00:15:54,720

this year to start us off olivia

446

00:15:59,749 --> 00:15:57,120

palangoni will go over our outline for

447

00:16:03,829 --> 00:16:01,990

in this presentation each intern will be

448

00:16:06,150 --> 00:16:03,839

explaining the key parts of our study

449

00:16:08,069 --> 00:16:06,160

and how they are interconnected to begin

450

00:16:10,069 --> 00:16:08,079

the concept of astrobiology will be

451
00:16:12,790 --> 00:16:10,079
explained and why lassen volcanic

452
00:16:14,389 --> 00:16:12,800
national park is a part of our studies

453
00:16:16,230 --> 00:16:14,399
then the matter in which we collected

454
00:16:18,150 --> 00:16:16,240
samples will be explained

455
00:16:19,670 --> 00:16:18,160
next each field site we studied will be

456
00:16:21,509 --> 00:16:19,680
described

457
00:16:23,030 --> 00:16:21,519
then the rock dissolution experiments we

458
00:16:24,790 --> 00:16:23,040
conduct in the classroom will also be

459
00:16:26,230 --> 00:16:24,800
outlined along with the experimental

460
00:16:27,829 --> 00:16:26,240
parameters of our winter grassy

461
00:16:29,509 --> 00:16:27,839
incubations

462
00:16:32,310 --> 00:16:29,519
lastly the second year interns will

463
00:16:34,550 --> 00:16:32,320

summarize the water chemistry each site

464

00:16:38,470 --> 00:16:34,560

next hyrum blizz will be explaining what

465

00:16:43,430 --> 00:16:40,870

astrobiology is the investigation of the

466

00:16:45,590 --> 00:16:43,440

origins distribution and future of life

467

00:16:48,230 --> 00:16:45,600

in the universe a key aspect of

468

00:16:50,150 --> 00:16:48,240

astrobiology is to search for and

469

00:16:52,629 --> 00:16:50,160

characterize the full diversity of

470

00:16:54,550 --> 00:16:52,639

habitable environments both on early

471

00:16:56,389 --> 00:16:54,560

earth and on other planets

472

00:16:58,949 --> 00:16:56,399

volcanic activity and its interactions

473

00:17:01,350 --> 00:16:58,959

with water are key aspects of ancient

474

00:17:03,509 --> 00:17:01,360

habitable environments on earth

475

00:17:05,270 --> 00:17:03,519

evidence of such interactions have been

476

00:17:07,270 --> 00:17:05,280

discovered on mars and these

477

00:17:09,590 --> 00:17:07,280

interactions probably also occurred on

478

00:17:11,990 --> 00:17:09,600

other earth-like planets in the universe

479

00:17:14,470 --> 00:17:12,000

and now austell diaz will be explaining

480

00:17:18,870 --> 00:17:14,480

why we are so interested specifically in

481

00:17:20,789 --> 00:17:18,880

the lassen volcanic national park area

482

00:17:22,230 --> 00:17:20,799

volcanic activity and its interactions

483

00:17:23,590 --> 00:17:22,240

with water were key components in

484

00:17:25,270 --> 00:17:23,600

allowing past life to live in their

485

00:17:27,189 --> 00:17:25,280

environment on earth

486

00:17:29,430 --> 00:17:27,199

from photographic evidence taken by our

487

00:17:31,110 --> 00:17:29,440

fellow robotic friends on mars we know

488

00:17:33,830 --> 00:17:31,120

that alaska mechanic national park

489

00:17:35,590 --> 00:17:33,840

shares various yoga geographical

490

00:17:37,350 --> 00:17:35,600

similarities with mars

491

00:17:39,590 --> 00:17:37,360

this being the aforementioned volcanic

492

00:17:40,630 --> 00:17:39,600

influence and effects of liquid erosion

493

00:17:42,150 --> 00:17:40,640

on the ground

494

00:17:44,310 --> 00:17:42,160

the volcanoes and lassen mckinnon

495

00:17:47,029 --> 00:17:44,320

national park create unique

496

00:17:48,950 --> 00:17:47,039

opportunities for study for example

497

00:17:51,270 --> 00:17:48,960

groundwater and latin volcanic national

498

00:17:52,630 --> 00:17:51,280

park interacts with molten rock stemming

499

00:17:54,870 --> 00:17:52,640

from volcanoes

500

00:17:56,630 --> 00:17:54,880

the subsequent groundwater now altered

501
00:17:59,750 --> 00:17:56,640
by its previous contact

502
00:18:01,510 --> 00:17:59,760
interacts with living organisms microbes

503
00:18:02,630 --> 00:18:01,520
and landscapes of its surrounding

504
00:18:04,150 --> 00:18:02,640
environment

505
00:18:05,830 --> 00:18:04,160
seeking to understand the mechanisms

506
00:18:07,830 --> 00:18:05,840
behind lassen's wide range of

507
00:18:09,750 --> 00:18:07,840
environmental conditions and rich

508
00:18:12,150 --> 00:18:09,760
microbial life that are all impacted by

509
00:18:13,510 --> 00:18:12,160
the volcanic activity

510
00:18:16,310 --> 00:18:13,520
we can replicate many of the

511
00:18:17,990 --> 00:18:16,320
hypothesized conditions of early mars

512
00:18:19,750 --> 00:18:18,000
the study of microbes in the present day

513
00:18:21,669 --> 00:18:19,760

can help answer the question

514

00:18:23,510 --> 00:18:21,679

was their life on mars

515

00:18:26,630 --> 00:18:23,520

up next todd will talk about the

516

00:18:28,789 --> 00:18:26,640

prerequisites for life to even exist

517

00:18:30,390 --> 00:18:28,799

in our studies of lassen we looked not

518

00:18:32,390 --> 00:18:30,400

only at the conditions of the water

519

00:18:34,789 --> 00:18:32,400

chemistry in geology but also at the

520

00:18:36,789 --> 00:18:34,799

microbial life that's present there are

521

00:18:38,310 --> 00:18:36,799

four categories that we observed to

522

00:18:40,470 --> 00:18:38,320

determine if the conditions are

523

00:18:41,510 --> 00:18:40,480

favorable for life to survive and

524

00:18:43,190 --> 00:18:41,520

prosper

525

00:18:45,350 --> 00:18:43,200

the first of these four requirements is

526

00:18:47,510 --> 00:18:45,360

for life to have a solvent present a

527

00:18:49,510 --> 00:18:47,520

solvent typically that of water is

528

00:18:51,270 --> 00:18:49,520

necessary in order to dissolve many

529

00:18:53,029 --> 00:18:51,280

nutrients for life

530

00:18:55,029 --> 00:18:53,039

these essential elements for life which

531

00:18:57,830 --> 00:18:55,039

are dissolved by water include carbon

532

00:19:00,390 --> 00:18:57,840

hydrogen nitrogen sulfur and more

533

00:19:02,710 --> 00:19:00,400

for life to be present in an ecosystem a

534

00:19:04,789 --> 00:19:02,720

source of energy also must be present

535

00:19:06,390 --> 00:19:04,799

energy is provided to the organisms at

536

00:19:08,630 --> 00:19:06,400

these sites through the processes of

537

00:19:10,870 --> 00:19:08,640

photosynthesis the absorption of light

538

00:19:12,950 --> 00:19:10,880

and chemosynthesis which provides energy

539

00:19:14,870 --> 00:19:12,960

through chemical reactions

540

00:19:17,430 --> 00:19:14,880

the fourth and final necessity for life

541

00:19:20,310 --> 00:19:17,440

to exist is that of favorable conditions

542

00:19:22,310 --> 00:19:20,320

in terms of temperature ph and salinity

543

00:19:23,750 --> 00:19:22,320

for life to exist the conditions of the

544

00:19:24,950 --> 00:19:23,760

environment must be suited to what the

545

00:19:27,029 --> 00:19:24,960

microbes need

546

00:19:28,789 --> 00:19:27,039

many microbes have different adaptations

547

00:19:30,950 --> 00:19:28,799

to survive in different environments for

548

00:19:33,110 --> 00:19:30,960

instance many organisms can survive in

549

00:19:35,270 --> 00:19:33,120

an acidic environment while others must

550

00:19:37,029 --> 00:19:35,280

be in a more neutral environment on the

551
00:19:38,710 --> 00:19:37,039
whole it is necessary for the four

552
00:19:41,830 --> 00:19:38,720
categories seen in the venn diagram to

553
00:19:43,830 --> 00:19:41,840
be present for life to survive and grow

554
00:19:46,710 --> 00:19:43,840
now cameron will introduce the field

555
00:19:48,789 --> 00:19:46,720
sites that we studied at lassen

556
00:19:50,549 --> 00:19:48,799
after learning about astrobiology and

557
00:19:52,230 --> 00:19:50,559
the requirements for life we looked for

558
00:19:53,909 --> 00:19:52,240
field sites within lassen volcanic

559
00:19:55,830 --> 00:19:53,919
national park to see if we could apply

560
00:19:57,750 --> 00:19:55,840
what we had learned when observing

561
00:20:00,230 --> 00:19:57,760
lassen it is important to remember its

562
00:20:02,710 --> 00:20:00,240
history lassen volcanic national park

563
00:20:03,830 --> 00:20:02,720

once had an ancient volcano named mount

564

00:20:08,470 --> 00:20:03,840

tahimah

565

00:20:10,789 --> 00:20:08,480

the inside because of the underground

566

00:20:13,270 --> 00:20:10,799

acidic hydrothermal activity

567

00:20:15,270 --> 00:20:13,280

causing it to collapse in on itself

568

00:20:17,350 --> 00:20:15,280

this volcano was massive

569

00:20:18,789 --> 00:20:17,360

its footprint outlined in red

570

00:20:21,029 --> 00:20:18,799

within the remains of this ancient

571

00:20:22,390 --> 00:20:21,039

volcano we see the sulfur works area

572

00:20:24,230 --> 00:20:22,400

circled in yellow

573

00:20:26,390 --> 00:20:24,240

at sulfur works we picked three

574

00:20:28,870 --> 00:20:26,400

significant field sites to observe

575

00:20:30,070 --> 00:20:28,880

ridge lake stream upper pond and big

576
00:20:32,390 --> 00:20:30,080
boiler

577
00:20:33,270 --> 00:20:32,400
now moving outside of the volcano we see

578
00:20:36,070 --> 00:20:33,280
the

579
00:20:38,789 --> 00:20:36,080
warner valley area within warner valley

580
00:20:41,350 --> 00:20:38,799
we pick two significant sites to observe

581
00:20:43,590 --> 00:20:41,360
padawa creek and alkaline spring

582
00:20:45,430 --> 00:20:43,600
we will now hear five of our first-year

583
00:20:47,270 --> 00:20:45,440
interns describe the field sites we

584
00:20:51,350 --> 00:20:47,280
observed in lassen volcanic national

585
00:20:52,789 --> 00:20:51,360
park first we will hear from mia gleason

586
00:20:54,870 --> 00:20:52,799
paddle wheel creek is found in the

587
00:20:57,190 --> 00:20:54,880
warner valley area of lassen volcanic

588
00:20:59,110 --> 00:20:57,200

national park paddle wheel creek is a

589

00:21:00,789 --> 00:20:59,120

fresh water stream with conditions that

590

00:21:03,029 --> 00:21:00,799

can commonly be found at any other

591

00:21:04,549 --> 00:21:03,039

national park because they are moderate

592

00:21:06,310 --> 00:21:04,559

and relatively normal

593

00:21:07,990 --> 00:21:06,320

when you approach paddlewheel creek it

594

00:21:09,590 --> 00:21:08,000

appears to be a typical mountain stream

595

00:21:10,470 --> 00:21:09,600

that is thriving with an abundance of

596

00:21:12,230 --> 00:21:10,480

life

597

00:21:14,549 --> 00:21:12,240

there is grass and trees to the edge of

598

00:21:16,310 --> 00:21:14,559

the stream as can be seen in the photo

599

00:21:18,070 --> 00:21:16,320

along with algae in the stream the

600

00:21:20,310 --> 00:21:18,080

temperature and ph support this because

601
00:21:22,070 --> 00:21:20,320
the temperature of paddlewheel creek is

602
00:21:23,190 --> 00:21:22,080
nine celsius which is an average

603
00:21:26,549 --> 00:21:23,200
temperature

604
00:21:29,270 --> 00:21:26,559
and a ph of 6.7 which is neutral the

605
00:21:31,669 --> 00:21:29,280
conductivity of paddlewheel creek is 52

606
00:21:33,270 --> 00:21:31,679
micro siemens there is no volcanic

607
00:21:34,710 --> 00:21:33,280
activity at the site because it is a

608
00:21:36,070 --> 00:21:34,720
fresh water stream

609
00:21:39,029 --> 00:21:36,080
up next natalie moore will be

610
00:21:40,789 --> 00:21:39,039
introducing ridge lake streams

611
00:21:42,789 --> 00:21:40,799
originally extremes of silver works

612
00:21:44,870 --> 00:21:42,799
appears to be a typical mountain stream

613
00:21:47,190 --> 00:21:44,880

it is fed by runoff from ridge lakes and

614

00:21:48,630 --> 00:21:47,200

lassen volcanic national park however

615

00:21:51,510 --> 00:21:48,640

the water chemistry here tells a

616

00:21:53,669 --> 00:21:51,520

different story the ph of 5.8 seems

617

00:21:55,909 --> 00:21:53,679

standard but is low in comparison to

618

00:21:58,470 --> 00:21:55,919

places like padua creek making it

619

00:22:01,270 --> 00:21:58,480

slightly more acidic than that site the

620

00:22:03,190 --> 00:22:01,280

conductivity of 290 is relatively high

621

00:22:05,990 --> 00:22:03,200

when compared as well the stream is

622

00:22:07,909 --> 00:22:06,000

filled with lots of vegetation and algae

623

00:22:11,350 --> 00:22:07,919

and now i'm introducing courtney white

624

00:22:12,870 --> 00:22:11,360

to talk about silverworks upper site

625

00:22:15,110 --> 00:22:12,880

sulfur works upper site is a

626
00:22:16,470 --> 00:22:15,120
hydrothermal feature at lassen volcanic

627
00:22:18,470 --> 00:22:16,480
national park

628
00:22:20,870 --> 00:22:18,480
upper site is a small acidic pool

629
00:22:22,630 --> 00:22:20,880
adjacent to richly extreme with a low ph

630
00:22:24,390 --> 00:22:22,640
and a mild temperature

631
00:22:27,270 --> 00:22:24,400
upper site has a temperature of 10

632
00:22:30,310 --> 00:22:27,280
degrees celsius or 50 degrees fahrenheit

633
00:22:32,310 --> 00:22:30,320
and a ph value of 3.6

634
00:22:33,990 --> 00:22:32,320
the pool appears to be bubbling and the

635
00:22:35,590 --> 00:22:34,000
rich sulfur can be smelled when

636
00:22:38,070 --> 00:22:35,600
approaching the pool

637
00:22:39,990 --> 00:22:38,080
as seen in the top right image upper

638
00:22:42,390 --> 00:22:40,000

site has a beautiful vibrant top layer

639

00:22:44,070 --> 00:22:42,400

of green photosynthetic microbes

640

00:22:46,710 --> 00:22:44,080

when removing the top layer of green

641

00:22:49,350 --> 00:22:46,720

microbes a reddish purple microblade can

642

00:22:51,990 --> 00:22:49,360

be observed below the green surface one

643

00:22:54,789 --> 00:22:52,000

iconic hydrothermal area found at lassen

644

00:22:56,390 --> 00:22:54,799

is the big boiler found at sofa works

645

00:22:58,470 --> 00:22:56,400

when approaching the site you'll notice

646

00:23:00,710 --> 00:22:58,480

the yellow orange clay hillside

647

00:23:03,029 --> 00:23:00,720

surrounding the area and see little to

648

00:23:04,390 --> 00:23:03,039

no vegetation like plants or shrubs

649

00:23:06,549 --> 00:23:04,400

growing around

650

00:23:09,110 --> 00:23:06,559

it also has a strong distinct smell of

651
00:23:11,669 --> 00:23:09,120
rotten eggs which is sulfur and has

652
00:23:14,310 --> 00:23:11,679
boiling mud plots up close

653
00:23:17,110 --> 00:23:14,320
big boiler has a high temperature of 170

654
00:23:19,990 --> 00:23:17,120
degrees fahrenheit down inside and a

655
00:23:22,470 --> 00:23:20,000
acidic ph concentration of three making

656
00:23:24,310 --> 00:23:22,480
the highest in all the field sites

657
00:23:26,390 --> 00:23:24,320
this is because the groundwater reaches

658
00:23:27,669 --> 00:23:26,400
to a boil causing the water to bubble

659
00:23:29,270 --> 00:23:27,679
and steam

660
00:23:32,950 --> 00:23:29,280
the next site being talked about is

661
00:23:34,630 --> 00:23:32,960
warner valley alkaline by maya rodriguez

662
00:23:35,990 --> 00:23:34,640
at first glance the alkaline site in

663
00:23:37,990 --> 00:23:36,000

warner valley seemed to be a healthy

664

00:23:39,750 --> 00:23:38,000

stream much like paddleville creek

665

00:23:41,510 --> 00:23:39,760

however looking closer we saw it was

666

00:23:42,870 --> 00:23:41,520

much different in these pictures you

667

00:23:44,390 --> 00:23:42,880

could see a thermal image of the heat

668

00:23:46,470 --> 00:23:44,400

coming from the water that there was

669

00:23:47,990 --> 00:23:46,480

steam coming off the water little to no

670

00:23:49,830 --> 00:23:48,000

plant life weathered rocks around the

671

00:23:51,830 --> 00:23:49,840

stream and thick green micro mats along

672

00:23:53,830 --> 00:23:51,840

with a few dead insects in the stream

673

00:23:56,390 --> 00:23:53,840

additionally it has a temperature of 62

674

00:23:58,950 --> 00:23:56,400

degrees celsius or 144 degrees

675

00:24:01,990 --> 00:23:58,960

fahrenheit at ph of 6.6 and a

676
00:24:03,669 --> 00:24:02,000
conductivity level of 1010 together this

677
00:24:04,950 --> 00:24:03,679
indicated a much different environment

678
00:24:06,630 --> 00:24:04,960
at the alkaline site than we have

679
00:24:08,710 --> 00:24:06,640
encountered in lassen volcanic national

680
00:24:10,310 --> 00:24:08,720
park

681
00:24:11,830 --> 00:24:10,320
after viewing the field sites we

682
00:24:13,190 --> 00:24:11,840
returned with questions regarding the

683
00:24:15,350 --> 00:24:13,200
various readings we took and

684
00:24:16,789 --> 00:24:15,360
observations we made why did we see the

685
00:24:18,549 --> 00:24:16,799
various differences in ph and

686
00:24:20,870 --> 00:24:18,559
temperature and why did we observe

687
00:24:22,870 --> 00:24:20,880
differences in the life of each site we

688
00:24:25,430 --> 00:24:22,880

set up several experiments to explain

689

00:24:27,190 --> 00:24:25,440

these differences now liam rano will

690

00:24:29,830 --> 00:24:27,200

give us a brief introduction to the lab

691

00:24:32,230 --> 00:24:29,840

environment and tools we used

692

00:24:33,830 --> 00:24:32,240

using the meters shown ph conductivity

693

00:24:34,630 --> 00:24:33,840

and temperature were measured from each

694

00:24:37,750 --> 00:24:34,640

site

695

00:24:39,750 --> 00:24:37,760

ph is a measurement of acidity from 0-14

696

00:24:42,149 --> 00:24:39,760

sites at lassen volcanic national park

697

00:24:44,470 --> 00:24:42,159

range between the acidic levels of 1.7

698

00:24:46,549 --> 00:24:44,480

and 7. conductivity is a measurement of

699

00:24:48,230 --> 00:24:46,559

the dissolved solids known as ions

700

00:24:49,830 --> 00:24:48,240

cations are positively charged and

701

00:24:51,669 --> 00:24:49,840

anions are negative

702

00:24:53,590 --> 00:24:51,679

sulfate is an anion we've measured from

703

00:24:56,230 --> 00:24:53,600

the sites produced when the volcanic gas

704

00:24:58,070 --> 00:24:56,240

hydrogen sulfide reacts with oxygen and

705

00:25:00,070 --> 00:24:58,080

water this creates the acid that

706

00:25:01,669 --> 00:25:00,080

contributes to the acidity of sites and

707

00:25:03,190 --> 00:25:01,679

indicates the presence of volcanic

708

00:25:05,269 --> 00:25:03,200

activity

709

00:25:07,029 --> 00:25:05,279

we will now hear two of our first-year

710

00:25:08,630 --> 00:25:07,039

interns describe and discuss our

711

00:25:10,870 --> 00:25:08,640

findings from the water chemistry

712

00:25:12,390 --> 00:25:10,880

experiments we conducted in the lab

713

00:25:14,230 --> 00:25:12,400

these experiments were designed to

714

00:25:16,710 --> 00:25:14,240

explain the interactions between rock

715

00:25:17,830 --> 00:25:16,720

and water of various ph and temperature

716

00:25:20,070 --> 00:25:17,840

values

717

00:25:21,830 --> 00:25:20,080

first we will hear from john sheffield

718

00:25:25,350 --> 00:25:21,840

who will be discussing the effect rock

719

00:25:27,590 --> 00:25:25,360

has on the ph of a solution

720

00:25:29,990 --> 00:25:27,600

during our visitations at the lassen

721

00:25:32,230 --> 00:25:30,000

volcanic national park field sites we

722

00:25:34,310 --> 00:25:32,240

are presented with a question of how the

723

00:25:36,630 --> 00:25:34,320

ph at these different field sites will

724

00:25:39,029 --> 00:25:36,640

react with the rocks surrounding them

725

00:25:41,029 --> 00:25:39,039

our hypothesis for this question was

726

00:25:42,950 --> 00:25:41,039

that the ph of these field sites were

727

00:25:45,750 --> 00:25:42,960

dissolving the rock into the water which

728

00:25:47,990 --> 00:25:45,760

raised the ph to test our hypothesis we

729

00:25:49,990 --> 00:25:48,000

set up six different testing stations

730

00:25:52,470 --> 00:25:50,000

that fluctuated in both ph and

731

00:25:53,990 --> 00:25:52,480

temperature we then used the two rocks

732

00:25:56,470 --> 00:25:54,000

found in abundance near the lassen

733

00:25:59,110 --> 00:25:56,480

volcanic national park field sites as

734

00:26:01,430 --> 00:25:59,120

rock powder the data below shows that

735

00:26:03,990 --> 00:26:01,440

over our month-long experiment we had to

736

00:26:05,909 --> 00:26:04,000

continually add sulfuric acid to the

737

00:26:08,950 --> 00:26:05,919

solution to lower the ph down to the

738

00:26:12,070 --> 00:26:08,960

desired ph this can be seen in each line

739

00:26:14,630 --> 00:26:12,080

with the green line meaning 3 200

740

00:26:17,350 --> 00:26:14,640

micro moles of sulfuric acid over 30

741

00:26:18,909 --> 00:26:17,360

days to lower to the original ph and the

742

00:26:21,990 --> 00:26:18,919

red line needing

743

00:26:24,149 --> 00:26:22,000

9700 micromoles when observing the

744

00:26:27,269 --> 00:26:24,159

yellow and blue line the ph of both is

745

00:26:29,909 --> 00:26:27,279

5.5 which is closer to a neutral ph of

746

00:26:31,990 --> 00:26:29,919

7. this results in their ph raising a

747

00:26:34,070 --> 00:26:32,000

much smaller amount each week when

748

00:26:35,269 --> 00:26:34,080

compared to the solutions with a ph of

749

00:26:37,269 --> 00:26:35,279

2.

750

00:26:39,190 --> 00:26:37,279

therefore from these experiments we can

751

00:26:41,110 --> 00:26:39,200

conclude that rock reacting with an

752

00:26:42,950 --> 00:26:41,120

acidic solution will raise the acidic

753

00:26:45,590 --> 00:26:42,960

solutions ph

754

00:26:47,830 --> 00:26:45,600

i will now be introducing aubrey norton

755

00:26:51,269 --> 00:26:47,840

who is presenting solubility of rock at

756

00:26:52,470 --> 00:26:51,279

different ph and temperatures

757

00:26:54,230 --> 00:26:52,480

we compared the change of net

758

00:26:56,310 --> 00:26:54,240

conductivity in experiments that have

759

00:26:58,149 --> 00:26:56,320

like ph's and different temperatures we

760

00:26:59,750 --> 00:26:58,159

know that any difference in conductivity

761

00:27:01,269 --> 00:26:59,760

between the two experiments must be

762

00:27:03,029 --> 00:27:01,279

because of the change in temperature

763

00:27:04,950 --> 00:27:03,039

because that is the only difference the

764

00:27:07,430 --> 00:27:04,960

same goes for having like temperatures

765

00:27:09,110 --> 00:27:07,440

in different phs net conductivity is the

766

00:27:11,190 --> 00:27:09,120

total amount of rock dissolved into

767

00:27:13,029 --> 00:27:11,200

solution during an experiment

768

00:27:15,029 --> 00:27:13,039

we hypothesized that solutions with a

769

00:27:17,029 --> 00:27:15,039

lower ph were able to dissolve more

770

00:27:19,110 --> 00:27:17,039

wrong to solution than that of a higher

771

00:27:21,269 --> 00:27:19,120

ph we were able to test this through two

772

00:27:23,669 --> 00:27:21,279

experiments one experiment had a ph of

773

00:27:24,870 --> 00:27:23,679

two and the other had a ph of five and

774

00:27:27,269 --> 00:27:24,880

both are at the same constant

775

00:27:29,350 --> 00:27:27,279

temperature our data shows that in fact

776

00:27:31,750 --> 00:27:29,360

the lower ph was able to dissolve more

777

00:27:33,110 --> 00:27:31,760

rock into solution our next hypothesis

778

00:27:35,110 --> 00:27:33,120

was that solutions with a higher

779

00:27:36,950 --> 00:27:35,120

temperature were able to dissolve more

780

00:27:38,710 --> 00:27:36,960

rock into solution than that of a lower

781

00:27:40,389 --> 00:27:38,720

temperature we will assess this through

782

00:27:42,230 --> 00:27:40,399

two experiments one experiment had a

783

00:27:43,750 --> 00:27:42,240

temperature of 35 degrees celsius the

784

00:27:45,110 --> 00:27:43,760

other had a temperature of 20 degrees

785

00:27:47,590 --> 00:27:45,120

celsius and both were at the same

786

00:27:48,950 --> 00:27:47,600

constant ph our data shows that in fact

787

00:27:51,669 --> 00:27:48,960

the higher temperature was able to

788

00:27:53,669 --> 00:27:51,679

dissolve more rock to solution

789

00:27:55,830 --> 00:27:53,679

we will now hear four of our first year

790

00:27:58,149 --> 00:27:55,840

interns describe and discuss our

791

00:27:59,990 --> 00:27:58,159

findings from the microbial incubations

792

00:28:01,510 --> 00:28:00,000

we conducted in the lab

793

00:28:04,149 --> 00:28:01,520

these experiments were designed to

794

00:28:05,909 --> 00:28:04,159

explain and explore the effect of

795

00:28:08,149 --> 00:28:05,919

altering the various variables of a

796

00:28:10,149 --> 00:28:08,159

microbes environment first we will hear

797

00:28:12,710 --> 00:28:10,159

from sierra lim on the effect of

798

00:28:14,630 --> 00:28:12,720

altering light

799

00:28:16,789 --> 00:28:14,640

we tested the impact of changing the

800

00:28:18,630 --> 00:28:16,799

color on microbes to see how much of the

801
00:28:21,029 --> 00:28:18,640
microbial life and diversity would be

802
00:28:23,110 --> 00:28:21,039
affected to test this microbes from the

803
00:28:25,590 --> 00:28:23,120
big boiler and alkyne sites were put

804
00:28:27,269 --> 00:28:25,600
into a container that only allowed blue

805
00:28:28,789 --> 00:28:27,279
light to transit through

806
00:28:30,710 --> 00:28:28,799
this experiment gives us a better

807
00:28:32,870 --> 00:28:30,720
understanding of which microbes can

808
00:28:34,389 --> 00:28:32,880
survive in temperature changing climates

809
00:28:35,510 --> 00:28:34,399
which correlates to the past life on

810
00:28:37,990 --> 00:28:35,520
mars

811
00:28:39,990 --> 00:28:38,000
after examination growth of the microbes

812
00:28:42,230 --> 00:28:40,000
was inhibited by the lack of light and

813
00:28:44,870 --> 00:28:42,240

energy that is typically provided

814

00:28:47,029 --> 00:28:44,880

primarily from red or orange color waves

815

00:28:48,870 --> 00:28:47,039

which are being filtered out

816

00:28:51,430 --> 00:28:48,880

however some microbes were able to

817

00:28:53,590 --> 00:28:51,440

survive and be unaffected by the change

818

00:28:56,070 --> 00:28:53,600

as they were more heavily rely on the

819

00:28:58,789 --> 00:28:56,080

blue light that was still present in the

820

00:29:01,909 --> 00:28:58,799

system unlike some microbes that needed

821

00:29:03,430 --> 00:29:01,919

the red or orange light to prosper

822

00:29:05,430 --> 00:29:03,440

when we gathered the microbes from

823

00:29:06,950 --> 00:29:05,440

lassen volcanic national park we tested

824

00:29:08,389 --> 00:29:06,960

the microbes ability to adapt to

825

00:29:09,990 --> 00:29:08,399

different environments

826

00:29:12,149 --> 00:29:10,000

one of these environmental changes was

827

00:29:13,750 --> 00:29:12,159

the effects of temperature we created

828

00:29:16,230 --> 00:29:13,760

two different went grazie columns to

829

00:29:17,830 --> 00:29:16,240

determine this effect the first column

830

00:29:19,830 --> 00:29:17,840

was the control and the second was the

831

00:29:22,070 --> 00:29:19,840

experimental the control was kept at

832

00:29:24,310 --> 00:29:22,080

room temperature registering at 74

833

00:29:26,950 --> 00:29:24,320

degrees fahrenheit the experiment was

834

00:29:28,950 --> 00:29:26,960

kept in an incubator registering at 105

835

00:29:30,789 --> 00:29:28,960

degrees fahrenheit for the next two

836

00:29:33,350 --> 00:29:30,799

months we observed any physical change

837

00:29:35,269 --> 00:29:33,360

to our columns the first two pictures

838

00:29:36,710 --> 00:29:35,279

show the control of the experiment the

839

00:29:38,149 --> 00:29:36,720

one on the left is the one agonizing

840

00:29:40,470 --> 00:29:38,159

column and the one on the right is the

841

00:29:42,389 --> 00:29:40,480

microbes under a microscope you can see

842

00:29:43,510 --> 00:29:42,399

the biomass of the community is strong

843

00:29:45,110 --> 00:29:43,520

and there are different types of

844

00:29:47,029 --> 00:29:45,120

microbes which show that there's a high

845

00:29:48,389 --> 00:29:47,039

amount of biodiversity

846

00:29:50,630 --> 00:29:48,399

the pictures on the bottom show the

847

00:29:52,870 --> 00:29:50,640

experimental column under the microscope

848

00:29:55,029 --> 00:29:52,880

we can see that biodiversity is lacking

849

00:29:56,789 --> 00:29:55,039

as you can see the change is drastically

850

00:29:58,310 --> 00:29:56,799

different the biomass of the community

851
00:30:00,549 --> 00:29:58,320
has greatly decreased as well as the

852
00:30:02,389 --> 00:30:00,559
biodiversity after the two month

853
00:30:03,669 --> 00:30:02,399
observation period we concluded that

854
00:30:05,190 --> 00:30:03,679
when the temperature was either raised

855
00:30:07,029 --> 00:30:05,200
or lowered from the original temperature

856
00:30:08,950 --> 00:30:07,039
of the field sites it would negatively

857
00:30:11,190 --> 00:30:08,960
affect the microbes both in biomass and

858
00:30:12,789 --> 00:30:11,200
in biodiversity now that we covered the

859
00:30:14,470 --> 00:30:12,799
effect of temperature on the microbes

860
00:30:17,590 --> 00:30:14,480
russ and vaught will introduce the

861
00:30:21,110 --> 00:30:19,350
after our visit to lassen volcanic

862
00:30:22,789 --> 00:30:21,120
national park we wanted to determine the

863
00:30:25,029 --> 00:30:22,799

extent of environmental changes these

864

00:30:27,029 --> 00:30:25,039

microbes can handle we tested how ph

865

00:30:29,269 --> 00:30:27,039

would affect these microbes our initial

866

00:30:30,789 --> 00:30:29,279

hypothesis was that a change in ph in a

867

00:30:32,230 --> 00:30:30,799

microbes environment would visually

868

00:30:33,510 --> 00:30:32,240

change their growth in abundance and

869

00:30:35,029 --> 00:30:33,520

diversity

870

00:30:36,710 --> 00:30:35,039

during the experiment we checked the ph

871

00:30:38,950 --> 00:30:36,720

of the control and experimental every

872

00:30:40,470 --> 00:30:38,960

friday for the next two months after

873

00:30:42,549 --> 00:30:40,480

experimenting we determined that the

874

00:30:44,710 --> 00:30:42,559

original showed optimal growth in

875

00:30:46,870 --> 00:30:44,720

biomass and biodiversity

876

00:30:48,950 --> 00:30:46,880

while the experimental showed little

877

00:30:50,789 --> 00:30:48,960

growth in biomass and biodiversity

878

00:30:53,590 --> 00:30:50,799

resulting in us to believe that an

879

00:30:55,350 --> 00:30:53,600

increase or decrease in ph negatively

880

00:30:57,269 --> 00:30:55,360

affects the microbes in all aspects of

881

00:30:59,190 --> 00:30:57,279

life as shown by the reduction of

882

00:31:00,789 --> 00:30:59,200

biodiversity and biomass

883

00:31:03,830 --> 00:31:00,799

now we will talk about the effects of

884

00:31:05,750 --> 00:31:03,840

change in concentration on the microbes

885

00:31:08,149 --> 00:31:05,760

solute concentration otherwise referred

886

00:31:10,310 --> 00:31:08,159

to as conductivity is measure of ions

887

00:31:12,630 --> 00:31:10,320

dissolved in solution these ions are

888

00:31:15,590 --> 00:31:12,640

utilized by microbes as a source of

889

00:31:17,029 --> 00:31:15,600

nutrients or a fertilizer

890

00:31:18,789 --> 00:31:17,039

field sites in washington volcanic

891

00:31:20,630 --> 00:31:18,799

national park had a variety of ions

892

00:31:22,310 --> 00:31:20,640

dissolved in solution and a broad range

893

00:31:23,909 --> 00:31:22,320

of conductivity values

894

00:31:25,669 --> 00:31:23,919

certain microbes are specially evolved

895

00:31:28,230 --> 00:31:25,679

to survive in a specific set or

896

00:31:29,830 --> 00:31:28,240

threshold of conditions and have a

897

00:31:31,350 --> 00:31:29,840

threshold of solute concentrations that

898

00:31:32,789 --> 00:31:31,360

they can survive in

899

00:31:34,470 --> 00:31:32,799

our general hypothesis for lab

900

00:31:36,470 --> 00:31:34,480

experimentation was that a decrease in

901
00:31:38,310 --> 00:31:36,480
conductivity would lead to a decrease in

902
00:31:40,470 --> 00:31:38,320
microbial activity and vice versa

903
00:31:42,230 --> 00:31:40,480
depending on the magnitude of the change

904
00:31:44,549 --> 00:31:42,240
however lab experimentation provided

905
00:31:46,310 --> 00:31:44,559
inclusive results as no apparent

906
00:31:48,630 --> 00:31:46,320
correlation between solute concentration

907
00:31:50,310 --> 00:31:48,640
and microbe activity could be found

908
00:31:51,909 --> 00:31:50,320
pictures of these lab cultures can be

909
00:31:54,070 --> 00:31:51,919
observed to the right with the number of

910
00:31:55,750 --> 00:31:54,080
days magnitude of change and field site

911
00:31:57,509 --> 00:31:55,760
indicated

912
00:31:59,430 --> 00:31:57,519
earlier we had questions on why the

913
00:32:02,389 --> 00:31:59,440

various field sites had differences in

914

00:32:04,230 --> 00:32:02,399

ph connectivity and microbial life

915

00:32:06,070 --> 00:32:04,240

after conducting our experiments and

916

00:32:07,830 --> 00:32:06,080

compiling our results we now have

917

00:32:09,430 --> 00:32:07,840

answers to those questions

918

00:32:11,990 --> 00:32:09,440

we have gained a new understanding of

919

00:32:13,669 --> 00:32:12,000

how lassen volcanic national park works

920

00:32:15,430 --> 00:32:13,679

and we feel confident that we can share

921

00:32:17,350 --> 00:32:15,440

that understanding with you

922

00:32:19,269 --> 00:32:17,360

now you will hear all five of the second

923

00:32:21,909 --> 00:32:19,279

year interns interpret the field sites

924

00:32:23,990 --> 00:32:21,919

with our new understanding

925

00:32:25,990 --> 00:32:24,000

as mentioned earlier padwo creek is a

926
00:32:27,909 --> 00:32:26,000
typical mountain stream that exists as

927
00:32:30,710 --> 00:32:27,919
snowmelt and rainfall flows through the

928
00:32:33,669 --> 00:32:30,720
valley the ph of rainwater is around 5

929
00:32:35,669 --> 00:32:33,679
while the ph of the stream is around 6.7

930
00:32:37,669 --> 00:32:35,679
this change in ph is explained by our

931
00:32:39,350 --> 00:32:37,679
rock dissolution experiments where we

932
00:32:41,750 --> 00:32:39,360
prove that the ph of the solution

933
00:32:42,870 --> 00:32:41,760
increases over time as rock is dissolved

934
00:32:44,710 --> 00:32:42,880
within it

935
00:32:46,710 --> 00:32:44,720
we also saw in our rotten solution

936
00:32:49,110 --> 00:32:46,720
experiments that environments with a

937
00:32:51,190 --> 00:32:49,120
neutral ph in cold temperature dissolve

938
00:32:53,110 --> 00:32:51,200

rock but at a fairly slow rate

939

00:32:55,029 --> 00:32:53,120

which explains why the conductivity is so

940

00:32:57,350 --> 00:32:55,039

low and why there is not a large

941

00:32:59,909 --> 00:32:57,360

increase in pH from the original as only

942

00:33:01,509 --> 00:32:59,919

a small amount of solutes were dissolved

943

00:33:03,669 --> 00:33:01,519

paddle acreage also contains an

944

00:33:05,190 --> 00:33:03,679

extremely low level of sulfate which is

945

00:33:07,110 --> 00:33:05,200

because of the lack of hydrothermal

946

00:33:09,029 --> 00:33:07,120

input seen at the site

947

00:33:11,750 --> 00:33:09,039

once again confirming the simplicity of

948

00:33:14,230 --> 00:33:11,760

the treat the mitral zapata will create

949

00:33:16,230 --> 00:33:14,240

which primarily consist of a green algae

950

00:33:18,230 --> 00:33:16,240

are able to survive and grow due to the

951
00:33:20,789 --> 00:33:18,240
mild conditions they live in in the

952
00:33:22,470 --> 00:33:20,799
biology experiments previously discussed

953
00:33:24,630 --> 00:33:22,480
these conditions have a neutral ph and

954
00:33:27,110 --> 00:33:24,640
pool temperature allow for steady growth

955
00:33:29,350 --> 00:33:27,120
and a variety of diverse microbes are

956
00:33:31,350 --> 00:33:29,360
seen when these conditions are mimicked

957
00:33:33,509 --> 00:33:31,360
now austral will discuss the water

958
00:33:36,389 --> 00:33:33,519
chemistry found at the ridgewater stream

959
00:33:38,549 --> 00:33:36,399
of sulfur works

960
00:33:40,549 --> 00:33:38,559
the rich lake stream resembles very much

961
00:33:42,870 --> 00:33:40,559
the image of paddle wheel creek

962
00:33:44,710 --> 00:33:42,880
that of a typical mountain stream

963
00:33:46,789 --> 00:33:44,720

its main source is run up from snowmelt

964

00:33:48,870 --> 00:33:46,799

and rainfall and its low temperature of

965

00:33:52,470 --> 00:33:48,880

40 degrees fahrenheit is indicative of

966

00:33:54,389 --> 00:33:52,480

the cold climate typically seen

967

00:33:55,669 --> 00:33:54,399

while the ph of rich lake was measured

968

00:33:57,350 --> 00:33:55,679

at 5.8

969

00:33:59,430 --> 00:33:57,360

we can assume that its actual page would

970

00:34:00,870 --> 00:33:59,440

be closer to that padawa creek when

971

00:34:04,149 --> 00:34:00,880

accounting for the ph change from the

972

00:34:06,470 --> 00:34:04,159

snowstorm during the measurements

973

00:34:08,310 --> 00:34:06,480

this is because as stated before our

974

00:34:10,470 --> 00:34:08,320

rock distillation experiments indicated

975

00:34:11,349 --> 00:34:10,480

a rising ph when locked itself within

976
00:34:13,109 --> 00:34:11,359
water

977
00:34:15,349 --> 00:34:13,119
just like pedal wheel

978
00:34:17,270 --> 00:34:15,359
however deviations start to appear when

979
00:34:18,470 --> 00:34:17,280
talking about conductivity and sulfate

980
00:34:20,470 --> 00:34:18,480
levels

981
00:34:22,950 --> 00:34:20,480
contrary to pedal wheels conductivity of

982
00:34:25,109 --> 00:34:22,960
only 52 micro siemens

983
00:34:27,430 --> 00:34:25,119
rich lake was at a low to moderate level

984
00:34:28,629 --> 00:34:27,440
of 290 micro siemens

985
00:34:30,550 --> 00:34:28,639
likewise

986
00:34:33,270 --> 00:34:30,560
rich lake had a relatively higher level

987
00:34:35,190 --> 00:34:33,280
of sulfate of 1260 micromoles when

988
00:34:36,629 --> 00:34:35,200

compared to pythagoreal creek

989

00:34:37,750 --> 00:34:36,639

as seen in the rock dissolution

990

00:34:40,149 --> 00:34:37,760

experiments

991

00:34:42,710 --> 00:34:40,159

high levels of sulfate were suggested

992

00:34:44,710 --> 00:34:42,720

for hydrothermal influence present

993

00:34:46,389 --> 00:34:44,720

within a rich lake stream

994

00:34:48,790 --> 00:34:46,399

indicating some sort of volcanic

995

00:34:50,550 --> 00:34:48,800

activity feeding into it

996

00:34:53,030 --> 00:34:50,560

the presence of hydrothermal activity

997

00:34:54,550 --> 00:34:53,040

helps explain to a strange conductivity

998

00:34:57,190 --> 00:34:54,560

with the soldiers from the source of the

999

00:34:59,109 --> 00:34:57,200

hydrothermal activity activity flowed

1000

00:35:01,270 --> 00:34:59,119

into the stream to increase the

1001

00:35:03,589 --> 00:35:01,280

conductivity to such a level

1002

00:35:05,270 --> 00:35:03,599

however we are unsure if the soviet

1003

00:35:07,510 --> 00:35:05,280

comes from an event directly connected

1004

00:35:08,710 --> 00:35:07,520

to the stream or run up from another

1005

00:35:10,550 --> 00:35:08,720

site

1006

00:35:12,790 --> 00:35:10,560

regarding the biology of rich like

1007

00:35:14,790 --> 00:35:12,800

stream there seems to be a relatively

1008

00:35:16,630 --> 00:35:14,800

relative amount of microbes subsisting

1009

00:35:18,950 --> 00:35:16,640

well in their environment despite the

1010

00:35:21,270 --> 00:35:18,960

higher than usual sulfate level

1011

00:35:23,510 --> 00:35:21,280

as seen in their microbe experiments

1012

00:35:26,550 --> 00:35:23,520

the moderate moderate conductivity

1013

00:35:28,230 --> 00:35:26,560

levels and neutral ph allows for steady

1014

00:35:32,310 --> 00:35:28,240

and abundant growth

1015

00:35:36,470 --> 00:35:34,150

the sulfur works upper pond is a field

1016

00:35:38,310 --> 00:35:36,480

site with clear hydrothermal input here

1017

00:35:39,990 --> 00:35:38,320

we saw bubbling in the pond which one

1018

00:35:42,230 --> 00:35:40,000

could assume means it had an elevated

1019

00:35:44,390 --> 00:35:42,240

temperature however the pond had a cool

1020

00:35:46,630 --> 00:35:44,400

temperature of 10 degrees celsius or 50

1021

00:35:48,310 --> 00:35:46,640

degrees fahrenheit this low temperature

1022

00:35:50,150 --> 00:35:48,320

means that the bubbling is not a result

1023

00:35:52,150 --> 00:35:50,160

of high temperature

1024

00:35:53,829 --> 00:35:52,160

we then can assume that this bubbling is

1025

00:35:54,870 --> 00:35:53,839

a result of the release of volcanic

1026
00:35:56,710 --> 00:35:54,880

gases

1027
00:35:59,750 --> 00:35:56,720

the pond had a relatively high sulfate

1028
00:36:02,150 --> 00:35:59,760

level of 2010 and as we already

1029
00:36:04,630 --> 00:36:02,160

discussed the high sulfate level is a

1030
00:36:06,390 --> 00:36:04,640

result of volcanic gases specifically

1031
00:36:08,230 --> 00:36:06,400

hydrogen sulfide

1032
00:36:09,990 --> 00:36:08,240

this gas is a clear indication of

1033
00:36:13,030 --> 00:36:10,000

hydrothermal input

1034
00:36:14,950 --> 00:36:13,040

the pond also had a low ph of 3.6 this

1035
00:36:17,349 --> 00:36:14,960

is yet another indicator of hydrothermal

1036
00:36:19,750 --> 00:36:17,359

activity the low ph resulting from the

1037
00:36:21,750 --> 00:36:19,760

present sulfuric acid

1038
00:36:24,230 --> 00:36:21,760

the upper pond also had a low to

1039

00:36:25,589 --> 00:36:24,240

moderate conductivity of 385

1040

00:36:27,030 --> 00:36:25,599

microsiemens

1041

00:36:30,230 --> 00:36:27,040

this is consistent with our rock

1042

00:36:32,470 --> 00:36:30,240

dissolution experiment the low ph of 3.6

1043

00:36:34,870 --> 00:36:32,480

being more effective at dissolving rock

1044

00:36:37,109 --> 00:36:34,880

despite the low ph the upper pond is

1045

00:36:38,870 --> 00:36:37,119

abundant in microbial life one can

1046

00:36:41,270 --> 00:36:38,880

visually see this by the distinct and

1047

00:36:42,790 --> 00:36:41,280

vibrant green hue of the pond however

1048

00:36:45,270 --> 00:36:42,800

these microbes are visually different

1049

00:36:46,630 --> 00:36:45,280

from the microbes we saw at padawa creek

1050

00:36:48,470 --> 00:36:46,640

meaning the differences in water

1051
00:36:50,310 --> 00:36:48,480
chemistry has influenced the microbial

1052
00:36:51,109 --> 00:36:50,320
communities

1053
00:36:52,790 --> 00:36:51,119
now

1054
00:36:56,630 --> 00:36:52,800
hiram bliss will describe to us the

1055
00:37:01,270 --> 00:36:59,030
seeing big boiler it is a large pool of

1056
00:37:03,750 --> 00:37:01,280
bubbling and hot mud you can smell the

1057
00:37:06,310 --> 00:37:03,760
distinct sulfur smell up close and

1058
00:37:08,470 --> 00:37:06,320
easily see how volcanic the side is

1059
00:37:10,230 --> 00:37:08,480
as you can see the mud pot has been

1060
00:37:12,310 --> 00:37:10,240
practically carved into the hillside

1061
00:37:14,310 --> 00:37:12,320
over time from the acidic environment

1062
00:37:15,829 --> 00:37:14,320
and hydrothermal activity

1063
00:37:17,829 --> 00:37:15,839

the reactions and conditions have

1064

00:37:20,470 --> 00:37:17,839

altered the entire environment of that

1065

00:37:22,790 --> 00:37:20,480

area digging in the hole of the mud plot

1066

00:37:25,190 --> 00:37:22,800

melting all the snow around the site

1067

00:37:26,870 --> 00:37:25,200

and creating that smell of sulfur

1068

00:37:28,550 --> 00:37:26,880

the sensory evidence along with the

1069

00:37:30,710 --> 00:37:28,560

sulfate level being so much higher than

1070

00:37:32,870 --> 00:37:30,720

other sites provide evidence of how

1071

00:37:34,150 --> 00:37:32,880

hydrothermal activity is very active in

1072

00:37:38,150 --> 00:37:34,160

big boiler

1073

00:37:40,710 --> 00:37:38,160

between rocks and water like john spoke

1074

00:37:42,550 --> 00:37:40,720

about earlier as you can see the ph is

1075

00:37:44,950 --> 00:37:42,560

still pretty low due to the constant

1076
00:37:46,390 --> 00:37:44,960
inactive hydrothermal activity and the

1077
00:37:48,470 --> 00:37:46,400
acidic environment that is keeping the

1078
00:37:50,310 --> 00:37:48,480
ph as low as it is

1079
00:37:52,390 --> 00:37:50,320
due to the low ph and the high

1080
00:37:54,069 --> 00:37:52,400
temperature created by created by the

1081
00:37:56,390 --> 00:37:54,079
hydrothermal activity

1082
00:37:58,310 --> 00:37:56,400
both of which work to increase the

1083
00:38:01,030 --> 00:37:58,320
reaction rate and efficacy of the

1084
00:38:02,950 --> 00:38:01,040
chemical reactions big boiler has a

1085
00:38:04,950 --> 00:38:02,960
really high conductivity

1086
00:38:07,190 --> 00:38:04,960
similar to what we would expect based on

1087
00:38:09,589 --> 00:38:07,200
our rock distribution experiments

1088
00:38:11,430 --> 00:38:09,599

high temperature and the low ph makes

1089

00:38:14,310 --> 00:38:11,440

solutions a lot better at reacting with

1090

00:38:16,069 --> 00:38:14,320

the rocks as evidence of this at big

1091

00:38:18,390 --> 00:38:16,079

boiler you can see the connectivity is

1092

00:38:20,630 --> 00:38:18,400

so high especially compared to the other

1093

00:38:22,550 --> 00:38:20,640

sites like paddleworld creek that have

1094

00:38:24,710 --> 00:38:22,560

more ambient temperatures and closer to

1095

00:38:26,790 --> 00:38:24,720

neutral ph values

1096

00:38:28,630 --> 00:38:26,800

another byproduct of big boiler being in

1097

00:38:30,310 --> 00:38:28,640

this incredibly acidic and extreme

1098

00:38:31,430 --> 00:38:30,320

environment and having a high

1099

00:38:33,670 --> 00:38:31,440

temperature

1100

00:38:36,790 --> 00:38:33,680

is the small amount of life around in

1101

00:38:39,030 --> 00:38:36,800

mudbot the microbes here consist of

1102

00:38:40,630 --> 00:38:39,040

extremophiles which are extremely

1103

00:38:42,150 --> 00:38:40,640

tolerant microbes

1104

00:38:43,910 --> 00:38:42,160

this is because these microbes are the

1105

00:38:46,230 --> 00:38:43,920

only life that are able to live in big

1106

00:38:48,310 --> 00:38:46,240

boilers intense environment the high

1107

00:38:50,870 --> 00:38:48,320

temperature and low ph make the

1108

00:38:53,030 --> 00:38:50,880

conditions too harsh and inhospitable

1109

00:38:54,950 --> 00:38:53,040

for most things to survive

1110

00:38:57,270 --> 00:38:54,960

similar to how only a small amount of

1111

00:38:59,109 --> 00:38:57,280

microbes can live in big boiler we saw

1112

00:39:01,030 --> 00:38:59,119

in our biology experiments that microbes

1113

00:39:03,270 --> 00:39:01,040

and extremely high temperatures did not

1114

00:39:05,030 --> 00:39:03,280

grow very well or died

1115

00:39:07,030 --> 00:39:05,040

olivia will now explain the water

1116

00:39:09,750 --> 00:39:07,040

chemistry and biological environment of

1117

00:39:11,910 --> 00:39:09,760

our alkaline site

1118

00:39:13,910 --> 00:39:11,920

as stated previously in the presentation

1119

00:39:15,430 --> 00:39:13,920

the alkaline site is a stream that runs

1120

00:39:17,589 --> 00:39:15,440

through water valley

1121

00:39:19,910 --> 00:39:17,599

peering into the steaming water one can

1122

00:39:21,349 --> 00:39:19,920

observe that there are thick mats of of

1123

00:39:23,109 --> 00:39:21,359

green biomass

1124

00:39:24,470 --> 00:39:23,119

water samples taken from the site

1125

00:39:27,990 --> 00:39:24,480

indicate that the temperature of the

1126
00:39:30,150 --> 00:39:28,000
water is 62 degrees celsius or about 150

1127
00:39:33,190 --> 00:39:30,160
degrees fahrenheit and the amount of

1128
00:39:34,630 --> 00:39:33,200
solutes dissolved in the spring is 1010

1129
00:39:36,550 --> 00:39:34,640
micro siemens

1130
00:39:38,470 --> 00:39:36,560
the most shocking fact about this spring

1131
00:39:39,910 --> 00:39:38,480
is that the ph recorded at the site is

1132
00:39:41,990 --> 00:39:39,920
6.6

1133
00:39:43,510 --> 00:39:42,000
this ph has about the same neutrality as

1134
00:39:45,910 --> 00:39:43,520
bottled water

1135
00:39:48,150 --> 00:39:45,920
from our rock dissolution experiment we

1136
00:39:50,150 --> 00:39:48,160
hypothesized that solutions sitting at a

1137
00:39:52,950 --> 00:39:50,160
high temperature would dissolve more

1138
00:39:54,550 --> 00:39:52,960

solutes which was proven to be correct

1139

00:39:56,230 --> 00:39:54,560

the higher temperature at the site is

1140

00:39:58,870 --> 00:39:56,240

the explaining factor into why the

1141

00:40:02,230 --> 00:39:58,880

solute concentration is so high

1142

00:40:04,470 --> 00:40:02,240

the sulfate concentration of 1 690

1143

00:40:05,990 --> 00:40:04,480

micromoles and the high temperature

1144

00:40:07,670 --> 00:40:06,000

indicate that there is hydrothermal

1145

00:40:09,589 --> 00:40:07,680

output

1146

00:40:11,109 --> 00:40:09,599

a high conductivity and high sulfate

1147

00:40:13,190 --> 00:40:11,119

levels is what would be typically

1148

00:40:15,430 --> 00:40:13,200

recorded at a site

1149

00:40:17,750 --> 00:40:15,440

with hydrothermal output what makes the

1150

00:40:20,069 --> 00:40:17,760

alkaline site so unique is that the ph

1151

00:40:22,230 --> 00:40:20,079

is neutral in contrast to sites like big

1152

00:40:23,510 --> 00:40:22,240

boiler and upper pond

1153

00:40:25,190 --> 00:40:23,520

this can be explained in our rock

1154

00:40:26,870 --> 00:40:25,200

dissolution experiment

1155

00:40:29,589 --> 00:40:26,880

as john said earlier in our first

1156

00:40:31,589 --> 00:40:29,599

hypothesis as acid interacts with rocks

1157

00:40:32,550 --> 00:40:31,599

it raises the ph over long periods of

1158

00:40:34,390 --> 00:40:32,560

time

1159

00:40:36,309 --> 00:40:34,400

for thousands of years the water has

1160

00:40:39,829 --> 00:40:36,319

been interacting with the rocks raising

1161

00:40:42,150 --> 00:40:39,839

the ph this high ph is what allows the

1162

00:40:45,190 --> 00:40:42,160

thick green massive microbes to flourish

1163

00:40:46,069 --> 00:40:45,200

even under such high temperatures

1164

00:40:48,309 --> 00:40:46,079

which

1165

00:40:50,150 --> 00:40:48,319

over time the microbes have been have

1166

00:40:52,230 --> 00:40:50,160

evolved to be specifically adapted to

1167

00:40:54,069 --> 00:40:52,240

withstand the heat

1168

00:40:57,589 --> 00:40:54,079

lastly cameron beeman will be explaining

1169

00:40:59,510 --> 00:40:57,599

the significance of our studies

1170

00:41:01,430 --> 00:40:59,520

lassen volcanic national park is an

1171

00:41:04,069 --> 00:41:01,440

example of how hydrothermal activity

1172

00:41:06,550 --> 00:41:04,079

occurs on earth and can sustain life in

1173

00:41:08,790 --> 00:41:06,560

microbial communities the discovery of

1174

00:41:10,710 --> 00:41:08,800

ancient hydrothermal deposits on mars

1175

00:41:13,270 --> 00:41:10,720

indicates that some martian environments

1176

00:41:15,030 --> 00:41:13,280

might have sustained life in the past

1177

00:41:17,430 --> 00:41:15,040

the research at lassen enhances our

1178

00:41:19,190 --> 00:41:17,440

ability to search for and characterize

1179

00:41:28,069 --> 00:41:19,200

any life that might have existed on

1180

00:41:31,190 --> 00:41:29,589

with that we will conclude our

1181

00:41:33,109 --> 00:41:31,200

presentation and move into a special

1182

00:41:35,589 --> 00:41:33,119

portion of the night to show our

1183

00:41:37,750 --> 00:41:35,599

appreciation for the program and all

1184

00:41:40,069 --> 00:41:37,760

involved my fellow interns and i have

1185

00:41:41,670 --> 00:41:40,079

prepared what we call impact statements

1186

00:41:43,430 --> 00:41:41,680

i will start us off

1187

00:41:45,190 --> 00:41:43,440

in case you missed it my name is cameron

1188

00:41:46,470 --> 00:41:45,200

beeman and this has been my second year

1189

00:41:48,870 --> 00:41:46,480

in the program

1190

00:41:50,470 --> 00:41:48,880

i have loved my time in the internship

1191

00:41:52,390 --> 00:41:50,480

because of my love for science and

1192

00:41:54,710 --> 00:41:52,400

learning of which there is no short

1193

00:41:57,109 --> 00:41:54,720

supply during my two years

1194

00:41:59,589 --> 00:41:57,119

also the opportunity to work with and

1195

00:42:01,270 --> 00:41:59,599

learn from nasa scientists is phenomenal

1196

00:42:02,390 --> 00:42:01,280

and completely unique to red bluff high

1197

00:42:04,470 --> 00:42:02,400

school

1198

00:42:07,109 --> 00:42:04,480

i am grateful for the effort of the

1199

00:42:09,030 --> 00:42:07,119

scientists lassen volcanic national park

1200

00:42:12,069 --> 00:42:09,040

and mr michael for making this program

1201
00:42:15,910 --> 00:42:13,990
hi my name is tom bell and i have been

1202
00:42:17,829 --> 00:42:15,920
an intern for this program over the last

1203
00:42:19,750 --> 00:42:17,839
two years and having taken this

1204
00:42:21,109 --> 00:42:19,760
opportunity and working alongside these

1205
00:42:22,790 --> 00:42:21,119
nasa scientists

1206
00:42:24,870 --> 00:42:22,800
conducting field work and learning

1207
00:42:27,030 --> 00:42:24,880
whatever i could from them that i would

1208
00:42:29,030 --> 00:42:27,040
have never experienced otherwise has had

1209
00:42:30,870 --> 00:42:29,040
a huge impact in preparing myself for my

1210
00:42:36,150 --> 00:42:30,880
studies after high school and becoming a

1211
00:42:39,670 --> 00:42:38,069
i feel a great amount of appreciation

1212
00:42:41,510 --> 00:42:39,680
for how mr michael and the nasa

1213
00:42:43,349 --> 00:42:41,520

scientists helped me to improve my

1214

00:42:45,109 --> 00:42:43,359

knowledge of real experimentation and

1215

00:42:50,550 --> 00:42:45,119

for how they've taught me to analyze and

1216

00:42:54,230 --> 00:42:52,470

my name is olivia pallancone and i've

1217

00:42:56,550 --> 00:42:54,240

been interning this program for the past

1218

00:42:59,349 --> 00:42:56,560

two years it has truly been a once in a

1219

00:43:00,950 --> 00:42:59,359

lifetime opportunity and i'm so thankful

1220

00:43:03,510 --> 00:43:00,960

for all that i've learned under the help

1221

00:43:04,950 --> 00:43:03,520

of mr michael the nasa scientist

1222

00:43:07,270 --> 00:43:04,960

this program has really helped me

1223

00:43:08,870 --> 00:43:07,280

solidify my passion for the stem field

1224

00:43:12,230 --> 00:43:08,880

and i'm truly thankful for that thank

1225

00:43:15,829 --> 00:43:14,230

i am diaz and thank you for watching our

1226

00:43:17,829 --> 00:43:15,839

presentation that we all have worked

1227

00:43:19,670 --> 00:43:17,839

hard for for the last

1228

00:43:22,150 --> 00:43:19,680

few years it wouldn't have been possible

1229

00:43:24,550 --> 00:43:22,160

without the grilling a very satisfactory

1230

00:43:27,430 --> 00:43:24,560

education provided by mr di murray

1231

00:43:28,710 --> 00:43:27,440

mrs caprentu and mr cuba

1232

00:43:30,870 --> 00:43:28,720

and thank you mr michael for the

1233

00:43:32,390 --> 00:43:30,880

supportive and very persevering attitude

1234

00:43:35,030 --> 00:43:32,400

he had with us

1235

00:43:37,270 --> 00:43:35,040

i hope to get in my mind my brain the

1236

00:43:39,990 --> 00:43:37,280

mindset of a logical but a pathetic

1237

00:43:42,309 --> 00:43:40,000

person the way you guys showed us thank

1238

00:43:45,990 --> 00:43:44,309

hi my name is ryan nguyen and this is my

1239

00:43:48,150 --> 00:43:46,000

first year in the nasa internship

1240

00:43:49,910 --> 00:43:48,160

program this program gave me valuable

1241

00:43:51,750 --> 00:43:49,920

insight to what college level studies

1242

00:43:53,670 --> 00:43:51,760

entail by allowing me access to field

1243

00:43:55,670 --> 00:43:53,680

sites that weren't open to the public

1244

00:43:56,950 --> 00:43:55,680

to actually like scoop for microbial

1245

00:43:58,630 --> 00:43:56,960

life which put me directly into the

1246

00:43:59,589 --> 00:43:58,640

shoes of an actual scientist which was

1247

00:44:01,190 --> 00:43:59,599

pretty cool

1248

00:44:02,550 --> 00:44:01,200

um they taught me many things that you

1249

00:44:03,750 --> 00:44:02,560

really can't learn in your average

1250

00:44:06,470 --> 00:44:03,760

science class

1251

00:44:08,390 --> 00:44:06,480

and studying next to real nasa

1252

00:44:12,390 --> 00:44:08,400

scientists was a honor and i'm truly

1253

00:44:15,349 --> 00:44:13,910

my name is natalie moore and i'm a

1254

00:44:16,309 --> 00:44:15,359

first-year intern

1255

00:44:19,190 --> 00:44:16,319

and

1256

00:44:21,510 --> 00:44:19,200

the nasa program has provided me with a

1257

00:44:23,430 --> 00:44:21,520

more hands-on experience

1258

00:44:25,670 --> 00:44:23,440

and learning in a way that i've never

1259

00:44:28,150 --> 00:44:25,680

experienced before i'm very happy to be

1260

00:44:30,230 --> 00:44:28,160

a part of it

1261

00:44:32,309 --> 00:44:30,240

my name is john sheffield i'm a first

1262

00:44:34,470 --> 00:44:32,319

year intern in this nasa internship

1263

00:44:36,309 --> 00:44:34,480

program this program has taught me so

1264

00:44:39,190 --> 00:44:36,319

much and allowed for a hands-on approach

1265

00:44:41,829 --> 00:44:39,200

to science for this i thank all the nasa

1266

00:44:44,390 --> 00:44:41,839

scientists and mr michael for allowing

1267

00:44:46,470 --> 00:44:44,400

such an amazing opportunity at red bluff

1268

00:44:47,990 --> 00:44:46,480

high school

1269

00:44:49,990 --> 00:44:48,000

my name is leah moreno and i've been in

1270

00:44:52,230 --> 00:44:50,000

the nasa internship program for the last

1271

00:44:53,910 --> 00:44:52,240

year this program has reminded me of the

1272

00:44:55,750 --> 00:44:53,920

interests i had in space as a kid and

1273

00:44:57,670 --> 00:44:55,760

given me the ability to understand the

1274

00:44:59,109 --> 00:44:57,680

requirements for microbial life i hadn't

1275

00:45:00,790 --> 00:44:59,119

known of before

1276
00:45:02,550 --> 00:45:00,800
it was an honor having the chance to be

1277
00:45:03,910 --> 00:45:02,560
part of this and i really appreciate all

1278
00:45:07,510 --> 00:45:03,920
the time put into our learning by the

1279
00:45:10,150 --> 00:45:07,520
nasa scientists and mr michael

1280
00:45:12,550 --> 00:45:10,160
hi my name is sierra lim and i'm a first

1281
00:45:14,470 --> 00:45:12,560
year nasa intern throughout this program

1282
00:45:16,230 --> 00:45:14,480
i've learned so much about astrobiology

1283
00:45:17,829 --> 00:45:16,240
and the importance of life

1284
00:45:19,510 --> 00:45:17,839
i was privileged enough to work with the

1285
00:45:20,550 --> 00:45:19,520
most amazing scientists throughout this

1286
00:45:22,710 --> 00:45:20,560
whole year

1287
00:45:25,349 --> 00:45:22,720
through the in-person

1288
00:45:27,109 --> 00:45:25,359

experiments and the live zooms i was

1289

00:45:30,790 --> 00:45:27,119

able to get an experience i would have

1290

00:45:34,950 --> 00:45:32,630

hi my name is courtney white and i'm a

1291

00:45:37,190 --> 00:45:34,960

first-year nasa intern this program is

1292

00:45:39,510 --> 00:45:37,200

an amazing opportunity and has turned my

1293

00:45:40,870 --> 00:45:39,520

love for science and space into an

1294

00:45:42,550 --> 00:45:40,880

obsession

1295

00:45:44,870 --> 00:45:42,560

since i was a kid i have been very

1296

00:45:47,109 --> 00:45:44,880

inquisitive about life the universe and

1297

00:45:49,349 --> 00:45:47,119

how everything came to be i want to know

1298

00:45:51,109 --> 00:45:49,359

everything about everything

1299

00:45:53,430 --> 00:45:51,119

this program has allowed me to

1300

00:45:56,069 --> 00:45:53,440

understand the biological chemical

1301
00:45:57,750 --> 00:45:56,079
geological and hydrothermal interactions

1302
00:45:58,790 --> 00:45:57,760
that facilitate the conditions needed

1303
00:46:00,630 --> 00:45:58,800
for life

1304
00:46:04,630 --> 00:46:00,640
i plan to study biochem in college to

1305
00:46:08,390 --> 00:46:06,150
my name is mia gleason and i'm a first

1306
00:46:09,990 --> 00:46:08,400
year intern through this internship i

1307
00:46:11,670 --> 00:46:10,000
got the unique opportunity of learning

1308
00:46:12,870 --> 00:46:11,680
more in depth about lassen volcanic

1309
00:46:14,790 --> 00:46:12,880
national park

1310
00:46:16,950 --> 00:46:14,800
i was also able to connect with what we

1311
00:46:19,750 --> 00:46:16,960
were learning in class with what we saw

1312
00:46:21,670 --> 00:46:19,760
happening in lesson

1313
00:46:23,589 --> 00:46:21,680

hi my name is maya rodriguez i'm a first

1314

00:46:24,950 --> 00:46:23,599

year nasa intern this program has

1315

00:46:26,230 --> 00:46:24,960

exposed me to new things that i've never

1316

00:46:28,550 --> 00:46:26,240

been exposed to in any of my other

1317

00:46:30,550 --> 00:46:28,560

classes working with the nasa scientists

1318

00:46:31,910 --> 00:46:30,560

has been a very enjoyable experience as

1319

00:46:33,670 --> 00:46:31,920

well as going to lassen volcanic

1320

00:46:35,670 --> 00:46:33,680

national park and seeing new sites that

1321

00:46:37,349 --> 00:46:35,680

i've never seen before altogether this

1322

00:46:39,030 --> 00:46:37,359

is a one in a lifetime opportunity and

1323

00:46:41,670 --> 00:46:39,040

i'm so glad i got to experience this

1324

00:46:45,910 --> 00:46:43,750

my name is mauricio tamayo and this is

1325

00:46:46,950 --> 00:46:45,920

my first year of being a nasa internship

1326

00:46:51,990 --> 00:46:46,960

program

1327

00:46:53,510 --> 00:46:52,000

of learning more about astrobiology

1328

00:46:55,349 --> 00:46:53,520

when i was younger i remember being

1329

00:46:57,589 --> 00:46:55,359

obsessed with space and learning more

1330

00:46:58,550 --> 00:46:57,599

about basic biology in my elementary

1331

00:46:59,990 --> 00:46:58,560

school

1332

00:47:01,829 --> 00:47:00,000

i always enjoy learning about science

1333

00:47:03,990 --> 00:47:01,839

rare topics because i always learn

1334

00:47:05,589 --> 00:47:04,000

something new along the way

1335

00:47:07,270 --> 00:47:05,599

and during this program i learned that

1336

00:47:09,190 --> 00:47:07,280

every little thing matters in our

1337

00:47:10,710 --> 00:47:09,200

environment no matter it's a big or

1338

00:47:12,390 --> 00:47:10,720

small change

1339

00:47:14,790 --> 00:47:12,400

i hope later on in the future i get to

1340

00:47:17,430 --> 00:47:14,800

learn more about our environment and our

1341

00:47:20,790 --> 00:47:19,030

hi my name is justin vaughn and i'm a

1342

00:47:22,390 --> 00:47:20,800

first year nasa intern this program has

1343

00:47:24,069 --> 00:47:22,400

taught me more than i could imagine i

1344

00:47:25,589 --> 00:47:24,079

had a fantastic experience collecting

1345

00:47:27,829 --> 00:47:25,599

and growing macros from awesome volcanic

1346

00:47:29,349 --> 00:47:27,839

national park i also really enjoyed

1347

00:47:31,030 --> 00:47:29,359

working with the nasa scientists and

1348

00:47:32,309 --> 00:47:31,040

learning new things from them and i

1349

00:47:34,390 --> 00:47:32,319

would like to thank mr michael for

1350

00:47:36,309 --> 00:47:34,400

allowing me to be a part of this program

1351

00:47:37,829 --> 00:47:36,319

hi my name is aubry norton and this is

1352

00:47:39,910 --> 00:47:37,839

my first year in the nasa internship

1353

00:47:41,829 --> 00:47:39,920

program this program has benefited me in

1354

00:47:43,270 --> 00:47:41,839

multiple ways the foremost being with

1355

00:47:45,270 --> 00:47:43,280

the hands-on experience that i was able

1356

00:47:46,950 --> 00:47:45,280

to provide instead of just being told

1357

00:47:48,150 --> 00:47:46,960

what was done i actually got to do it

1358

00:47:50,309 --> 00:47:48,160

and this helped me build a great

1359

00:47:53,109 --> 00:47:50,319

foundation for continuing science and

1360

00:47:54,790 --> 00:47:53,119

future careers beyond that discovering

1361

00:47:57,910 --> 00:47:54,800

what will help and hurt life has been

1362

00:48:03,589 --> 00:48:01,750

well um great job interns um

1363

00:48:05,430 --> 00:48:03,599

really really impressed with with what

1364

00:48:08,390 --> 00:48:05,440

you guys just uh

1365

00:48:10,950 --> 00:48:08,400

with what you just put out there i know

1366

00:48:13,109 --> 00:48:10,960

all the hard work that you put into it i

1367

00:48:14,790 --> 00:48:13,119

was able to see that firsthand

1368

00:48:17,910 --> 00:48:14,800

on a daily basis

1369

00:48:19,990 --> 00:48:17,920

and i'm sure as you were

1370

00:48:22,630 --> 00:48:20,000

as the audience was hearing this there's

1371

00:48:24,870 --> 00:48:22,640

quite possibly some questions out there

1372

00:48:26,230 --> 00:48:24,880

and so i'd like to give um

1373

00:48:28,150 --> 00:48:26,240

the audience a chance to ask those

1374

00:48:30,150 --> 00:48:28,160

questions right now so i guess if there

1375

00:48:33,270 --> 00:48:30,160

are any questions for

1376

00:48:35,349 --> 00:48:33,280

for really anybody involved here um dr

1377

00:48:37,910 --> 00:48:35,359

day moray um

1378

00:48:41,510 --> 00:48:37,920

or anybody else um i'll we'll just open

1379

00:48:44,950 --> 00:48:41,520

it up to the chat and we'll see what

1380

00:48:48,150 --> 00:48:46,390

yeah we have a first question here i

1381

00:48:50,150 --> 00:48:48,160

guess this is open to any students who

1382

00:48:52,069 --> 00:48:50,160

want to answer um

1383

00:48:54,069 --> 00:48:52,079

uh this is from chris he says awesome

1384

00:48:57,910 --> 00:48:54,079

presentations uh wondering if anyone

1385

00:48:59,349 --> 00:48:57,920

prefers lab work over field work

1386

00:49:03,829 --> 00:48:59,359

mr michael i think he might have to

1387

00:49:07,349 --> 00:49:05,510

well well well

1388

00:49:09,270 --> 00:49:07,359

this is uh

1389

00:49:10,390 --> 00:49:09,280

isn't this an interesting predicament

1390

00:49:12,230 --> 00:49:10,400

i'm in

1391

00:49:15,109 --> 00:49:12,240

um so

1392

00:49:17,270 --> 00:49:15,119

uh i'll let you all decide how about

1393

00:49:19,349 --> 00:49:17,280

second year interns first so so what

1394

00:49:20,549 --> 00:49:19,359

second year intern would like to to

1395

00:49:22,309 --> 00:49:20,559

speak for

1396

00:49:24,710 --> 00:49:22,319

for the other four here so we have five

1397

00:49:29,270 --> 00:49:24,720

second year interns anybody interested

1398

00:49:29,280 --> 00:49:35,589

i can

1399

00:49:41,750 --> 00:49:37,990

um so when it comes down to the two

1400

00:49:46,309 --> 00:49:44,470

types of basically experimentation

1401

00:49:49,430 --> 00:49:46,319

um

1402

00:49:51,109 --> 00:49:49,440

field work versus lab work are both very

1403

00:49:54,549 --> 00:49:51,119

interesting in their own ways it's very

1404

00:49:56,150 --> 00:49:54,559

cool to get the experience but honestly

1405

00:49:59,510 --> 00:49:56,160

being able to do field work and then

1406

00:50:01,829 --> 00:49:59,520

apply it to the lab was awesome so

1407

00:50:03,670 --> 00:50:01,839

i prefer field work because it's more

1408

00:50:10,470 --> 00:50:03,680

hands-on and i'm a more hands-on type of

1409

00:50:14,309 --> 00:50:12,950

thank you cameron um

1410

00:50:16,870 --> 00:50:14,319

any of the other second year interns

1411

00:50:23,670 --> 00:50:16,880

want to chip in or or should i open it

1412

00:50:32,549 --> 00:50:26,470

um if i can talk about it be

1413

00:50:36,710 --> 00:50:34,069

um so

1414

00:50:38,309 --> 00:50:36,720

for me um i liked um

1415

00:50:40,069 --> 00:50:38,319

i actually liked the lab work better

1416

00:50:41,430 --> 00:50:40,079

because i got to work with measurements

1417

00:50:43,829 --> 00:50:41,440

that um

1418

00:50:45,750 --> 00:50:43,839

like um leah talked about those

1419

00:50:47,910 --> 00:50:45,760

measurements i didn't even know before

1420

00:50:49,990 --> 00:50:47,920

the master class and i really

1421

00:50:52,710 --> 00:50:50,000

appreciated the

1422

00:50:54,790 --> 00:50:52,720

amount of like work

1423

00:50:55,670 --> 00:50:54,800

actual nasa scientists had to go through

1424

00:50:57,349 --> 00:50:55,680

like the

1425

00:50:59,349 --> 00:50:57,359

grueling experimentation and the lab

1426
00:51:00,790 --> 00:50:59,359
methods um it just

1427
00:51:02,710 --> 00:51:00,800
it makes you

1428
00:51:04,790 --> 00:51:02,720
think about what type of

1429
00:51:06,150 --> 00:51:04,800
achievements we've made through process

1430
00:51:08,309 --> 00:51:06,160
instead of like

1431
00:51:10,390 --> 00:51:08,319
one-time achievements that we just came

1432
00:51:12,470 --> 00:51:10,400
up with magically it's just it's a

1433
00:51:20,150 --> 00:51:12,480
really little grueling process but it's

1434
00:51:24,630 --> 00:51:22,150
thank you aseal thank you cameron for

1435
00:51:26,230 --> 00:51:24,640
your response also um any first-year

1436
00:51:28,790 --> 00:51:26,240
interns want to

1437
00:51:52,870 --> 00:51:28,800
answer this so what do you prefer field

1438
00:51:56,630 --> 00:51:55,510

um for me it was most definitely

1439

00:51:57,990 --> 00:51:56,640

fieldwork

1440

00:52:00,390 --> 00:51:58,000

because um

1441

00:52:02,630 --> 00:52:00,400

it was more fun to like work in the uh

1442

00:52:04,710 --> 00:52:02,640

like go and like explore and like learn

1443

00:52:06,549 --> 00:52:04,720

like what actual scientists do

1444

00:52:08,069 --> 00:52:06,559

rather than like just sit in a lab take

1445

00:52:09,349 --> 00:52:08,079

measurements for me because when you're

1446

00:52:11,109 --> 00:52:09,359

out you could actually like understand

1447

00:52:13,030 --> 00:52:11,119

what you're doing and also you can like

1448

00:52:15,270 --> 00:52:13,040

make more memories that way too

1449

00:52:16,790 --> 00:52:15,280

like when they went to lassen

1450

00:52:18,710 --> 00:52:16,800

it was like super cold

1451
00:52:20,069 --> 00:52:18,720
and yeah was miserable like miserable

1452
00:52:21,510 --> 00:52:20,079
but it was like

1453
00:52:23,190 --> 00:52:21,520
i'm always gonna like memorize like that

1454
00:52:24,950 --> 00:52:23,200
moment because it was just like fun and

1455
00:52:27,349 --> 00:52:24,960
like it's a learning experience that i

1456
00:52:30,549 --> 00:52:27,359
you really can't learn like in a lab

1457
00:52:36,230 --> 00:52:30,559
so for me it was most definitely um

1458
00:52:41,589 --> 00:52:39,750
thank you ryan anybody else

1459
00:52:53,349 --> 00:52:41,599
before we move on i see there's a couple

1460
00:53:00,069 --> 00:52:55,910
okay let's move on to the next question

1461
00:53:05,109 --> 00:53:02,950
so it looks like asking about wildfires

1462
00:53:07,910 --> 00:53:05,119
um did the wildfires have any noticeable

1463
00:53:09,190 --> 00:53:07,920

change in conductivity or ph from years

1464

00:53:11,589 --> 00:53:09,200

past

1465

00:53:14,150 --> 00:53:11,599

um there was different definitely some

1466

00:53:17,190 --> 00:53:14,160

significant burning especially around

1467

00:53:19,910 --> 00:53:17,200

the um in the warner valley area so

1468

00:53:21,829 --> 00:53:19,920

around the alkaline site and around the

1469

00:53:22,630 --> 00:53:21,839

uh powderwell creek sites

1470

00:53:24,390 --> 00:53:22,640

um

1471

00:53:26,950 --> 00:53:24,400

i'm gonna let

1472

00:53:30,230 --> 00:53:26,960

nikki and mike and dave address this due

1473

00:53:31,670 --> 00:53:30,240

to tree dangers the risk of tree falls

1474

00:53:33,670 --> 00:53:31,680

and stuff like that we were not allowed

1475

00:53:34,870 --> 00:53:33,680

to go into the warner valley region this

1476

00:53:37,349 --> 00:53:34,880

year but

1477

00:53:39,190 --> 00:53:37,359

nikki and mike and dave were able to

1478

00:53:41,589 --> 00:53:39,200

actually go in there

1479

00:53:43,030 --> 00:53:41,599

being escorted by ranger sweeney and so

1480

00:53:45,030 --> 00:53:43,040

the three of them have a little bit

1481

00:53:46,950 --> 00:53:45,040

better feel for this and might have a

1482

00:53:50,710 --> 00:53:46,960

little bit better perspective than than

1483

00:53:53,910 --> 00:53:52,470

i'll just make a couple quick comments

1484

00:53:54,790 --> 00:53:53,920

this is dave

1485

00:54:01,910 --> 00:53:54,800

uh

1486

00:54:03,670 --> 00:54:01,920

develops over several years and so

1487

00:54:05,750 --> 00:54:03,680

the fire just being a month or two

1488

00:54:07,910 --> 00:54:05,760

before uh really didn't have too much of

1489

00:54:10,150 --> 00:54:07,920

an effect another effect of a fire of

1490

00:54:12,549 --> 00:54:10,160

course is to increase runoff

1491

00:54:14,790 --> 00:54:12,559

you know and uh but again you know this

1492

00:54:16,950 --> 00:54:14,800

was all during the dry season so

1493

00:54:18,870 --> 00:54:16,960

rudolph didn't have a chance to have an

1494

00:54:22,390 --> 00:54:18,880

effect that said it's going to be

1495

00:54:25,190 --> 00:54:22,400

interesting to see next year uh what uh

1496

00:54:27,510 --> 00:54:25,200

what the chemistry is like because then

1497

00:54:29,190 --> 00:54:27,520

you know we'll have had a wet season and

1498

00:54:31,670 --> 00:54:29,200

snow and all of that and see if that

1499

00:54:35,829 --> 00:54:31,680

makes a difference

1500

00:54:39,750 --> 00:54:38,630

you know just to add to what dave said

1501
00:54:41,990 --> 00:54:39,760
um

1502
00:54:43,750 --> 00:54:42,000
you know by monitoring the temperature

1503
00:54:45,829 --> 00:54:43,760
and ph and water chemistry of these

1504
00:54:47,670 --> 00:54:45,839
sites it's actually a great way to track

1505
00:54:50,150 --> 00:54:47,680
the impact of the drought

1506
00:54:52,630 --> 00:54:50,160
because that actually really affects the

1507
00:54:54,710 --> 00:54:52,640
concentration of these elements in

1508
00:54:57,990 --> 00:54:54,720
solution so there's you know

1509
00:54:59,349 --> 00:54:58,000
wide-ranging um applications of the work

1510
00:55:03,190 --> 00:54:59,359
and and the measurements that the

1511
00:55:06,950 --> 00:55:04,710
kevin i see

1512
00:55:08,789 --> 00:55:06,960
this this is a long-term study really i

1513
00:55:11,349 --> 00:55:08,799

mean mr michael said that we've been

1514

00:55:12,950 --> 00:55:11,359

doing this for over 10 years and so the

1515

00:55:15,670 --> 00:55:12,960

students i mean we're really building up

1516

00:55:16,549 --> 00:55:15,680

a nice database on the effective climate

1517

00:55:20,230 --> 00:55:16,559

and

1518

00:55:22,789 --> 00:55:20,240

you know annual changes

1519

00:55:24,870 --> 00:55:22,799

yeah just i just wanted to add into that

1520

00:55:28,150 --> 00:55:24,880

that you know fire is a natural

1521

00:55:29,349 --> 00:55:28,160

occurring um system in in this landscape

1522

00:55:31,789 --> 00:55:29,359

and so

1523

00:55:34,710 --> 00:55:31,799

when we have um

1524

00:55:36,549 --> 00:55:34,720

unnaturally suppressed this naturally

1525

00:55:39,270 --> 00:55:36,559

occurring process for

1526

00:55:40,230 --> 00:55:39,280

over 40 if not 50 years we've actually

1527

00:55:42,309 --> 00:55:40,240

done

1528

00:55:43,750 --> 00:55:42,319

a bit to chemically change that

1529

00:55:46,630 --> 00:55:43,760

environment

1530

00:55:48,870 --> 00:55:46,640

through putting these fires out not to

1531

00:55:51,030 --> 00:55:48,880

say that you know a massive million acre

1532

00:55:51,829 --> 00:55:51,040

fire is something we want to encourage

1533

00:55:56,870 --> 00:55:51,839

um

1534

00:55:59,190 --> 00:55:56,880

that you know

1535

00:56:00,870 --> 00:55:59,200

what we're seeing and what we had been

1536

00:56:02,390 --> 00:56:00,880

observing in a lot of these places was

1537

00:56:04,390 --> 00:56:02,400

an environment that

1538

00:56:06,789 --> 00:56:04,400

um excluded something that was is very

1539

00:56:09,030 --> 00:56:06,799

natural and very um the the

1540

00:56:11,510 --> 00:56:09,040

environment's used to having so you know

1541

00:56:13,990 --> 00:56:11,520

the dixie fire is certainly tragic um in

1542

00:56:15,589 --> 00:56:14,000

the fact that it burned up

1543

00:56:18,069 --> 00:56:15,599

you know chunks of communities and in

1544

00:56:20,230 --> 00:56:18,079

greenville that that story is awful um

1545

00:56:23,190 --> 00:56:20,240

and in california we're living with

1546

00:56:25,990 --> 00:56:23,200

these you know horrendous mega fires

1547

00:56:28,470 --> 00:56:26,000

that being said um as somebody who

1548

00:56:31,030 --> 00:56:28,480

defends natural processes i think it's

1549

00:56:32,470 --> 00:56:31,040

important that we do look at you know

1550

00:56:34,309 --> 00:56:32,480

what is supposed to be occurring in

1551

00:56:35,109 --> 00:56:34,319

these landscapes and fire is part of it

1552

00:56:37,670 --> 00:56:35,119

and

1553

00:56:40,230 --> 00:56:37,680

um you know as we hopefully become more

1554

00:56:42,630 --> 00:56:40,240

in tune with some of these processes um

1555

00:56:46,549 --> 00:56:42,640

you know we'll learn to to live on that

1556

00:56:47,990 --> 00:56:46,559

landscape so while the fire will impact

1557

00:56:49,270 --> 00:56:48,000

um short-term

1558

00:56:50,309 --> 00:56:49,280

measurements i think it's important to

1559

00:56:52,549 --> 00:56:50,319

know that

1560

00:56:54,710 --> 00:56:52,559

for thousands if not millions of years

1561

00:57:10,870 --> 00:56:54,720

this this landscape has experienced many

1562

00:57:15,829 --> 00:57:13,270

thank you um i'm not seeing any other

1563

00:57:17,910 --> 00:57:15,839

questions come up right now

1564

00:57:20,870 --> 00:57:17,920

and so i don't know if uh there's any

1565

00:57:23,670 --> 00:57:20,880

final questions i'll give you a a couple

1566

00:57:25,829 --> 00:57:23,680

you know maybe 30 seconds a minute or so

1567

00:57:27,109 --> 00:57:25,839

and then we'll move on to to finish up

1568

00:57:29,750 --> 00:57:27,119

the program here

1569

00:57:32,150 --> 00:57:29,760

um i guess one thing that that i i

1570

00:57:34,390 --> 00:57:32,160

failed to mention that did come up

1571

00:57:36,309 --> 00:57:34,400

in the student presentation and

1572

00:57:38,789 --> 00:57:36,319

definitely in their impact statements

1573

00:57:40,549 --> 00:57:38,799

was simply how

1574

00:57:43,030 --> 00:57:40,559

how big of an opportunity a program is

1575

00:57:44,230 --> 00:57:43,040

like this to be able to do field work to

1576

00:57:46,150 --> 00:57:44,240

be able to do

1577

00:57:48,870 --> 00:57:46,160

hands-on work

1578

00:57:50,870 --> 00:57:48,880

and not just reading stuff or being told

1579

00:57:53,270 --> 00:57:50,880

stuff in a lecture format or out of a

1580

00:57:55,349 --> 00:57:53,280

textbook and so um there's really a

1581

00:57:56,870 --> 00:57:55,359

uniqueness to this program that i think

1582

00:57:58,390 --> 00:57:56,880

you heard from the students when they

1583

00:58:00,390 --> 00:57:58,400

talked about their impact statements and

1584

00:58:01,510 --> 00:58:00,400

stated that that um

1585

00:58:02,950 --> 00:58:01,520

as as

1586

00:58:05,829 --> 00:58:02,960

the leaders of this program i think

1587

00:58:07,589 --> 00:58:05,839

we're all very very proud of and so um

1588

00:58:09,270 --> 00:58:07,599

yeah just thank you for that

1589

00:58:11,510 --> 00:58:09,280

can i make a quick comment

1590

00:58:13,349 --> 00:58:11,520

you know by all means a number of things

1591

00:58:15,270 --> 00:58:13,359

happened that were unexpected and guess

1592

00:58:17,990 --> 00:58:15,280

what science has to cope with the

1593

00:58:19,829 --> 00:58:18,000

unexpected in fact missions sometimes we

1594

00:58:21,190 --> 00:58:19,839

experience things that we really didn't

1595

00:58:23,430 --> 00:58:21,200

anticipate and

1596

00:58:25,430 --> 00:58:23,440

engineers and particularly engineers

1597

00:58:26,150 --> 00:58:25,440

really have proven to be quite resilient

1598

00:58:27,990 --> 00:58:26,160

and

1599

00:58:30,230 --> 00:58:28,000

just having the challenges that we did

1600

00:58:32,470 --> 00:58:30,240

this year it quite frankly

1601
00:58:33,750 --> 00:58:32,480
gives us almost a clearer view of what

1602
00:58:35,750 --> 00:58:33,760
research is

1603
00:58:38,470 --> 00:58:35,760
you have to cope with unexpected stuff

1604
00:58:40,470 --> 00:58:38,480
and and and make adjustments so in that

1605
00:58:42,710 --> 00:58:40,480
sense it was a better simulation of the

1606
00:58:47,910 --> 00:58:42,720
real world than the perfect year that

1607
00:58:52,150 --> 00:58:49,430
there there is one of those i'm still

1608
00:58:53,990 --> 00:58:52,160
waiting for that perfect year so once it

1609
00:58:55,750 --> 00:58:54,000
once it comes along i'll know what i can

1610
00:58:56,630 --> 00:58:55,760
compare this to i guess

1611
00:59:00,150 --> 00:58:56,640
um

1612
00:59:01,670 --> 00:59:00,160
anyway i think uh we're gonna move on to

1613
00:59:03,510 --> 00:59:01,680

kind of the final part of the the

1614

00:59:06,230 --> 00:59:03,520

program this is a chance where we have

1615

00:59:07,990 --> 00:59:06,240

to to honor these interns for their hard

1616

00:59:11,190 --> 00:59:08,000

work um

1617

00:59:12,710 --> 00:59:11,200

this this is a a volunteer class it's an

1618

00:59:15,430 --> 00:59:12,720

elective class it's not something these

1619

00:59:16,789 --> 00:59:15,440

students have to do and and they um

1620

00:59:18,870 --> 00:59:16,799

you can see all the time and the effort

1621

00:59:20,710 --> 00:59:18,880

that they put into it and so we do want

1622

00:59:22,630 --> 00:59:20,720

to acknowledge that that hard work right

1623

00:59:24,390 --> 00:59:22,640

now and so i'm going to hand things over

1624

00:59:26,870 --> 00:59:24,400

to mike kubo and he's going to be

1625

00:59:28,950 --> 00:59:26,880

introducing and recognizing all of the

1626

00:59:31,190 --> 00:59:28,960

student interns this year

1627

00:59:33,750 --> 00:59:31,200

thanks mr michael um hi everybody my

1628

00:59:36,230 --> 00:59:33,760

name is mike kubo and i'm a colleague of

1629

00:59:38,069 --> 00:59:36,240

uh dr diemery and dr prontos at nasa

1630

00:59:39,670 --> 00:59:38,079

ames and uh this is the part of the

1631

00:59:42,789 --> 00:59:39,680

presentation where we the part of the

1632

00:59:45,670 --> 00:59:42,799

night where we like to recognize and

1633

00:59:47,910 --> 00:59:45,680

honor all of uh

1634

00:59:50,230 --> 00:59:47,920

um and partners in this program and uh

1635

00:59:52,390 --> 00:59:50,240

we'll start by um

1636

00:59:55,109 --> 00:59:52,400

by recognizing the students

1637

00:59:57,109 --> 00:59:55,119

and at the end of every year we uh print

1638

00:59:58,950 --> 00:59:57,119

these uh basically it's like the

1639

01:00:01,510 --> 00:59:58,960
graduation certificate for all the

1640

01:00:04,470 --> 01:00:01,520
students and um

1641

01:00:06,150 --> 01:00:04,480
mike t if you wouldn't mind pulling up

1642

01:00:08,789 --> 01:00:06,160
an example of one of those i'll just

1643

01:00:10,309 --> 01:00:08,799
what i'm going to do is i'm going to

1644

01:00:12,309 --> 01:00:10,319
show you this shirt you know show the

1645

01:00:14,710 --> 01:00:12,319
audience the certificate

1646

01:00:16,470 --> 01:00:14,720
read the read the text to you and then i

1647

01:00:18,710 --> 01:00:16,480
will read all the names of the student

1648

01:00:21,190 --> 01:00:18,720
of the interns that participated so as

1649

01:00:23,589 --> 01:00:21,200
you can see um the certificate says

1650

01:00:25,430 --> 01:00:23,599
lassen volcanic national park red bluff

1651
01:00:27,750 --> 01:00:25,440
high school and the nasa ames research

1652
01:00:29,829 --> 01:00:27,760
center astrobiology team take pride in

1653
01:00:32,309 --> 01:00:29,839
presenting this astrobiology student

1654
01:00:33,589 --> 01:00:32,319
intern program award to

1655
01:00:35,030 --> 01:00:33,599
our first student is going to be mia

1656
01:00:38,230 --> 01:00:35,040
gleason

1657
01:00:40,630 --> 01:00:38,240
on may 23rd 2022 for your outstanding

1658
01:00:42,470 --> 01:00:40,640
performance commitment and dedication in

1659
01:00:45,270 --> 01:00:42,480
support of the partnership between

1660
01:00:46,789 --> 01:00:45,280
lassen volcanic national park nasa ames

1661
01:00:49,270 --> 01:00:46,799
research center and red bluff high

1662
01:00:51,670 --> 01:00:49,280
school in the collection of scientific

1663
01:00:52,789 --> 01:00:51,680

data through laboratory and field work

1664

01:00:54,470 --> 01:00:52,799

this work has increased our

1665

01:00:56,390 --> 01:00:54,480

understanding of lassen in ways that

1666

01:00:58,069 --> 01:00:56,400

will enhance astrobiology

1667

01:01:00,630 --> 01:00:58,079

as well as the mission of the national

1668

01:01:03,109 --> 01:01:00,640

aeronautics and space administration and

1669

01:01:04,710 --> 01:01:03,119

the national park service

1670

01:01:06,470 --> 01:01:04,720

so i'll go ahead and read all the names

1671

01:01:08,549 --> 01:01:06,480

of the first year students just to

1672

01:01:10,470 --> 01:01:08,559

recognize their contribution

1673

01:01:11,829 --> 01:01:10,480

so first your interns we have

1674

01:01:13,349 --> 01:01:11,839

nia gleason

1675

01:01:14,710 --> 01:01:13,359

samuel groom

1676
01:01:16,150 --> 01:01:14,720
sierra lim

1677
01:01:17,589 --> 01:01:16,160
natalie moore

1678
01:01:18,870 --> 01:01:17,599
leah moreno

1679
01:01:21,750 --> 01:01:18,880
ryan nguyen

1680
01:01:25,190 --> 01:01:21,760
aubry norton maya rodriguez

1681
01:01:27,510 --> 01:01:25,200
john sheffield mauricio tamayo perez

1682
01:01:29,829 --> 01:01:27,520
ruston vaught and courtney white and i

1683
01:01:31,750 --> 01:01:29,839
want to congratulate congratulate you

1684
01:01:33,589 --> 01:01:31,760
all on a job very well done it's been a

1685
01:01:36,069 --> 01:01:33,599
pleasure working with all of you and we

1686
01:01:38,390 --> 01:01:36,079
hope to see a few of you back next year

1687
01:01:39,750 --> 01:01:38,400
um for the second year interns um so you

1688
01:01:43,190 --> 01:01:39,760

know in case this wasn't really

1689

01:01:45,109 --> 01:01:43,200

highlighted um we do have a handful of

1690

01:01:46,950 --> 01:01:45,119

students that return every year

1691

01:01:48,789 --> 01:01:46,960

and they essentially become team leaders

1692

01:01:49,829 --> 01:01:48,799

and kind of mentors for the first year

1693

01:01:50,950 --> 01:01:49,839

interns

1694

01:01:52,630 --> 01:01:50,960

and um

1695

01:01:54,470 --> 01:01:52,640

every year when we have when we do this

1696

01:01:55,349 --> 01:01:54,480

presentation or when we do this class in

1697

01:01:56,789 --> 01:01:55,359

general

1698

01:01:59,430 --> 01:01:56,799

um

1699

01:02:01,829 --> 01:01:59,440

the success of the program and the

1700

01:02:04,309 --> 01:02:01,839

understanding of the content

1701

01:02:07,349 --> 01:02:04,319

by the first year interns is

1702

01:02:09,270 --> 01:02:07,359

generally uh you know a sign of how

1703

01:02:11,750 --> 01:02:09,280

great a job the second year interns have

1704

01:02:14,390 --> 01:02:11,760

done in their mentorship and i just want

1705

01:02:17,670 --> 01:02:14,400

to um really acknowledge how fantastic

1706

01:02:19,750 --> 01:02:17,680

of a presentation you all gave tonight

1707

01:02:21,109 --> 01:02:19,760

and i i'll really tip my hat to second

1708

01:02:23,270 --> 01:02:21,119

your interns for your leadership on

1709

01:02:25,430 --> 01:02:23,280

that's a nice job everybody

1710

01:02:27,029 --> 01:02:25,440

um so the first year the first

1711

01:02:29,029 --> 01:02:27,039

the first second year intern that i'd

1712

01:02:32,390 --> 01:02:29,039

like to acknowledge is cameron beeman

1713

01:02:34,150 --> 01:02:32,400

cameron fantastic job thank you so much

1714

01:02:36,630 --> 01:02:34,160

for participating in the program and and

1715

01:02:39,510 --> 01:02:36,640

for your leadership um this year

1716

01:02:41,910 --> 01:02:39,520

uh second intern is uh second the second

1717

01:02:44,230 --> 01:02:41,920

second year in turn is todd bell todd

1718

01:02:45,589 --> 01:02:44,240

fantastic really nice job as well thank

1719

01:02:47,589 --> 01:02:45,599

you so much and it was great working

1720

01:02:49,029 --> 01:02:47,599

with you these last two years

1721

01:02:51,750 --> 01:02:49,039

um the third person i'd like to

1722

01:02:54,470 --> 01:02:51,760

acknowledge is hyrum bliss hiram great

1723

01:02:56,549 --> 01:02:54,480

job again fantastic and you all have a

1724

01:02:59,990 --> 01:02:56,559

lot to be proud of thank you

1725

01:03:01,910 --> 01:03:00,000

um next is acell diaz assail it's been

1726

01:03:04,390 --> 01:03:01,920

another great year and really fantastic

1727

01:03:05,910 --> 01:03:04,400

working with you um thank you so much

1728

01:03:07,190 --> 01:03:05,920

for participating and for coming back

1729

01:03:09,990 --> 01:03:07,200

the second year

1730

01:03:12,390 --> 01:03:10,000

and uh lastly we have olivia pelintoni

1731

01:03:14,150 --> 01:03:12,400

um again olivia great job thank you so

1732

01:03:16,789 --> 01:03:14,160

much and it was really wonderful working

1733

01:03:19,190 --> 01:03:16,799

with me these past two years

1734

01:03:21,829 --> 01:03:19,200

um so next i'd like to also acknowledge

1735

01:03:24,150 --> 01:03:21,839

our partners at red bluff and and last

1736

01:03:26,069 --> 01:03:24,160

volcanic we always offer you know issue

1737

01:03:27,190 --> 01:03:26,079

a certificate for them as well because

1738

01:03:29,109 --> 01:03:27,200

um they are

1739

01:03:32,150 --> 01:03:29,119

you know equal equal parts in this in

1740

01:03:34,789 --> 01:03:32,160

this uh in this uh process and in this

1741

01:03:37,029 --> 01:03:34,799

program so first i'd like to acknowledge

1742

01:03:39,109 --> 01:03:37,039

uh ranger kevin sweeney kevin thank you

1743

01:03:40,710 --> 01:03:39,119

so much for everything you've done to

1744

01:03:43,029 --> 01:03:40,720

help support this program we know you're

1745

01:03:45,430 --> 01:03:43,039

a big part of its success and your

1746

01:03:47,029 --> 01:03:45,440

advocacy at the park thank you so much

1747

01:03:48,789 --> 01:03:47,039

we can do it without you and we love

1748

01:03:50,950 --> 01:03:48,799

having uh being a part of the program

1749

01:03:53,670 --> 01:03:50,960

with you thank you so much

1750

01:03:56,710 --> 01:03:53,680

and um last is of course

1751

01:03:58,630 --> 01:03:56,720

um dave michael uh again same thing we

1752

01:04:02,230 --> 01:03:58,640

couldn't do this without you you have uh

1753

01:04:05,190 --> 01:04:02,240

put up with us for now over a decade and

1754

01:04:06,390 --> 01:04:05,200

we are always always grateful for um for

1755

01:04:08,789 --> 01:04:06,400

your leadership

1756

01:04:12,230 --> 01:04:08,799

um both in the class and and outside of

1757

01:04:14,069 --> 01:04:12,240

class and um we just really uh really

1758

01:04:16,630 --> 01:04:14,079

want to thank you for your participation

1759

01:04:20,150 --> 01:04:16,640

again this year truly um

1760

01:04:22,390 --> 01:04:20,160

we truly couldn't do it without you

1761

01:04:25,270 --> 01:04:22,400

um and lastly i just want to acknowledge

1762

01:04:27,430 --> 01:04:25,280

our partners that helped produce this

1763

01:04:29,270 --> 01:04:27,440

this event tonight i want to thank the

1764

01:04:31,670 --> 01:04:29,280

nasa astrobiology program and

1765

01:04:33,510 --> 01:04:31,680

specifically uh mike tullian for all of

1766

01:04:34,470 --> 01:04:33,520

your work and helping to produce this

1767

01:04:36,470 --> 01:04:34,480

tonight

1768

01:04:39,029 --> 01:04:36,480

and also just want to acknowledge um

1769

01:04:41,270 --> 01:04:39,039

that blue marmal blue marble space

1770

01:04:43,109 --> 01:04:41,280

institute of science um

1771

01:04:44,549 --> 01:04:43,119

also helps to put the songs through

1772

01:04:46,870 --> 01:04:44,559

their support of the live stream so

1773

01:04:48,870 --> 01:04:46,880

thank you to blue marble to nasa ask the

1774

01:04:51,510 --> 01:04:48,880

nasa astrobiology program and especially

1775

01:04:53,589 --> 01:04:51,520

to mike t since you're you're here with

1776

01:04:55,349 --> 01:04:53,599

us for these several hours every year

1777

01:04:58,069 --> 01:04:55,359

thank you so much

1778

01:05:01,829 --> 01:04:58,079

and um with that i'll hand it back to mr

1779

01:05:05,270 --> 01:05:03,670

thank you mike and uh

1780

01:05:08,230 --> 01:05:05,280

i'd like to thank you know

1781

01:05:10,150 --> 01:05:08,240

mike and dave and nikki really all three

1782

01:05:12,069 --> 01:05:10,160

of you for you at the time and and the

1783

01:05:13,750 --> 01:05:12,079

energy um

1784

01:05:16,069 --> 01:05:13,760

not just during the school day and

1785

01:05:19,270 --> 01:05:16,079

during the time that we meet but outside

1786

01:05:22,470 --> 01:05:19,280

of of the school day really all hours of

1787

01:05:23,990 --> 01:05:22,480

of the day we including weekends um

1788

01:05:26,470 --> 01:05:24,000

you're always willing to go above and

1789

01:05:28,470 --> 01:05:26,480

beyond and and we really appreciate that

1790

01:05:31,349 --> 01:05:28,480

commitment that you guys showed to this

1791

01:05:33,349 --> 01:05:31,359

um and also ranger sweeney i i know that

1792

01:05:34,950 --> 01:05:33,359

you know with all the challenges that

1793

01:05:38,069 --> 01:05:34,960

you guys have been facing up at the park

1794

01:05:40,549 --> 01:05:38,079

with the coveted um

1795

01:05:42,549 --> 01:05:40,559

just restraints and restrictions along

1796

01:05:45,349 --> 01:05:42,559

with with wildfire

1797

01:05:46,870 --> 01:05:45,359

challenges and then on top of it just

1798

01:05:48,870 --> 01:05:46,880

staffing and choosing everything else i

1799

01:05:50,470 --> 01:05:48,880

just know it's been a real real

1800

01:05:52,230 --> 01:05:50,480

challenge from time to time for you but

1801
01:05:54,870 --> 01:05:52,240
you've always just been extremely

1802
01:05:56,710 --> 01:05:54,880
willing and um able to jump in and help

1803
01:05:59,029 --> 01:05:56,720
us out whenever you could so we really

1804
01:06:00,870 --> 01:05:59,039
really appreciate that and um look

1805
01:06:04,150 --> 01:06:00,880
forward to uh

1806
01:06:05,990 --> 01:06:04,160
to continued um time and experiences

1807
01:06:06,870 --> 01:06:06,000
with you up at the park

1808
01:06:13,029 --> 01:06:06,880
um

1809
01:06:14,710 --> 01:06:13,039
you heard mike kind of recognize you all

1810
01:06:15,750 --> 01:06:14,720
and i just want to take a moment and do

1811
01:06:17,349 --> 01:06:15,760
the same

1812
01:06:19,029 --> 01:06:17,359
um

1813
01:06:21,029 --> 01:06:19,039

the second year interns i i can't really

1814

01:06:23,190 --> 01:06:21,039

say enough it at the mix that you guys

1815

01:06:25,430 --> 01:06:23,200

provided this year just a real balance

1816

01:06:27,349 --> 01:06:25,440

um with how you approach things uh

1817

01:06:29,829 --> 01:06:27,359

between the five of you you really

1818

01:06:32,150 --> 01:06:29,839

covered a lot of different ground and

1819

01:06:35,109 --> 01:06:32,160

really worked with with everybody all

1820

01:06:36,950 --> 01:06:35,119

the first-year interns um myself nasa

1821

01:06:38,950 --> 01:06:36,960

scientists really everybody he did just

1822

01:06:41,589 --> 01:06:38,960

do an amazing job of connecting with us

1823

01:06:44,069 --> 01:06:41,599

all and so great job there um the first

1824

01:06:44,870 --> 01:06:44,079

year interns i i realized that

1825

01:06:48,390 --> 01:06:44,880

um

1826

01:06:51,829 --> 01:06:48,400

you haven't really fully had a real high

1827

01:06:54,390 --> 01:06:51,839

school science year yet um based with

1828

01:06:56,710 --> 01:06:54,400

all the the just obstacles and

1829

01:06:57,589 --> 01:06:56,720

everything else but you guys showed up

1830

01:06:58,710 --> 01:06:57,599

and you

1831

01:07:00,789 --> 01:06:58,720

had

1832

01:07:02,870 --> 01:07:00,799

just an energy a commitment to this and

1833

01:07:04,710 --> 01:07:02,880

always a willingness to to do whatever

1834

01:07:06,789 --> 01:07:04,720

we asked of you um

1835

01:07:08,710 --> 01:07:06,799

even when we were trying to to struggle

1836

01:07:10,470 --> 01:07:08,720

and figure things out and so that just

1837

01:07:11,910 --> 01:07:10,480

that commitment that you showed is

1838

01:07:14,390 --> 01:07:11,920

something that i wanted to acknowledge

1839

01:07:16,950 --> 01:07:14,400

and and so thank you for for all of that

1840

01:07:19,510 --> 01:07:16,960

um and i think what what we want to do

1841

01:07:21,750 --> 01:07:19,520

next is i believe olivia

1842

01:07:23,750 --> 01:07:21,760

wants to say a few words and possibly

1843

01:07:26,549 --> 01:07:23,760

somebody else i'm not quite sure about

1844

01:07:28,789 --> 01:07:26,559

that but but i'm leaving that open and

1845

01:07:31,990 --> 01:07:28,799

so the the interns have a few words that

1846

01:07:38,870 --> 01:07:32,000

they want to uh to say so olivia if

1847

01:07:43,029 --> 01:07:40,390

all right

1848

01:07:45,829 --> 01:07:43,039

um so as a class we decided that a

1849

01:07:48,069 --> 01:07:45,839

special thanks was in order for

1850

01:07:50,870 --> 01:07:48,079

nikki dave and mike for all their hard

1851

01:07:53,910 --> 01:07:50,880

work and dedication for this program

1852

01:07:56,470 --> 01:07:53,920

so every intern has picked out a little

1853

01:07:58,390 --> 01:07:56,480

gift from our community

1854

01:07:59,109 --> 01:07:58,400

to give you guys the next time we see

1855

01:08:02,150 --> 01:07:59,119

you

1856

01:08:04,549 --> 01:08:02,160

as a reminder of us and just this

1857

01:08:05,990 --> 01:08:04,559

program and just a big thank you from us

1858

01:08:16,550 --> 01:08:06,000

all

1859

01:08:21,669 --> 01:08:18,870

thank you olivia and and so we'll have

1860

01:08:23,110 --> 01:08:21,679

that waiting for you all i'm not sure

1861

01:08:25,189 --> 01:08:23,120

i mean i'm sure

1862

01:08:27,030 --> 01:08:25,199

your summer travels and stuff will bring

1863

01:08:29,669 --> 01:08:27,040

you all through red bluff at some point

1864

01:08:31,510 --> 01:08:29,679

you know um and so as you come up to red

1865

01:08:33,590 --> 01:08:31,520

bluff you can just stop in and we can

1866

01:08:35,430 --> 01:08:33,600

get that for you and if not then we'll

1867

01:08:38,630 --> 01:08:35,440

be more than happy to hold on to it when

1868

01:08:39,430 --> 01:08:38,640

we see you next uh in the fall next year

1869

01:08:40,229 --> 01:08:39,440

um

1870

01:08:42,870 --> 01:08:40,239

so

1871

01:08:44,709 --> 01:08:42,880

with all of that i believe

1872

01:08:47,669 --> 01:08:44,719

we are done

1873

01:08:50,229 --> 01:08:47,679

i don't have anything else i want to add

1874

01:08:51,669 --> 01:08:50,239

unless anyone else has has something

1875

01:08:53,030 --> 01:08:51,679

that we need to add to this i think

1876

01:08:55,829 --> 01:08:53,040

we're going to

1877

01:09:03,910 --> 01:08:55,839

to end it right there

1878

01:09:09,189 --> 01:09:06,550

okay well thank you all for for uh for

1879

01:09:12,709 --> 01:09:09,199

participating and spending a little bit

1880

01:09:15,189 --> 01:09:12,719

of time with us tonight um

1881

01:09:17,829 --> 01:09:15,199

and uh we will see you all again next