

# 2019-2020 Lassen Volcanic Astrobiology NASA Internship Program



1  
00:00:07,190 --> 00:00:04,150

[Music]

2  
00:00:09,230 --> 00:00:07,200

hello everybody my name is Michael and

3  
00:00:11,209 --> 00:00:09,240

I'm a science teacher at Red Bluff High

4  
00:00:14,480 --> 00:00:11,219

School and I'd like to welcome all of

5  
00:00:18,320 --> 00:00:14,490

you to the first live spirit live stream

6  
00:00:19,910 --> 00:00:18,330

Red Bluff High School NASA Ames Lassen

7  
00:00:23,109 --> 00:00:19,920

Volcanic National Park

8  
00:00:26,660 --> 00:00:23,119

astrobiology student intern public

9  
00:00:30,589 --> 00:00:26,670

presentation huh I didn't know if I

10  
00:00:33,350 --> 00:00:30,599

could get that out normally we would be

11  
00:00:36,979 --> 00:00:33,360

doing this in our PA C on campus a red

12  
00:00:37,940 --> 00:00:36,989

bluff Heights obviously this year isn't

13  
00:00:41,350 --> 00:00:37,950

normal

14

00:00:44,150 --> 00:00:41,360

we are all dealing with challenges all

15

00:00:47,000 --> 00:00:44,160

dealing with stuff and it's just beyond

16

00:00:48,950 --> 00:00:47,010

our control before we get started all of

17

00:00:51,350 --> 00:00:48,960

us really really truly hope that you're

18

00:00:53,540 --> 00:00:51,360

all safe you're all healthy those around

19

00:00:56,740 --> 00:00:53,550

you are the same and you're in a good

20

00:00:59,900 --> 00:00:56,750

spot to hopefully enjoy an hour or so of

21

00:01:06,260 --> 00:00:59,910

enlightenment from some amazing students

22

00:01:08,390 --> 00:01:06,270

that we have here since 2008 at Red

23

00:01:10,880 --> 00:01:08,400

Bluff high we've had a program that's

24

00:01:14,090 --> 00:01:10,890

partnered with Lassen Volcanic National

25

00:01:17,990 --> 00:01:14,100

Park and then also NASA's Ames Research

26  
00:01:21,080 --> 00:01:18,000  
Center and a lot of times we throw out

27  
00:01:22,580 --> 00:01:21,090  
terms like one of a kind and when we say

28  
00:01:26,149 --> 00:01:22,590  
one of a kind we just kind of are

29  
00:01:27,440 --> 00:01:26,159  
oblivious to that really needs I really

30  
00:01:29,719 --> 00:01:27,450  
want to stress to you that this is a

31  
00:01:32,539 --> 00:01:29,729  
one-of-a-kind partnership between these

32  
00:01:36,770 --> 00:01:32,549  
three agencies there is no other high

33  
00:01:40,039 --> 00:01:36,780  
school no other NASA facility no other

34  
00:01:42,710 --> 00:01:40,049  
national park that is involved with

35  
00:01:45,440 --> 00:01:42,720  
research the way that these three

36  
00:01:48,050 --> 00:01:45,450  
agencies are involved here at Red Bluff

37  
00:01:50,330 --> 00:01:48,060  
high school night our goal is to share

38  
00:01:53,960 --> 00:01:50,340

with you a little bit about what it is

39

00:01:56,959 --> 00:01:53,970

that we actually do before I do that I

40

00:02:00,109 --> 00:01:56,969

just want to talk a little bit about the

41

00:02:03,679 --> 00:02:00,119

impact the program really has on Red

42

00:02:05,450 --> 00:02:03,689

Bluff High School as a partnership and

43

00:02:09,529 --> 00:02:05,460

like I said it's a one-of-a-kind thing

44

00:02:12,680 --> 00:02:09,539

it is the only possible through

45

00:02:18,650 --> 00:02:15,740

now this cooperation begins with these

46

00:02:23,570 --> 00:02:18,660

three agencies but it extends beyond

47

00:02:25,780 --> 00:02:23,580

that into our community as well now what

48

00:02:29,810 --> 00:02:25,790

we really do with this program then is

49

00:02:32,870 --> 00:02:29,820

we go up to lassen park and we don't

50

00:02:35,720 --> 00:02:32,880

just learn science we don't just

51  
00:02:38,600 --> 00:02:35,730  
memorize science we actually practice

52  
00:02:40,940 --> 00:02:38,610  
science up there and what I'm referring

53  
00:02:44,030 --> 00:02:40,950  
to is actually the process of science

54  
00:02:46,160 --> 00:02:44,040  
that students for years whether it goes

55  
00:02:49,010 --> 00:02:46,170  
back in time to the first scientist out

56  
00:02:51,980 --> 00:02:49,020  
there to modern day students for years

57  
00:02:54,610 --> 00:02:51,990  
have really done and it's built around

58  
00:02:56,810 --> 00:02:54,620  
the whole idea of the observation and

59  
00:02:58,400 --> 00:02:56,820  
students observe things and people

60  
00:02:59,570 --> 00:02:58,410  
observe things and from what they

61  
00:03:02,150 --> 00:02:59,580  
observe and when they make these

62  
00:03:04,130 --> 00:03:02,160  
observations they naturally question

63  
00:03:06,910 --> 00:03:04,140

what's going on and after these

64

00:03:09,920 --> 00:03:06,920

questions are formed they then start to

65

00:03:14,330 --> 00:03:09,930

come up with a reason an explanation a

66

00:03:17,720 --> 00:03:14,340

hypothesis or exactly that what exactly

67

00:03:19,880 --> 00:03:17,730

is going on with that observation once

68

00:03:22,940 --> 00:03:19,890

they've been able to question that

69

00:03:25,820 --> 00:03:22,950

format hypothesis they then experiment

70

00:03:29,600 --> 00:03:25,830

and test and this is done at all levels

71

00:03:32,090 --> 00:03:29,610

we're seeing it right now at levels in

72

00:03:35,390 --> 00:03:32,100

our nation that will hopefully bring us

73

00:03:37,460 --> 00:03:35,400

back teens to tremendous obstacles

74

00:03:41,030 --> 00:03:37,470

challenges illnesses that are facing us

75

00:03:43,580 --> 00:03:41,040

as a society right now our students are

76

00:03:46,220 --> 00:03:43,590

practicing this process right now in the

77

00:03:48,650 --> 00:03:46,230

field as high school students and the

78

00:03:50,150 --> 00:03:48,660

reason why this is so unique is that we

79

00:03:53,150 --> 00:03:50,160

don't have other high schools that do

80

00:03:56,690 --> 00:03:53,160

this this is it like I said before Red

81

00:03:58,850 --> 00:03:56,700

Bluff is in a tremendous fortune

82

00:04:00,500 --> 00:03:58,860

tremendously fortunate position they

83

00:04:06,290 --> 00:04:00,510

have this partnership while they're able

84

00:04:09,290 --> 00:04:06,300

to conduct this research now these

85

00:04:14,300 --> 00:04:09,300

students as they are doing this they are

86

00:04:16,190 --> 00:04:14,310

being guided not just by features the

87

00:04:18,620 --> 00:04:16,200

leader that read the high school but it

88

00:04:21,680 --> 00:04:18,630

also brings in partnerships with these

89

00:04:23,540 --> 00:04:21,690

other two agencies and right now what

90

00:04:25,939 --> 00:04:23,550

I'd like to do is kind of turn it over

91

00:04:28,640 --> 00:04:25,949

to them a little bit and explain

92

00:04:31,159 --> 00:04:28,650

the impact with this program really as

93

00:04:32,989 --> 00:04:31,169

on them and and and the role that they

94

00:04:36,969 --> 00:04:32,999

play in educating these students as well

95

00:04:39,980 --> 00:04:36,979

and so we have two actually three total

96

00:04:42,920 --> 00:04:39,990

individuals that are representing our

97

00:04:45,890 --> 00:04:42,930

other partners here first off I would

98

00:04:49,119 --> 00:04:45,900

like to introduce education specialist

99

00:04:51,170 --> 00:04:49,129

Ranger Tammy Boyd and then also

100

00:04:53,749 --> 00:04:51,180

superintendent James Richardson and

101

00:04:55,129 --> 00:04:53,759

these individuals are both are both

102

00:04:57,679 --> 00:04:55,139

represented Lassen Volcanic National

103

00:04:59,990 --> 00:04:57,689

Park and together they are very

104

00:05:01,519 --> 00:05:00,000

instrumental in providing our students

105

00:05:04,070 --> 00:05:01,529

the opportunity to conduct this research

106

00:05:06,170 --> 00:05:04,080

up there I believe that I'm

107

00:05:08,719 --> 00:05:06,180

superintendent Richardson is going to be

108

00:05:15,019 --> 00:05:08,729

in and say a few words about the impact

109

00:05:20,390 --> 00:05:15,029

program has on last part good evening

110

00:05:24,260 --> 00:05:20,400

and congratulations to all students were

111

00:05:29,230 --> 00:05:24,270

very proud of you completing the program

112

00:05:34,779 --> 00:05:29,240

and carrying on this great tradition

113

00:05:38,600 --> 00:05:34,789

this more than anything else this is an

114

00:05:44,110 --> 00:05:38,610

opportunity for you to learn and

115

00:05:49,459 --> 00:05:44,120

practice the scientific method and we as

116

00:05:53,209 --> 00:05:49,469

mr. Michael has just explained that you

117

00:05:57,740 --> 00:05:53,219

need look no farther than the nightly

118

00:06:02,029 --> 00:05:57,750

news about vaccines and other

119

00:06:05,510 --> 00:06:02,039

information that's going on with the

120

00:06:08,889 --> 00:06:05,520

coronavirus to to know how important

121

00:06:12,619 --> 00:06:08,899

science and the scientific method is

122

00:06:17,269 --> 00:06:12,629

it's so applicable to so many things in

123

00:06:23,540 --> 00:06:17,279

your life and your future business and

124

00:06:28,990 --> 00:06:23,550

jobs so we are very proud to support

125

00:06:40,110 --> 00:06:29,000

that effort and congratulate you on on

126

00:06:47,290 --> 00:06:44,800

Thank You superintendent Richardson next

127

00:06:50,350 --> 00:06:47,300

up I'd like to introduce dr. Dave Maury

128

00:06:53,770 --> 00:06:50,360

he is the represent NASA's Ames Research

129

00:06:55,360 --> 00:06:53,780

Center and NASA has a variety of

130

00:06:57,580 --> 00:06:55,370

research facilities spread throughout

131

00:07:00,400 --> 00:06:57,590

the United States Ames Research Center

132

00:07:02,440 --> 00:07:00,410

is closest to us here in Red Bluff and

133

00:07:04,810 --> 00:07:02,450

they have been very interested in lassen

134

00:07:07,090 --> 00:07:04,820

Park for years Lassen Volcanic National

135

00:07:08,860 --> 00:07:07,100

Park for years and so I'm just gonna

136

00:07:12,310 --> 00:07:08,870

hand it over to dr. day Maury and let

137

00:07:15,100 --> 00:07:12,320

him kind of continue sharing with us the

138

00:07:19,480 --> 00:07:15,110

the involvement of NASA's Ames Research

139

00:07:22,510 --> 00:07:19,490

Center thank you we have entered a

140

00:07:24,760 --> 00:07:22,520

golden age of space exploration new

141

00:07:26,800 --> 00:07:24,770

technologies have created spacecraft

142

00:07:29,440 --> 00:07:26,810

that are not only highly capable that

143

00:07:32,740 --> 00:07:29,450

are remarkably resilient and long-lived

144

00:07:34,960 --> 00:07:32,750

and technology has also allowed an

145

00:07:37,690 --> 00:07:34,970

engaged public to become more involved

146

00:07:40,750 --> 00:07:37,700

in space exploration and the science

147

00:07:43,990 --> 00:07:40,760

that it has enabled but despite these

148

00:07:47,070 --> 00:07:44,000

new technologies distant destinations

149

00:07:49,780 --> 00:07:47,080

such as Mars still strongly constrained

150

00:07:52,750 --> 00:07:49,790

capabilities of spacecraft and our

151

00:07:54,760 --> 00:07:52,760

communication with them but still we

152

00:07:57,100 --> 00:07:54,770

have been able to employ strategies that

153

00:08:01,090 --> 00:07:57,110

were available long ago to geologists

154

00:08:03,790 --> 00:08:01,100

chemists and Atmospheric Sciences II and

155

00:08:06,310 --> 00:08:03,800

they were very effective those

156

00:08:08,860 --> 00:08:06,320

time-honored strategies followed proven

157

00:08:11,110 --> 00:08:08,870

principles of field research first

158

00:08:14,290 --> 00:08:11,120

conduct reconnaissance of the field area

159

00:08:16,720 --> 00:08:14,300

to grasp its geographic context and to

160

00:08:19,230 --> 00:08:16,730

develop initial impressions about the

161

00:08:22,570 --> 00:08:19,240

processes that might have shaped it

162

00:08:25,390 --> 00:08:22,580

second visit key locations to make

163

00:08:28,120 --> 00:08:25,400

observations and take samples in order

164

00:08:31,630 --> 00:08:28,130

to formulate hypotheses about those

165

00:08:34,120 --> 00:08:31,640

processes then analyze the samples and

166

00:08:37,180 --> 00:08:34,130

laboratories and conduct experiments to

167

00:08:38,820 --> 00:08:37,190

test the hypotheses incorporate all

168

00:08:41,050 --> 00:08:38,830

these findings into refined

169

00:08:44,020 --> 00:08:41,060

interpretations of the field area

170

00:08:46,570 --> 00:08:44,030

finally write reports and make oral

171

00:08:48,280 --> 00:08:46,580

presentations to solicit critical

172

00:08:52,360 --> 00:08:48,290

reviews by the scientific

173

00:08:54,670 --> 00:08:52,370

community as a result ask add to the

174

00:08:57,310 --> 00:08:54,680

foundation of scientific knowledge and

175

00:08:59,350 --> 00:08:57,320

address any implications the study might

176  
00:09:02,499 --> 00:08:59,360  
have about our world and perhaps also

177  
00:09:05,710 --> 00:09:02,509  
about other worlds by pursuing the

178  
00:09:07,870 --> 00:09:05,720  
strategy of follow the water NASA and

179  
00:09:11,170 --> 00:09:07,880  
the European Space Agency have

180  
00:09:14,769 --> 00:09:11,180  
documented evidence of widespread water

181  
00:09:17,139 --> 00:09:14,779  
activity on ancient Mars but the sheer

182  
00:09:20,050 --> 00:09:17,149  
number of these discoveries presents a

183  
00:09:22,949 --> 00:09:20,060  
new challenge which of these promising

184  
00:09:25,689 --> 00:09:22,959  
places most likely hosted ancient life

185  
00:09:28,030 --> 00:09:25,699  
given our limited number of visits to

186  
00:09:31,269 --> 00:09:28,040  
the surface of Mars we must determine

187  
00:09:34,540 --> 00:09:31,279  
which few sites are most promising and

188  
00:09:36,220 --> 00:09:34,550

when we visit a promising site we must

189

00:09:39,939 --> 00:09:36,230

know how to look for the crucial

190

00:09:41,980 --> 00:09:39,949

evidence renoir High School lesson

191

00:09:44,769 --> 00:09:41,990

volcanic National Park and NASA Ames

192

00:09:46,780 --> 00:09:44,779

Research Center have developed a course

193

00:09:49,090 --> 00:09:46,790

where students have pursued those proven

194

00:09:51,939 --> 00:09:49,100

strategies of field research that I

195

00:09:54,280 --> 00:09:51,949

mentioned earlier we selected Warner

196

00:09:57,519 --> 00:09:54,290

Valley in Lassen Volcanic National Park

197

00:10:01,090 --> 00:09:57,529

because it is a modern exist modern

198

00:10:04,780 --> 00:10:01,100

example or analog of certain promising

199

00:10:07,420 --> 00:10:04,790

sites on Mars this class has gained many

200

00:10:10,750 --> 00:10:07,430

of the perspectives and insights that

201  
00:10:13,930 --> 00:10:10,760  
NASA seeks as we search for evidence of

202  
00:10:15,790 --> 00:10:13,940  
life on Mars and elsewhere and the

203  
00:10:18,250 --> 00:10:15,800  
achievements by this class are very

204  
00:10:20,490 --> 00:10:18,260  
important because theirs is the

205  
00:10:27,330 --> 00:10:20,500  
generation that will continue the search

206  
00:10:34,960 --> 00:10:31,390  
thank you Dave and we're gonna move on

207  
00:10:37,030 --> 00:10:34,970  
now and and kind of get to the heart of

208  
00:10:40,570 --> 00:10:37,040  
the reason why that we're we're all here

209  
00:10:43,870 --> 00:10:40,580  
today and really that's about students

210  
00:10:47,950 --> 00:10:43,880  
that's about these interns here there

211  
00:10:50,140 --> 00:10:47,960  
were 18 interns in this course for these

212  
00:10:51,850 --> 00:10:50,150  
interns were in it for a second year so

213  
00:10:53,740 --> 00:10:51,860

that we refer to them simply a

214

00:10:56,830 --> 00:10:53,750

second-year interns creative isn't it

215

00:11:00,150 --> 00:10:56,840

and then the other 14 or were first-year

216

00:11:02,860 --> 00:11:00,160

interns the second-year interns were

217

00:11:06,070 --> 00:11:02,870

held accountable in a leadership role

218

00:11:08,500 --> 00:11:06,080

they were involved with groups that they

219

00:11:12,160 --> 00:11:08,510

led invited and kind of instructed on

220

00:11:13,960 --> 00:11:12,170

how to conduct research and analyze the

221

00:11:15,910 --> 00:11:13,970

research once it once it was conducted

222

00:11:18,640 --> 00:11:15,920

and the first-year interns were just

223

00:11:22,150 --> 00:11:18,650

simply being introduced to the gathering

224

00:11:24,340 --> 00:11:22,160

the observation the experiment setup the

225

00:11:26,500 --> 00:11:24,350

analysis of the results of the

226

00:11:32,160 --> 00:11:26,510

experiment just being introduced the

227

00:11:34,270 --> 00:11:32,170

entire process in general now this year

228

00:11:35,950 --> 00:11:34,280

well I'm just gonna let them kind of

229

00:11:38,160 --> 00:11:35,960

tell you about what they did with the

230

00:11:41,410 --> 00:11:38,170

year and they have another a

231

00:11:45,520 --> 00:11:41,420

presentation for this normally they'd be

232

00:11:47,650 --> 00:11:45,530

doing this live in-person due to the

233

00:11:49,180 --> 00:11:47,660

events that we're facing we can't do

234

00:11:52,660 --> 00:11:49,190

that unfortunately but they have

235

00:11:54,310 --> 00:11:52,670

pre-recorded it for you they have done

236

00:11:57,730 --> 00:11:54,320

things with this recording in this

237

00:12:00,280 --> 00:11:57,740

presentation that I personally him

238

00:12:04,390 --> 00:12:00,290

couldn't do and I greatly respect and

239

00:12:06,370 --> 00:12:04,400

appreciate their ability to do this and

240

00:12:08,290 --> 00:12:06,380

so I'm just gonna step back now and

241

00:12:10,360 --> 00:12:08,300

allow you to kind of follow along and

242

00:12:13,300 --> 00:12:10,370

watch and they're going to explain to

243

00:12:16,540 --> 00:12:13,310

you basically what we did over the

244

00:12:22,630 --> 00:12:16,550

course of this year so with that I think

245

00:12:28,670 --> 00:12:26,120

hello everyone my name is TC Drury and

246

00:12:31,100 --> 00:12:28,680

I'm a second year intern I'll be your

247

00:12:33,880 --> 00:12:31,110

master of ceremonies for tonight I like

248

00:12:36,080 --> 00:12:33,890

to welcome you to the 2019 2020

249

00:12:39,170 --> 00:12:36,090

astrobiology internship program

250

00:12:41,330 --> 00:12:39,180

presentation we'd like to thank everyone

251  
00:12:43,940 --> 00:12:41,340  
for watching this virtual presentation

252  
00:12:49,970 --> 00:12:43,950  
as current circumstances do not allow us

253  
00:12:54,360 --> 00:12:52,800  
in our presentation we will discuss the

254  
00:12:56,750 --> 00:12:54,370  
work we've been conducting at that

255  
00:12:59,430 --> 00:12:56,760  
Lassen Volcanic National Park this year

256  
00:13:03,470 --> 00:12:59,440  
to give some context we will begin by

257  
00:13:06,060 --> 00:13:03,480  
answer the question what is astrobiology

258  
00:13:08,610 --> 00:13:06,070  
we will then consider why we are

259  
00:13:11,370 --> 00:13:08,620  
interested in lassen in the context of

260  
00:13:13,140 --> 00:13:11,380  
astrobiology and we'll go over the key

261  
00:13:16,520 --> 00:13:13,150  
requirements for life and how they are

262  
00:13:19,320 --> 00:13:16,530  
found at lassen volcanic national park

263  
00:13:21,900 --> 00:13:19,330

then after going over the main focus of

264

00:13:23,760 --> 00:13:21,910

our study we will review our field trip

265

00:13:25,890 --> 00:13:23,770

that we took this year and the field

266

00:13:28,800 --> 00:13:25,900

methods both of which allowed us to

267

00:13:30,810 --> 00:13:28,810

carry out this study we will then

268

00:13:33,360 --> 00:13:30,820

examine each of our field sites within

269

00:13:36,890 --> 00:13:33,370

Warner Valley a region in the southeast

270

00:13:39,480 --> 00:13:36,900

portion of Lassen Volcanic National Park

271

00:13:41,460 --> 00:13:39,490

this will be followed by a discussion on

272

00:13:45,570 --> 00:13:41,470

the lab experiments we conducted based

273

00:13:47,120 --> 00:13:45,580

on our field site observations finally

274

00:13:49,050 --> 00:13:47,130

we will present our field site

275

00:13:51,330 --> 00:13:49,060

interpretations and conclude the

276

00:13:53,640 --> 00:13:51,340

presentation by explaining the

277

00:13:55,920 --> 00:13:53,650

significance of our study along with the

278

00:14:00,150 --> 00:13:55,930

personal impact the program had on all

279

00:14:06,570 --> 00:14:00,160

of us students katie will now begin by

280

00:14:12,370 --> 00:14:10,060

astrobiology is the study of the origin

281

00:14:15,490 --> 00:14:12,380

evolution and distribution of life in

282

00:14:17,380 --> 00:14:15,500

the universe study and astrobiology

283

00:14:19,990 --> 00:14:17,390

includes understanding the origins of

284

00:14:22,900 --> 00:14:20,000

life studying the habitability of other

285

00:14:25,210 --> 00:14:22,910

planets research and extremophiles and

286

00:14:26,530 --> 00:14:25,220

environments on earth and searching for

287

00:14:29,470 --> 00:14:26,540

life on other planets

288

00:14:35,600 --> 00:14:29,480

Ashgate will now introduce us to Lassen

289

00:14:40,440 --> 00:14:38,280

Lassen Volcanic National Park is a main

290

00:14:42,420 --> 00:14:40,450

focus of this program an important

291

00:14:44,610 --> 00:14:42,430

aspect of the park is the hydrothermal

292

00:14:46,410 --> 00:14:44,620

system that is found there which can be

293

00:14:49,170 --> 00:14:46,420

compared to similar systems found on

294

00:14:50,940 --> 00:14:49,180

Mars and other rocky planets microbial

295

00:14:52,710 --> 00:14:50,950

life thrives in this environment

296

00:14:54,480 --> 00:14:52,720

therefore by researching and

297

00:14:56,670 --> 00:14:54,490

experimenting at sites and Lassen

298

00:14:58,470 --> 00:14:56,680

Volcanic National Park we can learn more

299

00:15:00,210 --> 00:14:58,480

information about other terrestrial

300

00:15:02,880 --> 00:15:00,220

planets and searching for life on them

301

00:15:05,040 --> 00:15:02,890

by performing field investigations at

302

00:15:06,990 --> 00:15:05,050

lassen we can learn what conditions

303

00:15:08,519 --> 00:15:07,000

support life and apply the results to

304

00:15:10,650 --> 00:15:08,529

similar environments found on other

305

00:15:13,200 --> 00:15:10,660

planets and become one step closer to

306

00:15:15,269 --> 00:15:13,210

finding life outside of Earth but it

307

00:15:17,340 --> 00:15:15,279

doesn't stop there we can also learn

308

00:15:19,110 --> 00:15:17,350

more about life on early Earth since

309

00:15:21,510 --> 00:15:19,120

hydrothermal systems we're a common

310

00:15:23,640 --> 00:15:21,520

feature millions of years ago by

311

00:15:25,230 --> 00:15:23,650

researching microbial life on lassen we

312

00:15:27,150 --> 00:15:25,240

can learn about the early periods of

313

00:15:29,070 --> 00:15:27,160

life on Earth now that we know that

314

00:15:31,260 --> 00:15:29,080

lassen is a gateway in the search for

315

00:15:33,000 --> 00:15:31,270

life so he'll will explain the specific

316

00:15:37,910 --> 00:15:33,010

conditions that are necessary for the

317

00:15:42,650 --> 00:15:40,879

to sustain all life as we know it there

318

00:15:44,689 --> 00:15:42,660

are four key requirements which must be

319

00:15:47,470 --> 00:15:44,699

met at all times in order to achieve

320

00:15:49,759 --> 00:15:47,480

habitability as represented on the right

321

00:15:52,220 --> 00:15:49,769

primarily there must be a presence of

322

00:15:53,889 --> 00:15:52,230

raw materials basic materials for all

323

00:15:57,019 --> 00:15:53,899

life are depicted in a Venn diagram

324

00:16:00,379 --> 00:15:57,029

these include carbon hydrogen nitrogen

325

00:16:03,109 --> 00:16:00,389

oxygen phosphorus sulfur key metals and

326

00:16:05,659 --> 00:16:03,119

electrons next for any organism to do

327

00:16:07,189 --> 00:16:05,669

work it requires energy and this can be

328

00:16:09,319 --> 00:16:07,199

obtained from either a chemical or a

329

00:16:11,259 --> 00:16:09,329

light source the condition of the

330

00:16:13,539 --> 00:16:11,269

environment such as temperature and pH

331

00:16:16,129 --> 00:16:13,549

additionally determine the habitability

332

00:16:18,559 --> 00:16:16,139

generally complex organisms required

333

00:16:20,329 --> 00:16:18,569

climate conditions regardless of the raw

334

00:16:22,759 --> 00:16:20,339

materials energy or conditions present

335

00:16:24,530 --> 00:16:22,769

at the site in order to support life an

336

00:16:26,659 --> 00:16:24,540

environment requires something that

337

00:16:29,720 --> 00:16:26,669

allows all the chemical processes within

338

00:16:32,689 --> 00:16:29,730

the organism to occur this is a solvent

339

00:16:34,099 --> 00:16:32,699

a solvent permits of the molecules of

340

00:16:36,349 --> 00:16:34,109

life to quickly react with one another

341

00:16:38,659 --> 00:16:36,359

and form any chemistry in the organism

342

00:16:41,449 --> 00:16:38,669

needs to survive for any form of life on

343

00:16:43,280 --> 00:16:41,459

earth the solvent is water the four

344

00:16:46,100 --> 00:16:43,290

requirements together make an

345

00:16:48,049 --> 00:16:46,110

environment habitable the Venn diagram

346

00:16:50,139 --> 00:16:48,059

illustrates its relation with the H in

347

00:16:52,429 --> 00:16:50,149

the center symbolizing habitability

348

00:16:54,319 --> 00:16:52,439

Lassen Volcanic National Park was our

349

00:16:56,539 --> 00:16:54,329

focus of study because the mountain

350

00:16:58,189 --> 00:16:56,549

exhibited a variety of each requirement

351

00:17:00,409 --> 00:16:58,199

some field sites posted higher

352

00:17:01,850 --> 00:17:00,419

temperatures and lower pH while others

353

00:17:03,829 --> 00:17:01,860

possessed a more neutral pH and lower

354

00:17:05,750 --> 00:17:03,839

temperatures the difference in

355

00:17:07,759 --> 00:17:05,760

conditions and rolla may abandon smade

356

00:17:10,009 --> 00:17:07,769

Warner Valley a particular point of

357

00:17:12,799 --> 00:17:10,019

interest and thus it was selected for

358

00:17:15,470 --> 00:17:12,809

our research next first-year intern

359

00:17:19,810 --> 00:17:15,480

Reece Gambetta will talk about our field

360

00:17:24,010 --> 00:17:21,730

our field trip took place on September

361

00:17:25,420 --> 00:17:24,020

19th to the 20th we left for Warner

362

00:17:28,150 --> 00:17:25,430

Valley and vans in the morning of the

363

00:17:29,650 --> 00:17:28,160

19th after arriving at the campsite we

364

00:17:32,410 --> 00:17:29,660

hiked up the valley taking observations

365

00:17:34,180 --> 00:17:32,420

of each field site we went after hiking

366

00:17:36,850 --> 00:17:34,190

to each field site we set up our tents

367

00:17:39,490 --> 00:17:36,860

and a dinner after dinner we watched a

368

00:17:41,590 --> 00:17:39,500

astrobiology presentation the next day

369

00:17:43,150 --> 00:17:41,600

we broke into groups and hiked back to

370

00:17:45,700 --> 00:17:43,160

our designated field sites to collect

371

00:17:47,230 --> 00:17:45,710

microbe and water samples we then packed

372

00:17:49,180 --> 00:17:47,240

up our belongings and returned back to

373

00:17:51,550 --> 00:17:49,190

the high school Andreea will now talk

374

00:17:55,190 --> 00:17:51,560

about the field methods we used during

375

00:18:00,890 --> 00:17:57,980

as we sampled a Warner Valley an

376

00:18:03,710 --> 00:18:00,900

important and heavily used method was

377

00:18:06,560 --> 00:18:03,720

the measurement of pH at Cana 2d what is

378

00:18:09,530 --> 00:18:06,570

pH pH is a scale that measures from 0 to

379

00:18:13,070 --> 00:18:09,540

14 measuring the city and alkalinity of

380

00:18:15,560 --> 00:18:13,080

a solution if a pH is below 7 then it is

381

00:18:18,200 --> 00:18:15,570

an acid meaning it has more hydrogen

382

00:18:21,620 --> 00:18:18,210

ions in solution like stomach acid if

383

00:18:24,650 --> 00:18:21,630

the pH is above 7 its basic like bleach

384

00:18:27,170 --> 00:18:24,660

with few hydrogen ions what is

385

00:18:29,420 --> 00:18:27,180

connectivity connectivity can be defined

386

00:18:32,030 --> 00:18:29,430

as the total dissolved solutes in a

387

00:18:34,460 --> 00:18:32,040

solution the higher the connectivity the

388

00:18:36,230 --> 00:18:34,470

more solutes dissolved connectivity is

389

00:18:38,270 --> 00:18:36,240

measured in a unit called micro Siemens

390

00:18:41,090 --> 00:18:38,280

the measurement of electrical

391

00:18:43,250 --> 00:18:41,100

conductance of a substance and both

392

00:18:45,650 --> 00:18:43,260

meters temperatures use the Celsius

393

00:18:47,120 --> 00:18:45,660

scale which is based on zero degrees

394

00:18:49,580 --> 00:18:47,130

Celsius for the freezing point of water

395

00:18:52,160 --> 00:18:49,590

and 100 degrees Celsius for the boiling

396

00:18:54,290 --> 00:18:52,170

point of water we also use numerous

397

00:18:57,050 --> 00:18:54,300

methods for sampling such as falcon

398

00:18:59,030 --> 00:18:57,060

tubes for sets and pipettes to collect

399

00:19:04,480 --> 00:18:59,040

water samples and microbial samples

400

00:19:09,770 --> 00:19:07,490

now that we have established why Lassen

401  
00:19:12,200 --> 00:19:09,780  
Volcanic National Park is important to

402  
00:19:15,020 --> 00:19:12,210  
the study of life and how we made our

403  
00:19:18,260 --> 00:19:15,030  
initial observations we can consider the

404  
00:19:20,419 --> 00:19:18,270  
sites studied within Water Valley as the

405  
00:19:23,030 --> 00:19:20,429  
hill said water is a key requirement for

406  
00:19:26,780 --> 00:19:23,040  
life and in scientists search for life

407  
00:19:29,299 --> 00:19:26,790  
they follow the water similarly we will

408  
00:19:32,210 --> 00:19:29,309  
follow the water in water valley we took

409  
00:19:35,330 --> 00:19:32,220  
samples and observations from four major

410  
00:19:39,020 --> 00:19:35,340  
springs or streams which each had very

411  
00:19:41,480 --> 00:19:39,030  
different conditions freesia ELISA Deane

412  
00:19:43,669 --> 00:19:41,490  
and Emma will now speak a bit about our

413  
00:19:47,450 --> 00:19:43,679

initial observations at each of these

414

00:19:52,410 --> 00:19:50,070

the first site we will be discussing in

415

00:19:53,880 --> 00:19:52,420

depth is paddlewheel Creek the parallel

416

00:19:55,650 --> 00:19:53,890

Creek site is the freshwater mountain

417

00:19:57,450 --> 00:19:55,660

stream located in declaring at Warner

418

00:19:58,860 --> 00:19:57,460

Valley visually there were shrubs

419

00:20:00,600 --> 00:19:58,870

starting the bank and green grass that

420

00:20:02,730 --> 00:20:00,610

grew right up to the edge as well as

421

00:20:04,350 --> 00:20:02,740

under the water itself there were also

422

00:20:06,480 --> 00:20:04,360

various species of trees growing around

423

00:20:08,580 --> 00:20:06,490

the water in the water there was moss

424

00:20:10,500 --> 00:20:08,590

and algae growing on the rocks the water

425

00:20:12,570 --> 00:20:10,510

has an ideal temperature and pH which

426  
00:20:14,040 --> 00:20:12,580  
creates habitable conditions for plants

427  
00:20:16,380 --> 00:20:14,050  
and microbial life to grow and thrive

428  
00:20:18,090 --> 00:20:16,390  
the conductivity of this site is the

429  
00:20:23,160 --> 00:20:18,100  
lowest of all the sites because it is

430  
00:20:28,300 --> 00:20:25,720  
another of the sites we looked at was

431  
00:20:30,310 --> 00:20:28,310  
Devil's kitchen Devil's kitchen is

432  
00:20:32,920 --> 00:20:30,320  
located the furthest from the campsite

433  
00:20:35,350 --> 00:20:32,930  
at this site there was little plant life

434  
00:20:37,330 --> 00:20:35,360  
surrounding the water and there was

435  
00:20:40,390 --> 00:20:37,340  
visible steam coming from the water as

436  
00:20:42,040 --> 00:20:40,400  
well as a strong smell of sulfur in the

437  
00:20:44,530 --> 00:20:42,050  
water there were green and brown

438  
00:20:47,620 --> 00:20:44,540

microbial mats located near the outflow

439

00:20:48,850 --> 00:20:47,630

channel the water had the lowest pH of

440

00:20:50,830 --> 00:20:48,860

all the sites and the highest

441

00:20:52,690 --> 00:20:50,840

conductivity of them all these

442

00:20:59,799 --> 00:20:52,700

conditions created extreme living

443

00:21:03,159 --> 00:21:01,899

the mainstream site is a large creek

444

00:21:04,989 --> 00:21:03,169

that runs through Olive Warner Valley

445

00:21:06,879 --> 00:21:04,999

interacting with two of the other sites

446

00:21:08,680 --> 00:21:06,889

the conditions of the water allow

447

00:21:10,299 --> 00:21:08,690

various algie's grasses and other

448

00:21:11,979 --> 00:21:10,309

aquatic plants to grow in the creek as

449

00:21:14,169 --> 00:21:11,989

well as trees and grasses along the

450

00:21:15,940 --> 00:21:14,179

banks because of the site-to-site

451  
00:21:18,639 --> 00:21:15,950  
interactions two sample sites were

452  
00:21:20,799 --> 00:21:18,649  
necessary compared to the paddlewheel

453  
00:21:22,690 --> 00:21:20,809  
Creek the first display to raising

454  
00:21:24,310 --> 00:21:22,700  
conductivity and a slight decrease in pH

455  
00:21:26,019 --> 00:21:24,320  
from interaction with Devil's kitchen

456  
00:21:28,089 --> 00:21:26,029  
and the second showed a lower

457  
00:21:30,249 --> 00:21:28,099  
conductivity and higher pH compared to

458  
00:21:35,990 --> 00:21:30,259  
the first as the paddlewheel Creek flows

459  
00:21:39,860 --> 00:21:38,240  
my field site alkaline springs was the

460  
00:21:41,990 --> 00:21:39,870  
first site along the path at Warner

461  
00:21:43,820 --> 00:21:42,000  
Valley is a small open stream with

462  
00:21:45,530 --> 00:21:43,830  
little vegetation there were small

463  
00:21:47,330 --> 00:21:45,540

grasses up to the water's edge but none

464

00:21:49,700 --> 00:21:47,340

within the water there is a visible

465

00:21:50,900 --> 00:21:49,710

steam coming from the water surface even

466

00:21:53,090 --> 00:21:50,910

though the temperature of alkaline

467

00:21:55,310 --> 00:21:53,100

Springs is high microbial features are

468

00:21:57,410 --> 00:21:55,320

evident such as long green filaments and

469

00:22:00,350 --> 00:21:57,420

algae the temperature of alkaline

470

00:22:02,720 --> 00:22:00,360

springs was 64 degrees Celsius 147

471

00:22:04,190 --> 00:22:02,730

degrees Fahrenheit the pH started at six

472

00:22:06,290 --> 00:22:04,200

point seven at the vent of the stream

473

00:22:08,210 --> 00:22:06,300

and began to increase to seven point

474

00:22:10,910 --> 00:22:08,220

eight downstream which is a neutral pH

475

00:22:12,800 --> 00:22:10,920

the conductivity was 700 microsiemens

476  
00:22:18,299 --> 00:22:12,810  
which was the second highest of all the

477  
00:22:23,259 --> 00:22:21,070  
with these observations from the field

478  
00:22:25,509 --> 00:22:23,269  
sites in Warner Valley we developed

479  
00:22:27,100 --> 00:22:25,519  
several hypotheses to explain the

480  
00:22:30,519 --> 00:22:27,110  
differences in water chemistry

481  
00:22:33,970 --> 00:22:30,529  
conditions and forms of life we saw at

482  
00:22:35,980 --> 00:22:33,980  
each of the field sites these hypotheses

483  
00:22:38,970 --> 00:22:35,990  
were tested in the rock dissolution

484  
00:22:41,740 --> 00:22:38,980  
experiment and biological experiments

485  
00:22:48,470 --> 00:22:41,750  
Fletcher Braden and Dean will now

486  
00:22:53,220 --> 00:22:51,210  
the rock dissolution experiments were

487  
00:22:55,259 --> 00:22:53,230  
made to simulate each of the field sites

488  
00:22:58,009 --> 00:22:55,269

so that the lab results would allow us

489

00:23:01,049 --> 00:22:58,019

to interpret the water chemistry

490

00:23:03,389 --> 00:23:01,059

throughout the experiments we maintain

491

00:23:05,220 --> 00:23:03,399

different PHS and temperatures depending

492

00:23:07,649 --> 00:23:05,230

on what field size we're trying to

493

00:23:09,779 --> 00:23:07,659

simulate every week by titrating our

494

00:23:15,269 --> 00:23:09,789

solutions back down to their desired P

495

00:23:17,489 --> 00:23:15,279

ages we use the pH values 5.5 and 2 as

496

00:23:19,649 --> 00:23:17,499

well as the temperature values of 20

497

00:23:23,940 --> 00:23:19,659

degrees Celsius and 60 degrees Celsius

498

00:23:25,799 --> 00:23:23,950

for our experiments we use basaltic rock

499

00:23:28,409 --> 00:23:25,809

powder in this rock dissolution

500

00:23:31,440 --> 00:23:28,419

experiments because this rock is found

501  
00:23:33,749 --> 00:23:31,450  
throughout water valley the water

502  
00:23:35,639 --> 00:23:33,759  
interacted with the rock powder to

503  
00:23:40,560 --> 00:23:35,649  
dissolve the elements within the basalt

504  
00:23:42,480 --> 00:23:40,570  
rock and dissolution overall these

505  
00:23:47,009 --> 00:23:42,490  
experiments evaluated the effects of

506  
00:23:49,169 --> 00:23:47,019  
temperature and pH now race will discuss

507  
00:23:53,390 --> 00:23:49,179  
the effects of rocks on the pH of a

508  
00:23:58,020 --> 00:23:55,860  
our first hypothesis was that

509  
00:24:00,419 --> 00:23:58,030  
interactions between rocks and water

510  
00:24:03,150 --> 00:24:00,429  
increase the pH of the solutions in the

511  
00:24:05,400 --> 00:24:03,160  
laboratory dissolution experiment each

512  
00:24:07,950 --> 00:24:05,410  
week when we measured the pH values of

513  
00:24:09,870 --> 00:24:07,960

each experiment we saw that the PHS had

514

00:24:12,450 --> 00:24:09,880

risen regardless of the experiments

515

00:24:15,299 --> 00:24:12,460

conditions in order to maintain the

516

00:24:17,580 --> 00:24:15,309

proper pages of the experiments we had

517

00:24:19,980 --> 00:24:17,590

to add acid to lower the PHS back to

518

00:24:22,110 --> 00:24:19,990

their desired values the graph on the

519

00:24:24,450 --> 00:24:22,120

Left shows the amount of acid that was

520

00:24:27,390 --> 00:24:24,460

added to the experiments as pH was set

521

00:24:30,090 --> 00:24:27,400

at 5.5 the graph on the right displays

522

00:24:33,539 --> 00:24:30,100

the UNAM acid added to the experiments

523

00:24:35,730 --> 00:24:33,549

whose pH was set at 2 both graphs show

524

00:24:38,340 --> 00:24:35,740

that as the days went on we continued to

525

00:24:40,260 --> 00:24:38,350

add acid to every experiment due to the

526  
00:24:42,600 --> 00:24:40,270  
fact that interactions between the water

527  
00:24:45,750 --> 00:24:42,610  
and the rock caused an increase in the

528  
00:24:47,760 --> 00:24:45,760  
solutions pages Braden will now explain

529  
00:24:52,760 --> 00:24:47,770  
why we had to add more acid to some

530  
00:24:56,000 --> 00:24:54,800  
one of the reasons as to why we

531  
00:24:57,800 --> 00:24:56,010  
conducted the rock dissolution

532  
00:25:00,290 --> 00:24:57,810  
experiments was to determine whether or

533  
00:25:01,730 --> 00:25:00,300  
not solutions with a lower pH and higher

534  
00:25:03,290 --> 00:25:01,740  
temperature are more effective and

535  
00:25:05,840 --> 00:25:03,300  
interacting with rocks and releasing

536  
00:25:08,120 --> 00:25:05,850  
their elements into solution in the

537  
00:25:10,070 --> 00:25:08,130  
bottom left graph the effect of pH on

538  
00:25:11,780 --> 00:25:10,080

the dissolution of rock is shown in the

539

00:25:13,040 --> 00:25:11,790

graph the bars with matching colors who

540

00:25:14,630 --> 00:25:13,050

are experiments that were conducted at

541

00:25:16,970 --> 00:25:14,640

the same temperature but different pH

542

00:25:18,560 --> 00:25:16,980

and therefore show that a lower pH has a

543

00:25:19,940 --> 00:25:18,570

greater effect on the dissolution of

544

00:25:21,890 --> 00:25:19,950

rock in the sense that each of the

545

00:25:23,270 --> 00:25:21,900

experiments with a lower pH had a

546

00:25:24,620 --> 00:25:23,280

greater net conductivity than the

547

00:25:27,680 --> 00:25:24,630

experiments that were conducted at a

548

00:25:29,090 --> 00:25:27,690

neutral pH furthermore in the

549

00:25:30,530 --> 00:25:29,100

bottom-right graph which displays the

550

00:25:32,930 --> 00:25:30,540

effect of temperature on the dissolution

551  
00:25:34,190 --> 00:25:32,940  
of rock the bars matching in color were

552  
00:25:35,900 --> 00:25:34,200  
represent experiments that were

553  
00:25:37,610 --> 00:25:35,910  
conducted at the same pH but different

554  
00:25:39,230 --> 00:25:37,620  
temperatures and therefore show that a

555  
00:25:41,180 --> 00:25:39,240  
higher temperature has a greater effect

556  
00:25:42,470 --> 00:25:41,190  
on the dissolution of rock considering

557  
00:25:44,180 --> 00:25:42,480  
the fact that each of the groups with a

558  
00:25:45,620 --> 00:25:44,190  
higher temperature had a higher net

559  
00:25:47,420 --> 00:25:45,630  
conductivity than the experiments that

560  
00:25:49,760 --> 00:25:47,430  
were conducted at a similar pH but

561  
00:25:51,530 --> 00:25:49,770  
different temperature Fletcher will now

562  
00:25:52,940 --> 00:25:51,540  
talk about the biological experiments

563  
00:25:57,159 --> 00:25:52,950

that were conducted with the microbes

564

00:26:02,719 --> 00:26:00,619

at Warner Valley we took microbe samples

565

00:26:05,899 --> 00:26:02,729

and place them in winogradsky columns in

566

00:26:07,699 --> 00:26:05,909

order to observe them in these columns

567

00:26:10,209 --> 00:26:07,709

we replicated the conditions that the

568

00:26:13,609 --> 00:26:10,219

microbes were living in at Warner Valley

569

00:26:15,709 --> 00:26:13,619

after a few weeks we then changed one of

570

00:26:18,019 --> 00:26:15,719

the microbes replicated environmental

571

00:26:20,180 --> 00:26:18,029

conditions to observe some kind of

572

00:26:24,379 --> 00:26:20,190

change in the abundance of biomass and

573

00:26:26,659 --> 00:26:24,389

diversity these changes involve the

574

00:26:29,989 --> 00:26:26,669

organism being blocked from or left in

575

00:26:33,049 --> 00:26:29,999

light temperature or pH being increased

576

00:26:37,519 --> 00:26:33,059

or decreased or solute concentration

577

00:26:40,190 --> 00:26:37,529

being changed our class hypothesis was

578

00:26:42,859 --> 00:26:40,200

if the environmental conditions of the

579

00:26:46,509 --> 00:26:42,869

microbes are changed then they will

580

00:26:49,190 --> 00:26:46,519

undergo a change in growth or appearance

581

00:26:51,560 --> 00:26:49,200

these changes could have taken place in

582

00:26:56,539 --> 00:26:51,570

a variety of different ways such as

583

00:26:58,879 --> 00:26:56,549

growth color and size in our experiments

584

00:27:01,039 --> 00:26:58,889

we visually observed and took notes on

585

00:27:04,399 --> 00:27:01,049

the changes that took place from week to

586

00:27:07,190 --> 00:27:04,409

week in our microbes at the end of this

587

00:27:10,339 --> 00:27:07,200

process we took a sample of our microbes

588

00:27:12,259 --> 00:27:10,349

to be observed through a microscope this

589

00:27:14,810 --> 00:27:12,269

way we could see the increase or

590

00:27:19,330 --> 00:27:14,820

decrease in growth at a more in-depth

591

00:27:24,349 --> 00:27:22,279

the light or dark variable was altered

592

00:27:26,419 --> 00:27:24,359

by covering our winogradsky columns in

593

00:27:30,169 --> 00:27:26,429

black electrical tape or was left

594

00:27:31,940 --> 00:27:30,179

unchanged and clear this way are my

595

00:27:34,039 --> 00:27:31,950

curves either had a normal inflow of

596

00:27:37,489 --> 00:27:34,049

light just like they did at their field

597

00:27:40,369 --> 00:27:37,499

sites or they were completely isolated

598

00:27:42,469 --> 00:27:40,379

from light the temperatures of the

599

00:27:45,080 --> 00:27:42,479

microbes were altered by removing the

600

00:27:47,570 --> 00:27:45,090

winogradsky columns from or putting them

601  
00:27:50,960 --> 00:27:47,580  
into an incubator set at 60 degrees

602  
00:27:53,389 --> 00:27:50,970  
Celsius when altering temperature for an

603  
00:27:55,820 --> 00:27:53,399  
organism it can have different effects

604  
00:27:58,729 --> 00:27:55,830  
on the organism depending on its optimal

605  
00:28:00,919 --> 00:27:58,739  
temperature the microbe could either

606  
00:28:03,889 --> 00:28:00,929  
have a boost in the amount of biological

607  
00:28:05,930 --> 00:28:03,899  
processes that it goes through or it can

608  
00:28:08,060 --> 00:28:05,940  
be negatively affected since it may be

609  
00:28:10,519 --> 00:28:08,070  
passed the organisms optimal temperature

610  
00:28:14,389 --> 00:28:10,529  
which can be seen in the experimental

611  
00:28:16,339 --> 00:28:14,399  
columns of altered temperature now dean

612  
00:28:21,530 --> 00:28:16,349  
will discuss the effects of pH and

613  
00:28:24,830 --> 00:28:23,120

the

614

00:28:26,750 --> 00:28:24,840

micro calms was changed through

615

00:28:28,910 --> 00:28:26,760

titration or dilution maintaining the

616

00:28:30,380 --> 00:28:28,920

other water conditions besides the pH as

617

00:28:32,390 --> 00:28:30,390

shown in the green growth in the upper

618

00:28:34,550 --> 00:28:32,400

right which experienced a drop in pH

619

00:28:37,580 --> 00:28:34,560

having a negative impact on further

620

00:28:39,830 --> 00:28:37,590

growth the solute of the water and the

621

00:28:41,360 --> 00:28:39,840

experiment columns was changed by using

622

00:28:42,680 --> 00:28:41,370

water from a different field site with

623

00:28:44,990 --> 00:28:42,690

similar conditions to the microbes

624

00:28:46,580 --> 00:28:45,000

original site visible in the colony in

625

00:28:47,870 --> 00:28:46,590

the lower right they experienced an

626

00:28:50,470 --> 00:28:47,880

increase in growth due to the higher

627

00:28:52,670 --> 00:28:50,480

solute count of the mainstream water in

628

00:28:58,750 --> 00:28:52,680

changing the column environments there

629

00:29:03,289 --> 00:29:01,370

after analyzing the results from our

630

00:29:06,260 --> 00:29:03,299

experiments we could relate what our

631

00:29:08,090 --> 00:29:06,270

hypothesis proved in the lab back to

632

00:29:11,990 --> 00:29:08,100

what we originally observed in Warner

633

00:29:14,510 --> 00:29:12,000

Valley in the lab our proven hypotheses

634

00:29:17,299 --> 00:29:14,520

showed us relationships between pH

635

00:29:20,299 --> 00:29:17,309

temperature and the solute concentration

636

00:29:22,549 --> 00:29:20,309

of solutions understanding these helped

637

00:29:24,620 --> 00:29:22,559

us to understand the multiple paths of

638

00:29:28,460 --> 00:29:24,630

the water flowing through Warner Valley

639

00:29:30,560 --> 00:29:28,470

now Ilana Reece Sam and Mary will

640

00:29:32,710 --> 00:29:30,570

describe our interpretations of the

641

00:29:35,299 --> 00:29:32,720

field sites after considering our

642

00:29:40,400 --> 00:29:35,309

observations and the results of our

643

00:29:45,110 --> 00:29:43,010

the main source of water for each site

644

00:29:47,120 --> 00:29:45,120

is precipitation the cloud graphic

645

00:29:48,650 --> 00:29:47,130

indicates where rain and snow fall the

646

00:29:50,600 --> 00:29:48,660

most and then travel down the path

647

00:29:52,460 --> 00:29:50,610

through Warner Valley the site's water

648

00:29:54,440 --> 00:29:52,470

stories tell the path the water takes

649

00:29:56,180 --> 00:29:54,450

from the moment it falls from the sky to

650

00:29:58,340 --> 00:29:56,190

the ground and eventually ends up at one

651  
00:30:00,110 --> 00:29:58,350  
of the field sites these water stories

652  
00:30:02,240 --> 00:30:00,120  
give each site unique characteristics

653  
00:30:07,409 --> 00:30:02,250  
such as having a high pH or high

654  
00:30:12,119 --> 00:30:10,289  
once again the main source precipitation

655  
00:30:14,669 --> 00:30:12,129  
as well as runoff water and groundwater

656  
00:30:17,369 --> 00:30:14,679  
paddle Creek had a low temperature and

657  
00:30:19,259 --> 00:30:17,379  
neutral pH these conditions resulted in

658  
00:30:21,899 --> 00:30:19,269  
this site having the lowest conductivity

659  
00:30:23,969 --> 00:30:21,909  
value despite the fact that rains pH is

660  
00:30:26,039 --> 00:30:23,979  
around five point five once it comes

661  
00:30:28,169 --> 00:30:26,049  
into contact with the ground we begin to

662  
00:30:29,759 --> 00:30:28,179  
see changes and the pH increases to a

663  
00:30:31,349 --> 00:30:29,769

value of seven because of these

664

00:30:36,799 --> 00:30:31,359

interactions with the rocks as

665

00:30:40,430 --> 00:30:38,269

I found a devil's kitchen is supplied by

666

00:30:41,960 --> 00:30:40,440

snowmelt and rainfall this snowmelt in

667

00:30:43,909 --> 00:30:41,970

rainfall water seeps into the ground

668

00:30:46,129 --> 00:30:43,919

until it comes into contact volcanic

669

00:30:47,840 --> 00:30:46,139

gases and heat after being heated the

670

00:30:50,269 --> 00:30:47,850

water begins to rise up to the surface

671

00:30:51,980 --> 00:30:50,279

as it rises the water condenses and

672

00:30:53,899 --> 00:30:51,990

surfaces at Devil's kitchen the

673

00:30:55,909 --> 00:30:53,909

interaction with volcanic gases and heat

674

00:30:57,769 --> 00:30:55,919

gives the water its low pH and high

675

00:30:59,389 --> 00:30:57,779

temperature this also makes it more

676  
00:31:00,940 --> 00:30:59,399  
efficient at dissolving rock which

677  
00:31:03,289 --> 00:31:00,950  
explains the waters high conductivity

678  
00:31:07,410 --> 00:31:03,299  
Sam will now explain main streams of

679  
00:31:11,620 --> 00:31:10,000  
the water at the mainstream side comes

680  
00:31:14,500 --> 00:31:11,630  
from snowfall rain fall on ground water

681  
00:31:16,900 --> 00:31:14,510  
that feeds up the largest stream running

682  
00:31:18,520 --> 00:31:16,910  
in the length of Warner Valley example

683  
00:31:20,410 --> 00:31:18,530  
both ends of the stream in an effort to

684  
00:31:21,820 --> 00:31:20,420  
record any changes that may affect the

685  
00:31:25,150 --> 00:31:21,830  
water as it passes through the valley

686  
00:31:26,920 --> 00:31:25,160  
main tree was discovered to have a very

687  
00:31:29,260 --> 00:31:26,930  
similar ph temperature and conductivity

688  
00:31:30,880 --> 00:31:29,270

to paddleball Creek with only a few

689

00:31:33,070 --> 00:31:30,890

minor differences near Devil's kitchen

690

00:31:34,900 --> 00:31:33,080

we observed an outflow of water from

691

00:31:37,990 --> 00:31:34,910

Devil's kitchen into main stream this

692

00:31:39,640 --> 00:31:38,000

addition to of doubles kitchen water can

693

00:31:41,200 --> 00:31:39,650

explain the lower pH and higher

694

00:31:43,750 --> 00:31:41,210

conductivity that was recorded at

695

00:31:45,760 --> 00:31:43,760

Devil's kitchen devil's kitchen's main

696

00:31:47,410 --> 00:31:45,770

stream site as main stream runs the

697

00:31:49,540 --> 00:31:47,420

length of Warner valley it interacts

698

00:31:52,180 --> 00:31:49,550

with the brach and also receives an

699

00:31:53,880 --> 00:31:52,190

inflow of water from paddle Creek as we

700

00:31:55,660 --> 00:31:53,890

saw in our lab experiment that

701  
00:31:58,270 --> 00:31:55,670  
interaction with the rocks will cause

702  
00:32:00,010 --> 00:31:58,280  
the pH to rise over time in addition of

703  
00:32:02,260 --> 00:32:00,020  
the paddle Creek water will further

704  
00:32:04,420 --> 00:32:02,270  
dilute main stream causing the rise in

705  
00:32:06,550 --> 00:32:04,430  
the pH and the lowering of connectivity

706  
00:32:12,090 --> 00:32:06,560  
that we saw when sampling at the Warner

707  
00:32:16,470 --> 00:32:14,190  
Oakland stream comes from a similar

708  
00:32:18,330 --> 00:32:16,480  
source of Devil's kitchen it too

709  
00:32:20,100 --> 00:32:18,340  
originated from runoff that seeped deep

710  
00:32:22,530 --> 00:32:20,110  
underground and interacted extensively

711  
00:32:24,030 --> 00:32:22,540  
with volcanic gases the heat from deep

712  
00:32:25,680 --> 00:32:24,040  
inside the earth drove it back to the

713  
00:32:26,730 --> 00:32:25,690

surface giving it the high temperature

714

00:32:29,520 --> 00:32:26,740

we see above-ground

715

00:32:31,530 --> 00:32:29,530

however unlike Devil's kitchen the

716

00:32:32,730 --> 00:32:31,540

stream is located on a fault line which

717

00:32:34,290 --> 00:32:32,740

allows the water to have more

718

00:32:36,030 --> 00:32:34,300

opportunity to be neutralized by the

719

00:32:38,850 --> 00:32:36,040

rock around it by taking a less direct

720

00:32:40,830 --> 00:32:38,860

and thus longer path to the surface this

721

00:32:42,600 --> 00:32:40,840

results in a more neutral pH at the head

722

00:32:44,640 --> 00:32:42,610

of the stream located directly next to

723

00:32:46,350 --> 00:32:44,650

the fault line because the aqualen

724

00:32:48,420 --> 00:32:46,360

stream originally had high amounts of

725

00:32:50,070 --> 00:32:48,430

sulfuric acid in its water and had a lot

726

00:32:52,190 --> 00:32:50,080

of contact with rocks before reaching

727

00:32:54,810 --> 00:32:52,200

the surface it has a high conductivity

728

00:32:56,820 --> 00:32:54,820

however once again unlike Devil's

729

00:32:58,950 --> 00:32:56,830

kitchen there's not a constant resupply

730

00:33:04,120 --> 00:32:58,960

of sulfuric acid which leaves the pH a

731

00:33:08,860 --> 00:33:07,029

in addition to our interpretations of

732

00:33:11,110 --> 00:33:08,870

the water stories we've formed

733

00:33:13,919 --> 00:33:11,120

interpretations regarding the types of

734

00:33:16,750 --> 00:33:13,929

life found at Warner Valley our

735

00:33:19,419 --> 00:33:16,760

winogradsky columns showed us the

736

00:33:22,600 --> 00:33:19,429

effects of pH temperature solute

737

00:33:26,799 --> 00:33:22,610

concentrations and light on microbial

738

00:33:28,630 --> 00:33:26,809

life now freesia Lachlan and Terra will

739

00:33:33,490 --> 00:33:28,640

talk about the conclusions we formed

740

00:33:35,169 --> 00:33:33,500

based on our microbial incubations the

741

00:33:36,520 --> 00:33:35,179

water up of the potable Creek and

742

00:33:38,169 --> 00:33:36,530

mainstream sites has an ideal

743

00:33:39,880 --> 00:33:38,179

temperature and pH which creates how

744

00:33:42,130 --> 00:33:39,890

double conditions for life to grow and

745

00:33:43,570 --> 00:33:42,140

thrive the favorable conditions enabled

746

00:33:45,370 --> 00:33:43,580

the abundance and diversity of the

747

00:33:47,770 --> 00:33:45,380

microbial growth present at both sites

748

00:33:49,750 --> 00:33:47,780

the microbial communities are virtually

749

00:33:51,610 --> 00:33:49,760

obvious in and adjacent to the water at

750

00:33:53,409 --> 00:33:51,620

power wall Creek and mainstream or

751  
00:33:55,720 --> 00:33:53,419  
different green brown purple and red

752  
00:33:57,700 --> 00:33:55,730  
algae as well as moss and mats in

753  
00:33:59,260 --> 00:33:57,710  
relation to our winogradsky experiments

754  
00:34:00,549 --> 00:33:59,270  
microbes present add these two field

755  
00:34:02,260 --> 00:34:00,559  
sites survive best in their own

756  
00:34:03,630 --> 00:34:02,270  
conditions rather than when their

757  
00:34:05,830 --> 00:34:03,640  
environments were altered significantly

758  
00:34:07,810 --> 00:34:05,840  
this is because the conditions that

759  
00:34:10,000 --> 00:34:07,820  
these field sites were favorable these

760  
00:34:17,250 --> 00:34:10,010  
biology interpretations are consistent

761  
00:34:21,240 --> 00:34:19,169  
the alkaline site had water that had a

762  
00:34:23,520 --> 00:34:21,250  
higher temperature and more neutral pH

763  
00:34:25,680 --> 00:34:23,530

and these slightly harsh conditions led

764

00:34:29,190 --> 00:34:25,690

to less diversity than was seen at the

765

00:34:30,780 --> 00:34:29,200

paddle wheel or mainstream sites the

766

00:34:32,669 --> 00:34:30,790

microbes we saw were green and brown

767

00:34:35,730 --> 00:34:32,679

matte like microbes along with green

768

00:34:37,950 --> 00:34:35,740

stringy algae like microbes when we

769

00:34:40,230 --> 00:34:37,960

altered the environment therein and our

770

00:34:41,940 --> 00:34:40,240

laboratory experiments we saw they

771

00:34:43,680 --> 00:34:41,950

survived better when in their original

772

00:34:45,300 --> 00:34:43,690

environment this shows that they are

773

00:34:47,310 --> 00:34:45,310

specifically adapted to their

774

00:34:49,290 --> 00:34:47,320

environment and explains but we don't

775

00:34:54,440 --> 00:34:49,300

see the same microbes at the other field

776

00:34:59,609 --> 00:34:57,329

at Devil's kitchen we observed a high

777

00:35:02,069 --> 00:34:59,619

temperature low pH and a high

778

00:35:03,870 --> 00:35:02,079

conductivity there were a few trees that

779

00:35:06,510 --> 00:35:03,880

were spread around but nothing too close

780

00:35:09,150 --> 00:35:06,520

to the site when you looked closer at

781

00:35:11,490 --> 00:35:09,160

the water you could start to see lots of

782

00:35:13,529 --> 00:35:11,500

different microbial communities there

783

00:35:15,240 --> 00:35:13,539

were green and coral colored microbial

784

00:35:18,089 --> 00:35:15,250

communities that were sitting right on

785

00:35:20,579 --> 00:35:18,099

top of the clay you can kinda see from

786

00:35:22,950 --> 00:35:20,589

the picture that outline of the green

787

00:35:25,620 --> 00:35:22,960

microbial communities the coral ones are

788

00:35:27,329 --> 00:35:25,630

a little bit harder to see also there

789

00:35:29,520 --> 00:35:27,339

were stringy looking microbes that were

790

00:35:31,770 --> 00:35:29,530

clinging on to rocks and sticks that had

791

00:35:33,779 --> 00:35:31,780

fallen into the water these microbes

792

00:35:35,849 --> 00:35:33,789

were very well-suited for their life at

793

00:35:38,700 --> 00:35:35,859

Devil's kitchen and did not respond well

794

00:35:45,970 --> 00:35:38,710

to an environmental change this we could

795

00:35:51,020 --> 00:35:48,560

now that we have an understanding of our

796

00:35:52,670 --> 00:35:51,030

findings amorta Valley I'll discuss the

797

00:35:54,310 --> 00:35:52,680

significance of our research with the

798

00:35:56,330 --> 00:35:54,320

Mars exploration mission

799

00:35:58,670 --> 00:35:56,340

NASA's main goal with the Mars

800

00:36:00,920 --> 00:35:58,680

exploration project is to find evidence

801  
00:36:03,200 --> 00:36:00,930  
of habitable environments for life on

802  
00:36:05,630 --> 00:36:03,210  
Mars there have been several expeditions

803  
00:36:08,510 --> 00:36:05,640  
to Mars with Rovers the latest

804  
00:36:09,920 --> 00:36:08,520  
expedition perseverance will launch and

805  
00:36:12,590 --> 00:36:09,930  
mid july of this year

806  
00:36:14,870 --> 00:36:12,600  
each rover has given a depiction of the

807  
00:36:18,050 --> 00:36:14,880  
ancient environment of Mars beginning

808  
00:36:19,850 --> 00:36:18,060  
with the Viking mission in 1976 we have

809  
00:36:22,190 --> 00:36:19,860  
found hydrothermal features with spirit

810  
00:36:24,740 --> 00:36:22,200  
rover ancient stream channels and lake

811  
00:36:26,480 --> 00:36:24,750  
beds with curiosity and rocks with

812  
00:36:29,960 --> 00:36:26,490  
elements necessary for sustaining life

813  
00:36:32,210 --> 00:36:29,970

from all the landing sites worn Evalia

814

00:36:34,430 --> 00:36:32,220

has a similar landscape to Mars which

815

00:36:36,860 --> 00:36:34,440

allows us to study a terrain akin to

816

00:36:38,930 --> 00:36:36,870

what early Mars looked like with this

817

00:36:41,060 --> 00:36:38,940

NASA is able to design more effective

818

00:36:49,769 --> 00:36:41,070

missions that find more supporting

819

00:36:54,609 --> 00:36:52,269

again my name is TC Drury and I'm a

820

00:36:55,749 --> 00:36:54,619

second year intern I would like to thank

821

00:36:57,849 --> 00:36:55,759

you all for watching tonight's

822

00:36:59,799 --> 00:36:57,859

presentation and for giving your support

823

00:37:02,169 --> 00:36:59,809

to the program to conclude our

824

00:37:05,019 --> 00:37:02,179

presentation each of us will now share

825

00:37:07,029 --> 00:37:05,029

the personal impact of the program for

826

00:37:08,469 --> 00:37:07,039

me the biggest impact of the program was

827

00:37:11,019 --> 00:37:08,479

that it allowed me to apply my

828

00:37:12,999 --> 00:37:11,029

leadership skills and science and gave

829

00:37:15,009 --> 00:37:13,009

me the opportunity to utilize my

830

00:37:22,010 --> 00:37:15,019

knowledge of technology to better our

831

00:37:26,030 --> 00:37:24,260

my name is Ashley car and I'm a second

832

00:37:27,620 --> 00:37:26,040

year intern in this program through this

833

00:37:29,329 --> 00:37:27,630

class I learned how full leadership

834

00:37:31,190 --> 00:37:29,339

skills and gained scientific knowledge

835

00:37:33,650 --> 00:37:31,200

that I can apply in future endeavors

836

00:37:39,280 --> 00:37:33,660

including quad classes and my intended

837

00:37:43,910 --> 00:37:41,810

hi my name is Sahil Singh and I'm a

838

00:37:46,040 --> 00:37:43,920

second year intern through this program

839

00:37:48,080 --> 00:37:46,050

I was able to apply my knowledge into

840

00:37:49,460 --> 00:37:48,090

real scientific research and I was able

841

00:37:56,540 --> 00:37:49,470

to strengthen my leadership skills

842

00:38:01,940 --> 00:37:59,750

hi I'm Katie little and this program has

843

00:38:04,520 --> 00:38:01,950

given me the opportunity to experience

844

00:38:06,440 --> 00:38:04,530

science beyond a textbook and has given

845

00:38:07,910 --> 00:38:06,450

me a greater interest and accrued that

846

00:38:13,420 --> 00:38:07,920

studies are outside

847

00:38:17,470 --> 00:38:15,670

this program opened my eyes to the many

848

00:38:19,390 --> 00:38:17,480

possibilities and roles available in the

849

00:38:21,580 --> 00:38:19,400

scientific field as well as unique

850

00:38:27,150 --> 00:38:21,590

experience that will affect my decisions

851

00:38:32,280 --> 00:38:29,820

my name is Fletcher Bakke and I am a

852

00:38:35,400 --> 00:38:32,290

first-year intern in the NASA internship

853

00:38:37,260 --> 00:38:35,410

program this program has showed me what

854

00:38:39,450 --> 00:38:37,270

the scientific process is like in a

855

00:38:40,760 --> 00:38:39,460

real-world scenario compared to another

856

00:38:45,740 --> 00:38:40,770

classroom science lab

857

00:38:49,800 --> 00:38:48,120

I'm Mary Collier and I've been

858

00:38:51,510 --> 00:38:49,810

influenced by this program by being able

859

00:38:52,980 --> 00:38:51,520

to learn how science is applicable in

860

00:38:54,390 --> 00:38:52,990

the real world and by gaining a better

861

00:38:55,830 --> 00:38:54,400

understanding of how the scientific

862

00:39:01,710 --> 00:38:55,840

process worked through hands-on

863

00:39:05,850 --> 00:39:03,930

my name is Lachlan Dean and I'm a

864

00:39:07,080 --> 00:39:05,860

first-year intern this program helped me

865

00:39:08,610 --> 00:39:07,090

get experience what running an

866

00:39:10,740 --> 00:39:08,620

experiment outside the classroom is like

867

00:39:12,420 --> 00:39:10,750

and also taught me new skills and

868

00:39:18,359 --> 00:39:12,430

processes needed when conducting an

869

00:39:22,599 --> 00:39:21,039

my name's Fraser Gillis and this program

870

00:39:24,309 --> 00:39:22,609

gave me the opportunity to be around

871

00:39:30,230 --> 00:39:24,319

other people who truly appreciate

872

00:39:35,099 --> 00:39:32,880

my name is Grace Gallagher and this

873

00:39:37,050 --> 00:39:35,109

program has led me to learn how to use

874

00:39:39,420 --> 00:39:37,060

scientific equipment conduct my own

875

00:39:41,820 --> 00:39:39,430

experiment and analyze the results of my

876

00:39:48,530 --> 00:39:41,830

experiment these experiences bettered my

877

00:39:52,760 --> 00:39:50,870

hi my name is Rhys Canberra and this

878

00:39:54,200 --> 00:39:52,770

NASA program is impacted the way I look

879

00:39:56,060 --> 00:39:54,210

at science it's given me an opportunity

880

00:39:57,800 --> 00:39:56,070

to go out in the field and experience

881

00:39:59,480 --> 00:39:57,810

field science firsthand but it's also

882

00:40:01,400 --> 00:39:59,490

giving me the opportunity to form a

883

00:40:03,710 --> 00:40:01,410

hypothesis coming up with an experiment

884

00:40:05,270 --> 00:40:03,720

and taking those results and creating a

885

00:40:06,859 --> 00:40:05,280

reasonable conclusion with it and just

886

00:40:12,290 --> 00:40:06,869

getting a better grasp of the scientific

887

00:40:16,190 --> 00:40:14,600

hi my name is Alana Garrity and I'm a

888

00:40:18,110 --> 00:40:16,200

junior at rebel of high school involved

889

00:40:19,700 --> 00:40:18,120

in the NASA program being a part of this

890

00:40:21,620 --> 00:40:19,710

program further fueled my love for

891

00:40:23,420 --> 00:40:21,630

science and gave me a passion for asking

892

00:40:28,660 --> 00:40:23,430

questions and doing experiments to try

893

00:40:33,400 --> 00:40:31,089

my name is Emma Hale and this year's

894

00:40:35,680 --> 00:40:33,410

NASA internship has allowed me to get a

895

00:40:37,450 --> 00:40:35,690

hands-on experience and it has taught me

896

00:40:42,330 --> 00:40:37,460

that is the smallest things in science

897

00:40:48,330 --> 00:40:46,260

hi my name is ELISA Harrison and through

898

00:40:50,220 --> 00:40:48,340

this program I was able to gain a better

899

00:40:52,740 --> 00:40:50,230

understanding about what science really

900

00:40:58,170 --> 00:40:52,750

is and this deepened my interest in the

901  
00:41:02,589 --> 00:41:00,579  
my name is Burton Klein and this program

902  
00:41:04,150 --> 00:41:02,599  
has impacted me by allowing me to grasp

903  
00:41:06,069 --> 00:41:04,160  
a better understanding of the scientific

904  
00:41:12,070 --> 00:41:06,079  
process and how it is used in self

905  
00:41:16,940 --> 00:41:15,080  
hi my name is andré marques and I just

906  
00:41:19,250 --> 00:41:16,950  
wanted to say that the impact that the

907  
00:41:21,410 --> 00:41:19,260  
program had on me is that it allowed me

908  
00:41:23,150 --> 00:41:21,420  
to be able to question things that

909  
00:41:25,700 --> 00:41:23,160  
people normally don't question and

910  
00:41:28,310 --> 00:41:25,710  
allowed me to be able to test and come

911  
00:41:35,600 --> 00:41:28,320  
up with the reasonable explanations calm

912  
00:41:41,290 --> 00:41:39,230  
my name is Tara Norton I am a first-year

913  
00:41:44,360 --> 00:41:41,300

intern at the NASA Astrobiology

914

00:41:45,860 --> 00:41:44,370

internship program in this program I

915

00:41:52,890 --> 00:41:45,870

learned how to perfectly create

916

00:41:57,430 --> 00:41:55,510

my name is Samantha ball and there's

917

00:41:59,020 --> 00:41:57,440

Berger my lot would be to build up with

918

00:42:00,460 --> 00:41:59,030

my team working skills in the field and

919

00:42:08,089 --> 00:42:00,470

also allowed me to make a whole bunch of

920

00:42:13,750 --> 00:42:11,280

well what you all think

921

00:42:15,220 --> 00:42:13,760

now here's the problem

922

00:42:18,400 --> 00:42:15,230

in order for you to answer that question

923

00:42:21,069 --> 00:42:18,410

you need to be able to know how to do

924

00:42:23,079 --> 00:42:21,079

that that's where I messed up I was

925

00:42:25,960 --> 00:42:23,089

supposed to tell you before we started

926

00:42:28,480 --> 00:42:25,970

is that we have a place for you to ask

927

00:42:31,030 --> 00:42:28,490

questions so within the live stream

928

00:42:33,730 --> 00:42:31,040

there's a chat box there if you go and

929

00:42:36,579 --> 00:42:33,740

find that chat box I have any questions

930

00:42:39,760 --> 00:42:36,589

for any of us please enter them into

931

00:42:43,270 --> 00:42:39,770

that chat box when I say any of us I

932

00:42:44,710 --> 00:42:43,280

mean the adults or all of these interns

933

00:42:46,000 --> 00:42:44,720

that are here with us today we have

934

00:42:48,280 --> 00:42:46,010

first two your interns we have

935

00:42:50,440 --> 00:42:48,290

second-year interns you can call them

936

00:42:52,809 --> 00:42:50,450

out by name they'd be more than happy to

937

00:42:54,760 --> 00:42:52,819

answer your questions individually they

938

00:42:57,849 --> 00:42:54,770

are ready for whatever you throw at them

939

00:42:59,980 --> 00:42:57,859

and so as you are preparing these

940

00:43:01,839 --> 00:42:59,990

questions getting them going just a

941

00:43:05,220 --> 00:43:01,849

couple more things about this program

942

00:43:07,870 --> 00:43:05,230

not just like pass on to you this

943

00:43:09,700 --> 00:43:07,880

presentation that you just saw is not

944

00:43:12,880 --> 00:43:09,710

the only thing that these students do

945

00:43:15,430 --> 00:43:12,890

all year the majority of year is

946

00:43:17,770 --> 00:43:15,440

actually focused on a research paper and

947

00:43:22,510 --> 00:43:17,780

this research paper is a college-level

948

00:43:24,390 --> 00:43:22,520

thesis paper students produce they

949

00:43:27,609 --> 00:43:24,400

produce this under the guidance of

950

00:43:30,099 --> 00:43:27,619

myself the NASA scientists the lassen

951  
00:43:32,470 --> 00:43:30,109  
Park Rangers together we guide these

952  
00:43:36,220 --> 00:43:32,480  
students and by the end of this this

953  
00:43:39,099 --> 00:43:36,230  
class they produced a paper it's usually

954  
00:43:41,230 --> 00:43:39,109  
somewhere between 3035 pages long and

955  
00:43:44,319 --> 00:43:41,240  
it's equivalent to what's going to be

956  
00:43:48,309 --> 00:43:44,329  
created by any college level student in

957  
00:43:52,270 --> 00:43:48,319  
a science class the depth that they go

958  
00:43:56,230 --> 00:43:52,280  
to to write it to get it edited to

959  
00:43:57,339 --> 00:43:56,240  
finalize it is amazing and so if you get

960  
00:43:59,559 --> 00:43:57,349  
a chance if you know any of these

961  
00:44:01,539 --> 00:43:59,569  
interns ask to see this paper from them

962  
00:44:03,900 --> 00:44:01,549  
it is truly something that they're proud

963  
00:44:06,849 --> 00:44:03,910

of and they'd love to share with you

964

00:44:09,849 --> 00:44:06,859

besides that the presentation that you

965

00:44:11,829 --> 00:44:09,859

just saw this year we did not start the

966

00:44:15,069 --> 00:44:11,839

presentation until after the closure of

967

00:44:16,359 --> 00:44:15,079

the school on March the 13th so as you

968

00:44:19,539 --> 00:44:16,369

can imagine there were some challenges

969

00:44:22,480 --> 00:44:19,549

involved with it what you just saw there

970

00:44:24,190 --> 00:44:22,490

took countless hours of our students

971

00:44:26,950 --> 00:44:24,200

work on their own

972

00:44:29,140 --> 00:44:26,960

guiding them through zoom sessions or

973

00:44:30,579 --> 00:44:29,150

just emails and just having these

974

00:44:32,829 --> 00:44:30,589

students kind of figure things out on

975

00:44:36,099 --> 00:44:32,839

their own so they did an amazing job

976

00:44:38,290 --> 00:44:36,109

here of basically coming up with this

977

00:44:40,870 --> 00:44:38,300

and I hope that you agree with me when

978

00:44:46,329 --> 00:44:40,880

you when you watch this and you were

979

00:44:48,370 --> 00:44:46,339

truly impressed with it as I was one

980

00:44:50,500 --> 00:44:48,380

more that I want to get to and then

981

00:44:52,690 --> 00:44:50,510

we'll get to all your questions

982

00:44:55,300 --> 00:44:52,700

it's just thanking people involved with

983

00:44:56,740 --> 00:44:55,310

this there's so many different levels to

984

00:44:59,920 --> 00:44:56,750

this program so many different

985

00:45:02,859 --> 00:44:59,930

individuals involved first off I want to

986

00:45:05,470 --> 00:45:02,869

start with Red Bluff high school from

987

00:45:07,780 --> 00:45:05,480

our district office to our site

988

00:45:10,359 --> 00:45:07,790

leadership here at the school all the

989

00:45:12,010 --> 00:45:10,369

way down to the individual teachers we

990

00:45:15,069 --> 00:45:12,020

are supported it's in so many different

991

00:45:17,800 --> 00:45:15,079

ways personally I know that this program

992

00:45:20,069 --> 00:45:17,810

would not work without support of all

993

00:45:22,720 --> 00:45:20,079

the science teachers in my department

994

00:45:25,000 --> 00:45:22,730

without them involved without them

995

00:45:27,400 --> 00:45:25,010

backing us we simply couldn't do what we

996

00:45:29,109 --> 00:45:27,410

do so that's really really appreciate

997

00:45:31,150 --> 00:45:29,119

when you see something like this that

998

00:45:32,740 --> 00:45:31,160

students are producing we're only able

999

00:45:35,380 --> 00:45:32,750

to do this with the support of everyone

1000

00:45:38,079 --> 00:45:35,390

involved with us here at Red Bluff now

1001

00:45:39,280 --> 00:45:38,089

it's not just what we talked about Red

1002

00:45:42,430 --> 00:45:39,290

Bluff it's not just the high school

1003

00:45:44,829 --> 00:45:42,440

because I know that these students are

1004

00:45:47,290 --> 00:45:44,839

receiving all kinds of support from

1005

00:45:50,470 --> 00:45:47,300

parents from family members from friends

1006

00:45:51,579 --> 00:45:50,480

in the community as well and so all the

1007

00:45:54,150 --> 00:45:51,589

red Bluff's should be proud of this

1008

00:45:56,710 --> 00:45:54,160

program at the school to the community

1009

00:45:59,710 --> 00:45:56,720

everyone that's involved with it

1010

00:46:02,230 --> 00:45:59,720

I just couldn't be happier with with the

1011

00:46:04,000 --> 00:46:02,240

work that we received them in addition

1012

00:46:05,880 --> 00:46:04,010

to Red Bull high school obviously we

1013

00:46:09,190 --> 00:46:05,890

have partnered with these two amazing

1014

00:46:11,589 --> 00:46:09,200

agencies the scientists that we work

1015

00:46:15,640 --> 00:46:11,599

with closely at NASA Ames Research

1016

00:46:19,059 --> 00:46:15,650

Center my Kubo Dave damar a Nicki

1017

00:46:22,000 --> 00:46:19,069

paronto these three scientists become as

1018

00:46:26,380 --> 00:46:22,010

much mentors for our students as they

1019

00:46:29,079 --> 00:46:26,390

are teachers they advise these students

1020

00:46:31,210 --> 00:46:29,089

they help them get into college as far

1021

00:46:33,339 --> 00:46:31,220

as letters of recommendation go as far

1022

00:46:36,150 --> 00:46:33,349

as getting them scholarships you can

1023

00:46:38,130 --> 00:46:36,160

call us at college paid for with

1024

00:46:40,470 --> 00:46:38,140

again letters of recommendation and so

1025

00:46:42,810 --> 00:46:40,480

the assistance and the guidance of these

1026

00:46:45,090 --> 00:46:42,820

NASA scientists is truly amazing and

1027

00:46:47,460 --> 00:46:45,100

that can also be said then of our

1028

00:46:49,860 --> 00:46:47,470

massive volcanic National Park Rangers

1029

00:46:51,840 --> 00:46:49,870

as well on the support the guidance the

1030

00:46:53,940 --> 00:46:51,850

fieldwork that we get the practical

1031

00:46:56,160 --> 00:46:53,950

application in the time that we get

1032

00:46:58,260 --> 00:46:56,170

assigned with these Park Rangers up at

1033

00:47:01,530 --> 00:46:58,270

at Lassen Volcanic National Park it's

1034

00:47:03,300 --> 00:47:01,540

truly amazing and it's it's impactful on

1035

00:47:06,690 --> 00:47:03,310

our students in so many different ways

1036

00:47:08,250 --> 00:47:06,700

and so I just like to thank everyone

1037

00:47:09,570 --> 00:47:08,260

involved with this program in the

1038

00:47:12,930 --> 00:47:09,580

community and the school of Red Bluff

1039

00:47:15,870 --> 00:47:12,940

with NASA Ames Research Center and and

1040

00:47:17,250 --> 00:47:15,880

beyond and then also with the most

1041

00:47:21,510 --> 00:47:17,260

volcanic national park in the entire

1042

00:47:24,600 --> 00:47:21,520

park service really Benham and wonderful

1043

00:47:26,400 --> 00:47:24,610

working with all these people so with

1044

00:47:28,290 --> 00:47:26,410

that being said I'm hoping I've given

1045

00:47:33,920 --> 00:47:28,300

you enough time to type out some

1046

00:47:33,930 --> 00:47:37,039

you

1047

00:47:41,009 --> 00:47:39,630

okay so we do have some questions we'll

1048

00:47:42,870 --> 00:47:41,019

get people some more time to write those

1049

00:47:46,680 --> 00:47:42,880

in in the meantime I'll read out some

1050

00:47:47,759 --> 00:47:46,690

shout outs so Aaron Michael says is so

1051  
00:47:49,529 --> 00:47:47,769  
great the students still get to

1052  
00:47:51,450 --> 00:47:49,539  
participate and show their hard work

1053  
00:47:53,579 --> 00:47:51,460  
great job to everyone

1054  
00:47:54,989 --> 00:47:53,589  
federal Junior congratulations students

1055  
00:47:58,230 --> 00:47:54,999  
great contributions to the scientific

1056  
00:48:03,660 --> 00:48:00,749  
Santee Dueck amazing presentations

1057  
00:48:06,150 --> 00:48:03,670  
you've done NASA and our BHS very proud

1058  
00:48:07,890 --> 00:48:06,160  
congratulations hi Sandy

1059  
00:48:09,299 --> 00:48:07,900  
Tammy Cooper says shout out to mr.

1060  
00:48:13,170 --> 00:48:09,309  
Michael great teachers create great

1061  
00:48:15,960 --> 00:48:13,180  
experiences for students and now we got

1062  
00:48:18,180 --> 00:48:15,970  
some questions so first from Sandy Dueck

1063  
00:48:20,400 --> 00:48:18,190

besides sulfur what other sources of

1064

00:48:24,570 --> 00:48:20,410

ions are there in the surrounding

1065

00:48:24,580 --> 00:48:27,030

you

1066

00:48:31,980 --> 00:48:29,790

mmm who would like to go on out how

1067

00:48:34,800 --> 00:48:31,990

about a second-year intern let's throw

1068

00:48:36,510 --> 00:48:34,810

it at em first and there's no pressure

1069

00:48:37,859 --> 00:48:36,520

at all I like people are watching you

1070

00:48:39,180 --> 00:48:37,869

it's not like you have NASA scientists

1071

00:48:42,180 --> 00:48:39,190

looking over your shoulders or anything

1072

00:48:44,790 --> 00:48:42,190

to correct you if you don't well wait we

1073

00:48:45,570 --> 00:48:44,800

will know right we're not gonna get this

1074

00:48:55,000 --> 00:48:45,580

one wrong

1075

00:49:02,120 --> 00:48:59,240

don't all go at once and just to

1076  
00:49:03,740 --> 00:49:02,130  
reiterate asking about the other sources

1077  
00:49:11,650 --> 00:49:03,750  
of ions in the surrounding environment

1078  
00:49:15,410 --> 00:49:14,060  
I'm used to this this is you know I

1079  
00:49:17,960 --> 00:49:15,420  
haven't done this in about two months

1080  
00:49:19,960 --> 00:49:17,970  
now because I haven't asked Jim I'm used

1081  
00:49:23,060 --> 00:49:19,970  
to just the awkward silence of waiting

1082  
00:49:24,560 --> 00:49:23,070  
I'm okay with it like your loved ones

1083  
00:49:29,660 --> 00:49:24,570  
are watching you right now that are

1084  
00:49:38,450 --> 00:49:29,670  
sitting there going oh my kid is getting

1085  
00:49:40,310 --> 00:49:38,460  
called out if any students are watching

1086  
00:49:41,630 --> 00:49:40,320  
just the live stream feel free to pop

1087  
00:49:48,290 --> 00:49:41,640  
your answer in the chat if you want to

1088  
00:49:52,700 --> 00:49:48,300

answer that way as well okay where I

1089

00:49:54,410 --> 00:49:52,710

guess we're way too shy um devar

1090

00:49:56,450 --> 00:49:54,420

or Mike or Nikki do you want to help

1091

00:50:02,150 --> 00:49:56,460

them out at all this is water chemistry

1092

00:50:03,710 --> 00:50:02,160

Mike what you do it one of the students

1093

00:50:06,200 --> 00:50:03,720

start to answer so let's pause for a

1094

00:50:11,780 --> 00:50:06,210

second ask me did you did you have

1095

00:50:14,810 --> 00:50:11,790

something you you wanted to add so so

1096

00:50:18,130 --> 00:50:14,820

phrase one today anions found out Werner

1097

00:50:23,120 --> 00:50:18,140

Valley we also looked into cations and

1098

00:50:26,180 --> 00:50:23,130

some examples are iron aluminum sodium

1099

00:50:30,430 --> 00:50:26,190

and we analyzed those as well in our

1100

00:50:36,680 --> 00:50:34,010

they came from the rocks also so from

1101  
00:50:37,010 --> 00:50:36,690  
Rock dissolution thank you there's the

1102  
00:50:41,810 --> 00:50:37,020  
answer

1103  
00:50:43,550 --> 00:50:41,820  
nice nice all right nicely done

1104  
00:50:45,980 --> 00:50:43,560  
next question comes from federal Junior

1105  
00:50:47,780 --> 00:50:45,990  
he says my daughter wants to know is

1106  
00:50:49,940 --> 00:50:47,790  
Lassen Volcanic National Park of the

1107  
00:50:52,900 --> 00:50:49,950  
only place where this kind of science is

1108  
00:51:00,589 --> 00:50:55,819  
it's sort of a question to a teacher in

1109  
00:51:04,269 --> 00:51:00,599  
a way but I don't know or or maybe

1110  
00:51:06,469 --> 00:51:04,279  
Mickey I don't know well I think we have

1111  
00:51:08,809 --> 00:51:06,479  
scientists with us that maybe does this

1112  
00:51:10,519 --> 00:51:08,819  
research in another Park as well as

1113  
00:51:13,190 --> 00:51:10,529

Latin volcanic National Park is that

1114

00:51:16,219 --> 00:51:13,200

true that is true

1115

00:51:18,380 --> 00:51:16,229

certainly we there are quite a few

1116

00:51:20,299 --> 00:51:18,390

different studies that take place in

1117

00:51:23,359 --> 00:51:20,309

hydrothermal areas like Yellowstone

1118

00:51:24,829 --> 00:51:23,369

National Park we use them as analogs for

1119

00:51:27,859 --> 00:51:24,839

different environments on other

1120

00:51:29,479 --> 00:51:27,869

planetary bodies but as mr. Michel said

1121

00:51:32,509 --> 00:51:29,489

earlier what's unique about this program

1122

00:51:35,120 --> 00:51:32,519

it is it's the only astrobiology

1123

00:51:38,269 --> 00:51:35,130

internship program within the National

1124

00:51:41,420 --> 00:51:38,279

Park Service and it's also a unique

1125

00:51:44,089 --> 00:51:41,430

program within certainly NASA Ames as

1126  
00:51:45,559 --> 00:51:44,099  
well so this is partnership between the

1127  
00:51:47,719 --> 00:51:45,569  
three agencies carrying out research

1128  
00:51:52,969 --> 00:51:47,729  
within Lassen Volcanic National Park is

1129  
00:51:53,420 --> 00:51:52,979  
completely unique all right Thank You

1130  
00:51:55,880 --> 00:51:53,430  
Nicki

1131  
00:51:58,009 --> 00:51:55,890  
our next question comes from Colin

1132  
00:52:00,289 --> 00:51:58,019  
Agharta out of all the national parks

1133  
00:52:02,690 --> 00:52:00,299  
and landmarks in the United States what

1134  
00:52:07,089 --> 00:52:02,700  
makes NASA choose lassen as the park to

1135  
00:52:09,559 --> 00:52:07,099  
compare to Mars biology and environment

1136  
00:52:12,890 --> 00:52:09,569  
all right Nickey and

1137  
00:52:14,900 --> 00:52:12,900  
now it's my turn I research in several

1138  
00:52:18,289 --> 00:52:14,910

national parks but the one thing about

1139

00:52:21,109 --> 00:52:18,299

lassen that is so nice is that first of

1140

00:52:23,769 --> 00:52:21,119

all just plain proximity to population

1141

00:52:26,779 --> 00:52:23,779

centers where we could really can engage

1142

00:52:30,229 --> 00:52:26,789

high school students in sort of real

1143

00:52:33,170 --> 00:52:30,239

immersion hand-on experience in a

1144

00:52:35,690 --> 00:52:33,180

national park and so the fact that NASA

1145

00:52:37,519 --> 00:52:35,700

Ames Research Center's in California and

1146

00:52:40,339 --> 00:52:37,529

that Red Bluff is so close to lassen

1147

00:52:44,680 --> 00:52:40,349

really set up an ideal geography to

1148

00:52:46,640 --> 00:52:44,690

pursue this course I mean in principle

1149

00:52:49,579 --> 00:52:46,650

Yellowstone National Park would be

1150

00:52:51,950 --> 00:52:49,589

another great place you know it's got

1151  
00:52:52,579 --> 00:52:51,960  
the kinds of features also that we see

1152  
00:52:55,640 --> 00:52:52,589  
on Mars

1153  
00:52:57,739 --> 00:52:55,650  
like what attracted is to lessen the

1154  
00:53:00,200 --> 00:52:57,749  
evidence of volcanic activity which we

1155  
00:53:02,209 --> 00:53:00,210  
now see happened on Mars we've now found

1156  
00:53:04,550 --> 00:53:02,219  
evidence of hot springs that once

1157  
00:53:07,340 --> 00:53:04,560  
existed on Mars and so in

1158  
00:53:09,620 --> 00:53:07,350  
lassen is a great match but really any

1159  
00:53:11,510 --> 00:53:09,630  
national park that embodies some of

1160  
00:53:13,790 --> 00:53:11,520  
these features like hydrothermal

1161  
00:53:15,500 --> 00:53:13,800  
activity hot springs and so forth as

1162  
00:53:17,690 --> 00:53:15,510  
well as the other environments where

1163  
00:53:20,900 --> 00:53:17,700

water can support life I mean they would

1164

00:53:23,300 --> 00:53:20,910

be eligible also as good good candidate

1165

00:53:26,780 --> 00:53:23,310

sites but again it's that proximity of

1166

00:53:28,610 --> 00:53:26,790

lassen to Red Bluff with high school

1167

00:53:31,130 --> 00:53:28,620

that was willing to do this and also the

1168

00:53:34,340 --> 00:53:31,140

wonderful cooperation we've had with the

1169

00:53:37,340 --> 00:53:34,350

lassen park staff it really made lassen

1170

00:53:41,029 --> 00:53:37,350

that you had choice place to launch this

1171

00:53:45,749 --> 00:53:45,029

okay thank you Dave let's see some more

1172

00:53:47,670 --> 00:53:45,759

shout outs

1173

00:53:50,400 --> 00:53:47,680

this is wonderful very professional Wow

1174

00:53:51,480 --> 00:53:50,410

great experience for kids thank you

1175

00:53:52,859 --> 00:53:51,490

everybody

1176

00:53:55,529 --> 00:53:52,869

the next question comes from Chris to

1177

00:53:57,900 --> 00:53:55,539

Te'o do you think the stream flow rate

1178

00:54:00,150 --> 00:53:57,910

might be important and if so is this

1179

00:54:04,019 --> 00:54:00,160

something that was or can be tested with

1180

00:54:06,210 --> 00:54:04,029

the laboratory equipment okay is that

1181

00:54:07,980 --> 00:54:06,220

Ruth respect to biology I'm assuming

1182

00:54:09,930 --> 00:54:07,990

that it might be in which case Nicky do

1183

00:54:13,410 --> 00:54:09,940

you want to give a try at this or oh I'm

1184

00:54:15,599 --> 00:54:13,420

sorry these are for students back to the

1185

00:54:18,569 --> 00:54:15,609

students mr. Michael how do you want to

1186

00:54:21,690 --> 00:54:18,579

manage this one yeah let's see I'll give

1187

00:54:24,420 --> 00:54:21,700

mr. you know me two or three four five

1188

00:54:25,950 --> 00:54:24,430

percents and see if any student wants to

1189

00:54:27,720 --> 00:54:25,960

try to tackle this is it something I

1190

00:54:31,380 --> 00:54:27,730

know we have not discussed at all and so

1191

00:54:35,279 --> 00:54:31,390

okay sure - to hear what they come up

1192

00:54:36,569 --> 00:54:35,289

with on this and so in terms is there

1193

00:54:44,759 --> 00:54:36,579

anyone that would like to give this one

1194

00:54:49,319 --> 00:54:44,769

a go mr. Michael could I say something

1195

00:54:52,109 --> 00:54:49,329

about that yes in our class we you focus

1196

00:54:56,190 --> 00:54:52,119

on very still water we just had a small

1197

00:54:58,740 --> 00:54:56,200

column in our experiments however when

1198

00:54:59,670 --> 00:54:58,750

we visited the NASA Ames Research Center

1199

00:55:03,480 --> 00:54:59,680

in the past

1200

00:55:06,059 --> 00:55:03,490

I know Mickey has set up ways to pass

1201

00:55:08,910 --> 00:55:06,069

that theory of flow rates as they had

1202

00:55:12,299 --> 00:55:08,920

different circulating water systems for

1203

00:55:18,590 --> 00:55:12,309

different microbial packs but for this

1204

00:55:24,120 --> 00:55:22,380

and just so the audience knows I mean

1205

00:55:26,190 --> 00:55:24,130

one of the beautiful things about this

1206

00:55:28,140 --> 00:55:26,200

program besides the partnership and the

1207

00:55:30,630 --> 00:55:28,150

experience the kids are getting is the

1208

00:55:33,960 --> 00:55:30,640

evolution of it and what I mean by that

1209

00:55:35,730 --> 00:55:33,970

is that we are constantly changing this

1210

00:55:39,140 --> 00:55:35,740

program and constantly looking to

1211

00:55:41,790 --> 00:55:39,150

further our understanding a park and of

1212

00:55:44,790 --> 00:55:41,800

what we find out there the microbes are

1213

00:55:46,410 --> 00:55:44,800

rocked everything and so that couldn't

1214

00:55:48,150 --> 00:55:46,420

very well be a direction that this

1215

00:55:50,070 --> 00:55:48,160

program takes here in the next couple of

1216

00:55:51,990 --> 00:55:50,080

years we could start looking at things

1217

00:55:55,770 --> 00:55:52,000

like low ratings and stuff like that and

1218

00:55:58,080 --> 00:55:55,780

just seeing how it impacts it so a kid

1219

00:55:59,640 --> 00:55:58,090

yeah but quick comment or two about just

1220

00:56:04,640 --> 00:55:59,650

the effect of slowing water

1221

00:56:06,030 --> 00:56:04,650

I'm sure if you want me to jump in so

1222

00:56:07,800 --> 00:56:06,040

yes

1223

00:56:10,500 --> 00:56:07,810

flowing water can be a very important

1224

00:56:13,770 --> 00:56:10,510

variable it affects nutrient delivery to

1225

00:56:15,990 --> 00:56:13,780

the microbes and also in terms of

1226

00:56:18,030 --> 00:56:16,000

flowing water you know I don't know if

1227

00:56:21,270 --> 00:56:18,040

Chris you were getting at it from this

1228

00:56:23,730 --> 00:56:21,280

perspective but you know might it also

1229

00:56:26,060 --> 00:56:23,740

affect the erosion of the rock to

1230

00:56:28,770 --> 00:56:26,070

release elements into solution as well

1231

00:56:30,180 --> 00:56:28,780

but yes it can have an impact on the

1232

00:56:33,210 --> 00:56:30,190

microbes not just from nutrient delivery

1233

00:56:35,310 --> 00:56:33,220

but it can also kind of help shape how

1234

00:56:36,630 --> 00:56:35,320

the microbes grow you heard mentioned in

1235

00:56:39,120 --> 00:56:36,640

the presentation of these sort of

1236

00:56:41,250 --> 00:56:39,130

streamer like fabrics and the flow

1237

00:56:49,590 --> 00:56:41,260

that's something that's a consequence of

1238

00:56:52,490 --> 00:56:49,600

the hydrodynamics of water flow great ok

1239

00:56:54,870 --> 00:56:52,500

our next question comes from Linda Janka

1240

00:57:02,420 --> 00:56:54,880

did you see a difference between the

1241

00:57:07,280 --> 00:57:04,540

again let's try to start with the

1242

00:57:10,190 --> 00:57:07,290

interns is there any intern that would

1243

00:57:12,500 --> 00:57:10,200

would be interested in answering that

1244

00:57:30,380 --> 00:57:12,510

question so microscopically were our

1245

00:57:32,599 --> 00:57:30,390

sites different and Nikki I want to

1246

00:57:35,960 --> 00:57:32,609

throw throw it to you but I kind of am I

1247

00:57:38,000 --> 00:57:35,970

guess there could you offer some

1248

00:57:40,670 --> 00:57:38,010

insights to that yeah I know it's a

1249

00:57:43,940 --> 00:57:40,680

great question so in the presentation

1250

00:57:46,160 --> 00:57:43,950

you heard the students talk about the

1251  
00:57:48,109 --> 00:57:46,170  
the what we call the abundance and

1252  
00:57:49,880 --> 00:57:48,119  
diversity of microbes at the different

1253  
00:57:51,799 --> 00:57:49,890  
field sites and in their experimental

1254  
00:57:55,130 --> 00:57:51,809  
set up in the lab and in what we call

1255  
00:57:57,680 --> 00:57:55,140  
these winogradsky columns so they did do

1256  
00:57:59,420 --> 00:57:57,690  
they took samples of their winogradsky

1257  
00:58:00,980 --> 00:57:59,430  
columns they looked at them under the

1258  
00:58:03,620 --> 00:58:00,990  
microscope and what they were doing is

1259  
00:58:05,540 --> 00:58:03,630  
they were looking at you know was there

1260  
00:58:07,910 --> 00:58:05,550  
a lot of biomass was the growth really

1261  
00:58:09,710 --> 00:58:07,920  
robust and abundant and also the

1262  
00:58:11,720 --> 00:58:09,720  
diversity how many different types of

1263  
00:58:13,430 --> 00:58:11,730

cells did they see and they saw very

1264

00:58:15,740 --> 00:58:13,440

distinctive differences between the

1265

00:58:19,400 --> 00:58:15,750

different field sites so as you heard

1266

00:58:21,319 --> 00:58:19,410

the students say at the more neutral pH

1267

00:58:23,180 --> 00:58:21,329

and lower temperature sites they saw the

1268

00:58:25,280 --> 00:58:23,190

greatest amount of diversity the most

1269

00:58:27,440 --> 00:58:25,290

amount of different types of cells and

1270

00:58:29,780 --> 00:58:27,450

the greatest amount of biomass because

1271

00:58:32,720 --> 00:58:29,790

those conditions were pretty favorable

1272

00:58:34,640 --> 00:58:32,730

favorable for growth as you went to the

1273

00:58:37,130 --> 00:58:34,650

more extreme sites like the alkaline

1274

00:58:39,020 --> 00:58:37,140

site or doubles kitchen the abundance

1275

00:58:40,400 --> 00:58:39,030

and the diversity tended to decrease a

1276

00:58:43,099 --> 00:58:40,410

little bit because those are fairly

1277

00:58:44,539 --> 00:58:43,109

challenging conditions to grow in and so

1278

00:58:47,420 --> 00:58:44,549

the students did see discrete

1279

00:58:50,120 --> 00:58:47,430

differences in in the microscopy and I'm

1280

00:58:51,740 --> 00:58:50,130

sure that had they had the chance they

1281

00:58:54,950 --> 00:58:51,750

would have presented some images of that

1282

00:58:57,319 --> 00:58:54,960

I just want to say that last year of the

1283

00:59:03,109 --> 00:58:57,329

year before they actually had the

1284

00:59:04,789 --> 00:59:03,119

audacity or the the insight to actually

1285

00:59:07,069 --> 00:59:04,799

stick their smartphones right up to the

1286

00:59:08,299 --> 00:59:07,079

eyelet eyepiece of the microscope and I

1287

00:59:10,630 --> 00:59:08,309

thought this isn't going to work

1288

00:59:12,710 --> 00:59:10,640

and they just got wonderful images

1289

00:59:14,180 --> 00:59:12,720

that's something I never would have

1290

00:59:16,070 --> 00:59:14,190

attempted and this was why you get young

1291

00:59:18,020 --> 00:59:16,080

people involved in science

1292

00:59:20,180 --> 00:59:18,030

they get outside the box and do things

1293

00:59:23,150 --> 00:59:20,190

we wouldn't have dreamed about but yeah

1294

00:59:25,449 --> 00:59:23,160

the guy got some great pictures using

1295

00:59:28,759 --> 00:59:25,459

that method

1296

00:59:31,459 --> 00:59:28,769

all right fantastic next question is

1297

00:59:37,029 --> 00:59:31,469

from Trevor Breckenridge he asks where

1298

00:59:43,660 --> 00:59:40,509

well it really depends on the student

1299

00:59:45,970 --> 00:59:43,670

you know

1300

00:59:47,380 --> 00:59:45,980

the second-year interns are seniors in

1301

00:59:49,390 --> 00:59:47,390

there they're branching out there

1302

00:59:54,220 --> 00:59:49,400

they'll be leaving us here in a couple

1303

00:59:57,310 --> 00:59:54,230

months and going off to school and it's

1304

01:00:00,520 --> 00:59:57,320

wide range in the past we've had

1305

01:00:04,770 --> 01:00:00,530

students you know leave this program and

1306

01:00:07,450 --> 01:00:04,780

go as far away as Notre Dame

1307

01:00:09,430 --> 01:00:07,460

you know there's they're just spread out

1308

01:00:13,620 --> 01:00:09,440

across the country really as far as

1309

01:00:17,950 --> 01:00:13,630

colleges go I'm still waiting for the

1310

01:00:21,610 --> 01:00:17,960

invite to you know a next in turn just

1311

01:00:24,190 --> 01:00:21,620

like PhD you know or Nobel Prize

1312

01:00:26,620 --> 01:00:24,200

ceremony or something like that it that

1313

01:00:28,450 --> 01:00:26,630

hasn't quite happened yet but but I'm

1314

01:00:30,370 --> 01:00:28,460

hopeful that these before they're

1315

01:00:32,560 --> 01:00:30,380

leaving us now you know not to put

1316

01:00:35,650 --> 01:00:32,570

pressure on you know all you guys out

1317

01:00:37,600 --> 01:00:35,660

Kesey and ask me Katie and Sahil don't

1318

01:00:39,700 --> 01:00:37,610

put pressure on you but but I will

1319

01:00:43,180 --> 01:00:39,710

expect a front row seat at your Nobel

1320

01:00:44,200 --> 01:00:43,190

Prize ceremony when you get something

1321

01:00:47,260 --> 01:00:44,210

okay

1322

01:00:50,350 --> 01:00:47,270

but really the the opportunities are

1323

01:00:54,580 --> 01:00:50,360

endless when when we look at the fact

1324

01:00:56,590 --> 01:00:54,590

that this is a unique program it has

1325

01:01:00,010 --> 01:00:56,600

carried some weight and allowed students

1326  
01:01:02,530 --> 01:01:00,020  
to go out and experience things a wide

1327  
01:01:04,060 --> 01:01:02,540  
range places and and it's really just up

1328  
01:01:05,140 --> 01:01:04,070  
to them as far as where they want to go

1329  
01:01:08,110 --> 01:01:05,150  
and what they want to do when they get

1330  
01:01:09,880 --> 01:01:08,120  
there I'd add something to that it's a

1331  
01:01:11,140 --> 01:01:09,890  
lot of these students come in with sort

1332  
01:01:13,690 --> 01:01:11,150  
of an interest in science and technology

1333  
01:01:15,130 --> 01:01:13,700  
but you know these are broad fields and

1334  
01:01:16,780 --> 01:01:15,140  
I think one of the thing I've noticed

1335  
01:01:19,540 --> 01:01:16,790  
over the years is it allows them to

1336  
01:01:22,540 --> 01:01:19,550  
identify which and areas of science or

1337  
01:01:24,280 --> 01:01:22,550  
which aspects of and technology really

1338  
01:01:26,860 --> 01:01:24,290

sort of interested in minuend sometimes

1339

01:01:28,720 --> 01:01:26,870

it's hard for a student to take that

1340

01:01:30,850 --> 01:01:28,730

step unless they experience sort of

1341

01:01:33,910 --> 01:01:30,860

hands-on immersion experiences things

1342

01:01:36,040 --> 01:01:33,920

and so we like to think that this course

1343

01:01:38,680 --> 01:01:36,050

amongst other experiences will have will

1344

01:01:41,790 --> 01:01:38,690

just help really make the connection

1345

01:01:44,260 --> 01:01:41,800

between an interest and a profession

1346

01:01:46,930 --> 01:01:44,270

yeah I was just gonna kind of follow

1347

01:01:49,030 --> 01:01:46,940

that up in terms of other opportunities

1348

01:01:50,800 --> 01:01:49,040

that are out there nASA has other

1349

01:01:53,320 --> 01:01:50,810

internship opportunities for

1350

01:01:53,970 --> 01:01:53,330

undergraduates and graduate students and

1351

01:02:00,450 --> 01:01:53,980

and

1352

01:02:02,520 --> 01:02:00,460

can try to put in the chat window for

1353

01:02:03,780 --> 01:02:02,530

other internship opportunities so

1354

01:02:06,410 --> 01:02:03,790

there's an opportunity again for

1355

01:02:08,460 --> 01:02:06,420

sustained exposure and mentoring to

1356

01:02:13,470 --> 01:02:08,470

different NASA science and engineering

1357

01:02:15,750 --> 01:02:13,480

programs yeah just a final comment I

1358

01:02:18,090 --> 01:02:15,760

found that the sooner students can get

1359

01:02:19,830 --> 01:02:18,100

involved in a research experience or a

1360

01:02:22,380 --> 01:02:19,840

hands-on experience like this the more

1361

01:02:24,870 --> 01:02:22,390

assertive and proactive they are about

1362

01:02:26,220 --> 01:02:24,880

taking the next steps in their career

1363

01:02:27,480 --> 01:02:26,230

you know they've already been through a

1364

01:02:28,859 --> 01:02:27,490

challenge sort of professional

1365

01:02:31,010 --> 01:02:28,869

experience and it really gives them a

1366

01:02:33,570 --> 01:02:31,020

more generally more self-confidence in

1367

01:02:35,849 --> 01:02:33,580

making key decisions down the room and

1368

01:02:40,140 --> 01:02:35,859

the whole importance of being able to

1369

01:02:42,060 --> 01:02:40,150

engage in critical thinking I have a lot

1370

01:02:43,560 --> 01:02:42,070

of good advice in there Trevor Falls

1371

01:02:45,000 --> 01:02:43,570

that up with the comment great

1372

01:02:46,980 --> 01:02:45,010

presentation by the way wonderful

1373

01:02:49,590 --> 01:02:46,990

information and production value Thank

1374

01:02:52,170 --> 01:02:49,600

You Trevor next questions from Fred and

1375

01:02:55,050 --> 01:02:52,180

ol jr. are there any seasonal changes in

1376

01:02:59,420 --> 01:02:55,060

the microbial life summer compared to

1377

01:03:03,349 --> 01:03:01,609

I don't know if students are prepared to

1378

01:03:06,859 --> 01:03:03,359

answer that one because we didn't one

1379

01:03:11,410 --> 01:03:06,869

field trip in September but I'll be

1380

01:03:21,290 --> 01:03:16,640

know that Dave had talked about that in

1381

01:03:25,210 --> 01:03:21,300

different seasons the water the ice or

1382

01:03:27,559 --> 01:03:25,220

water can change slightly in temperature

1383

01:03:29,000 --> 01:03:27,569

I'm not quite sure about anything else

1384

01:03:33,859 --> 01:03:29,010

but I do know that temperature can have

1385

01:03:38,079 --> 01:03:33,869

a huge effect on microbes so I think

1386

01:03:42,130 --> 01:03:38,089

that there is probably a change in

1387

01:03:47,450 --> 01:03:42,140

abundance and maybe diversity as well

1388

01:03:48,349 --> 01:03:47,460

with each season so yeah Nicki you got a

1389

01:03:52,040 --> 01:03:48,359

follow-up on that

1390

01:03:53,420 --> 01:03:52,050

oh I thought that was a great answer and

1391

01:03:55,460 --> 01:03:53,430

you know the students were at a

1392

01:03:58,309 --> 01:03:55,470

disadvantage of this year because just

1393

01:04:00,559 --> 01:03:58,319

as we were going to do our winter slash

1394

01:04:03,170 --> 01:04:00,569

spring snowshoeing trip to sample a bit

1395

01:04:06,079 --> 01:04:03,180

sulfur works everything was shut down

1396

01:04:07,849 --> 01:04:06,089

due to Koba 19 so the students didn't

1397

01:04:10,819 --> 01:04:07,859

have an opportunity to observe that this

1398

01:04:12,920 --> 01:04:10,829

year but yes there can be changes in

1399

01:04:14,660 --> 01:04:12,930

temperature across the seasons but also

1400

01:04:16,849 --> 01:04:14,670

there can be a change in light intensity

1401

01:04:18,770 --> 01:04:16,859

so during the winter months as we all

1402

01:04:20,630 --> 01:04:18,780

know things get a little bit darker the

1403

01:04:22,700 --> 01:04:20,640

Sun angles a little bit lower and that

1404

01:04:24,650 --> 01:04:22,710

can impact some of these photosynthetic

1405

01:04:27,079 --> 01:04:24,660

microbes and we can actually see quite a

1406

01:04:29,410 --> 01:04:27,089

significant decrease in growth across

1407

01:04:35,559 --> 01:04:29,420

the seasons but Katy gave a great answer

1408

01:04:39,740 --> 01:04:37,760

okay and there's the mute button okay

1409

01:04:43,130 --> 01:04:39,750

moving along our next question comes

1410

01:04:45,349 --> 01:04:43,140

from Tim Drury he asks have any

1411

01:04:46,940 --> 01:04:45,359

discoveries from the Rovers on Mars made

1412

01:04:50,089 --> 01:04:46,950

you want to take a closer look at

1413

01:04:52,220 --> 01:04:50,099

specific sites data in Warner Valley how

1414

01:04:56,380 --> 01:04:52,230

our findings in both areas possibly

1415

01:04:58,670 --> 01:04:56,390

similar well when we first selected

1416

01:05:01,099 --> 01:04:58,680

lassen and Warner Valley we were really

1417

01:05:04,339 --> 01:05:01,109

focusing in on the hot springs because

1418

01:05:06,440 --> 01:05:04,349

the discoveries made by the spirit rover

1419

01:05:08,720 --> 01:05:06,450

said wow you know we're finding these

1420

01:05:11,839 --> 01:05:08,730

fossil equivalents of these sites on

1421

01:05:13,549 --> 01:05:11,849

Mars and so wouldn't it be great to you

1422

01:05:16,069 --> 01:05:13,559

know pick Warner Valley as a site but

1423

01:05:18,170 --> 01:05:16,079

then as it turned out and especially

1424

01:05:20,990 --> 01:05:18,180

with the curiosity mission and now as it

1425

01:05:24,980 --> 01:05:21,000

turns out with the Mars 2020 Rover

1426

01:05:27,559 --> 01:05:24,990

mission these sites where you just have

1427

01:05:29,120 --> 01:05:27,569

streams and and deposits in water and

1428

01:05:31,400 --> 01:05:29,130

and and those types of things they're

1429

01:05:34,430 --> 01:05:31,410

also becoming really exciting places and

1430

01:05:36,290 --> 01:05:34,440

so we've actually it's actually deepened

1431

01:05:38,329 --> 01:05:36,300

our appreciation for Warner Valley as a

1432

01:05:40,130 --> 01:05:38,339

field site because it not only has the

1433

01:05:42,500 --> 01:05:40,140

hot springs at different flavors by the

1434

01:05:45,380 --> 01:05:42,510

way the acidic ones and the more

1435

01:05:47,150 --> 01:05:45,390

alkaline types but also the mainstream

1436

01:05:51,200 --> 01:05:47,160

itself and other features which really

1437

01:05:54,620 --> 01:05:51,210

makes Water Valley a sort of a real menu

1438

01:05:56,780 --> 01:05:54,630

of options to make you know sort of

1439

01:05:59,960 --> 01:05:56,790

relationships with Mars

1440

01:06:02,089 --> 01:05:59,970

so basically streams and deltas and

1441

01:06:03,829 --> 01:06:02,099

lakes and stuff as well as hot spring

1442

01:06:06,289 --> 01:06:03,839

environments these are sort of the

1443

01:06:09,079 --> 01:06:06,299

leading candidates for places to explore

1444

01:06:12,530 --> 01:06:09,089

on Mars and the types of observations we

1445

01:06:14,059 --> 01:06:12,540

make at lassen indicate that amongst the

1446

01:06:15,950 --> 01:06:14,069

different types of hot springs are

1447

01:06:18,049 --> 01:06:15,960

amongst the different types of deposits

1448

01:06:19,880 --> 01:06:18,059

in water which which ones are more

1449

01:06:22,010 --> 01:06:19,890

promising and you're a little bit about

1450

01:06:24,289 --> 01:06:22,020

the presentation tonight but that is

1451

01:06:29,190 --> 01:06:24,299

certainly relevant to our future site

1452

01:06:35,380 --> 01:06:32,350

great thank you Dave Krista tails

1453

01:06:36,310 --> 01:06:35,390

pointing out interned acid gov thank you

1454

01:06:38,740 --> 01:06:36,320

Chris

1455

01:06:41,680 --> 01:06:38,750

friend null jr. has a question from his

1456

01:06:42,280 --> 01:06:41,690

daughter she asks how did they hike that

1457

01:06:44,860 --> 01:06:42,290

far

1458

01:06:48,000 --> 01:06:44,870

how did they stay outside overnight what

1459

01:06:54,450 --> 01:06:48,010

did they eat yeah

1460

01:07:12,790 --> 01:06:58,090

who would like to gladwyn so first off

1461

01:07:24,040 --> 01:07:15,590

well I guess maybe it didn't really

1462

01:07:30,710 --> 01:07:26,080

somebody in this presentation talked

1463

01:07:37,509 --> 01:07:33,520

you

1464

01:07:44,120 --> 01:07:41,539

well our high quiz it wasn't that long

1465

01:07:47,569 --> 01:07:44,130

it was actually pretty nice it had just

1466

01:07:49,969 --> 01:07:47,579

rained and so it was really cool and

1467

01:07:53,180 --> 01:07:49,979

really nice - Wow

1468

01:07:54,559 --> 01:07:53,190

take the hike we actually our group of

1469

01:07:57,019 --> 01:07:54,569

mainstream when we were walking back I

1470

01:07:58,640 --> 01:07:57,029

think it was the first day we like saw

1471

01:08:05,299 --> 01:07:58,650

it deer in the field so it was actually

1472

01:08:08,120 --> 01:08:05,309

a pretty nice walk and so um we walked

1473

01:08:09,890 --> 01:08:08,130

the whole hike on our first date

1474

01:08:13,939 --> 01:08:09,900

- all the field sites and then on the

1475

01:08:15,199 --> 01:08:13,949

second day we just went to our own field

1476

01:08:20,780 --> 01:08:15,209

sites ah

1477

01:08:24,050 --> 01:08:20,790

and also they Vickie and Mike also

1478

01:08:32,019 --> 01:08:24,060

brought a lot of nice suit and they did

1479

01:08:36,319 --> 01:08:32,029

a really nice trip and mr. Michael - hey

1480

01:08:37,399 --> 01:08:36,329

I'm just gonna ask so for maybe some of

1481

01:08:39,410 --> 01:08:37,409

the students that was their first time

1482

01:08:42,620 --> 01:08:39,420

camping and I'm gonna guess it was the

1483

01:08:44,959 --> 01:08:42,630

first time for all of you hearing an

1484

01:08:49,999 --> 01:08:44,969

astrobiology presentation given at the

1485

01:08:52,849 --> 01:08:50,009

campsite with DES bringing out a screen

1486

01:08:54,950 --> 01:08:52,859

and a laptop and a way to project it

1487

01:09:03,649 --> 01:08:54,960

that was kind of fun and hooking up to

1488

01:09:04,930 --> 01:09:03,659

somebody's car battery for power okay

1489

01:09:07,160 --> 01:09:04,940

great thanks so much

1490

01:09:11,059 --> 01:09:07,170

Nikki Mike Dave how many more questions

1491

01:09:14,269 --> 01:09:11,069

or do you wanna take uh well I think

1492

01:09:16,339 --> 01:09:14,279

maybe we should do there what do you

1493

01:09:24,079 --> 01:09:16,349

think mr. Roybal yeah maybe maybe one or

1494

01:09:26,629 --> 01:09:24,089

two more one more great great before

1495

01:09:30,220 --> 01:09:26,639

that uh Linda Janka has a comment the

1496

01:09:35,269 --> 01:09:32,439

relating your answers please make sure

1497

01:09:36,649 --> 01:09:35,279

okay

1498

01:09:38,899 --> 01:09:36,659

the presentation came through clear and

1499

01:09:40,939 --> 01:09:38,909

was great so thank you Linda she also

1500

01:09:42,950 --> 01:09:40,949

has a question to the students did you

1501

01:09:45,169 --> 01:09:42,960

enjoy yourselves will any of you want to

1502

01:09:50,329 --> 01:09:45,179

pursue a career in science great

1503

01:09:54,560 --> 01:09:51,890

yeah I can speak from personal

1504

01:09:55,910 --> 01:09:54,570

experience that I had a lot of fun in

1505

01:09:57,819 --> 01:09:55,920

this class and I also feel like I

1506

01:10:02,060 --> 01:09:57,829

learned there's a great incorporation of

1507

01:10:03,680 --> 01:10:02,070

fun while also learning a lot about a

1508

01:10:06,350 --> 01:10:03,690

topic of signs that I'd never been

1509

01:10:08,779 --> 01:10:06,360

exposed to in school and I knew I always

1510

01:10:10,700 --> 01:10:08,789

wanted to at least I think I want to

1511

01:10:16,450 --> 01:10:10,710

study science in the future in her class

1512

01:10:16,460 --> 01:10:19,290

you

1513

01:10:28,000 --> 01:10:25,840

tonight DZ I definitely will be going

1514

01:10:31,500 --> 01:10:28,010

into the field of science and science

1515

01:10:33,939 --> 01:10:31,510

and engineering my I'm going to be

1516

01:10:37,000 --> 01:10:33,949

attending Oregon State University in the

1517

01:10:38,740 --> 01:10:37,010

fall hopefully and I will be in the

1518

01:10:41,140 --> 01:10:38,750

major viral resource engineering so

1519

01:10:45,970 --> 01:10:41,150

definitely it has impacted me a lot

1520

01:10:51,640 --> 01:10:48,850

and I believe a schmee sahil are also

1521

01:10:55,810 --> 01:10:51,650

gonna be majoring in science next year

1522

01:10:58,360 --> 01:10:55,820

well um because interested in sharing a

1523

01:11:01,750 --> 01:10:58,370

little bit am I remembering correctly I

1524

01:11:04,479 --> 01:11:01,760

could be misremembering there no you're

1525

01:11:08,130 --> 01:11:04,489

correct I plan to major in biological

1526  
01:11:12,280 --> 01:11:08,140  
sciences so and NASA definitely helped

1527  
01:11:25,570 --> 01:11:12,290  
pave the path for me in my inspiration

1528  
01:11:32,180 --> 01:11:30,470  
okay well I guess we are I've reached

1529  
01:11:34,700 --> 01:11:32,190  
the end of questions and so the last

1530  
01:11:37,400 --> 01:11:34,710  
thing that we're gonna do is a little

1531  
01:11:39,260 --> 01:11:37,410  
bit anti-climatic I realized through a

1532  
01:11:42,950 --> 01:11:39,270  
virtual thing but we're gonna try to

1533  
01:11:46,550 --> 01:11:42,960  
award certificates of completion kind of

1534  
01:11:48,710 --> 01:11:46,560  
a diploma birthday to our interns for

1535  
01:11:50,750 --> 01:11:48,720  
having wrapped up and ended and done an

1536  
01:11:53,740 --> 01:11:50,760  
amazing job this year throughout the

1537  
01:11:57,170 --> 01:11:53,750  
program and so with that I'm going to

1538  
01:11:59,390 --> 01:11:57,180

leave this to Mike kuba and he's gonna

1539

01:12:03,920 --> 01:11:59,400

be in charge of awarding these

1540

01:12:05,000 --> 01:12:03,930

certificates it's a lot mr. Michael so

1541

01:12:06,860 --> 01:12:05,010

yeah this is the part of the

1542

01:12:08,180 --> 01:12:06,870

presentation where normally we would be

1543

01:12:10,520 --> 01:12:08,190

standing up on stage handing out

1544

01:12:11,750 --> 01:12:10,530

diplomas obviously we can't do that

1545

01:12:15,020 --> 01:12:11,760

tonight

1546

01:12:16,910 --> 01:12:15,030

so we will essentially just acknowledge

1547

01:12:19,250 --> 01:12:16,920

the students I will show the certificate

1548

01:12:21,680 --> 01:12:19,260

and acknowledge their participation and

1549

01:12:23,930 --> 01:12:21,690

unfortunately we won't get to we hand it

1550

01:12:25,400 --> 01:12:23,940

to them shake their hands but before I

1551

01:12:27,650 --> 01:12:25,410

do that since this is the part where we

1552

01:12:30,200 --> 01:12:27,660

acknowledge the you know the students

1553

01:12:33,500 --> 01:12:30,210

and the mentors participation I very

1554

01:12:35,210 --> 01:12:33,510

quickly want to acknowledge the help and

1555

01:12:36,920 --> 01:12:35,220

assistance of some of the people who

1556

01:12:39,110 --> 01:12:36,930

made this possible tonight first of all

1557

01:12:41,540 --> 01:12:39,120

Mike Natori on thanks so much for

1558

01:12:44,210 --> 01:12:41,550

everything you've done for us I know we

1559

01:12:46,070 --> 01:12:44,220

could not have done this without you so

1560

01:12:49,910 --> 01:12:46,080

thanks so much for your for your

1561

01:12:51,830 --> 01:12:49,920

participation and also shout out to Blue

1562

01:12:53,540 --> 01:12:51,840

Marble space institute of science for

1563

01:12:56,060 --> 01:12:53,550

hosting the live feed we really

1564

01:12:59,600 --> 01:12:56,070

appreciate that support as well and

1565

01:13:01,880 --> 01:12:59,610

thanks of course to trying to try to

1566

01:13:03,890 --> 01:13:01,890

shout out the people that haven't gotten

1567

01:13:06,740 --> 01:13:03,900

a shout out yet thanks especially to you

1568

01:13:08,870 --> 01:13:06,750

know support from headquarters for the

1569

01:13:12,110 --> 01:13:08,880

you know the 12 years of support for

1570

01:13:13,720 --> 01:13:12,120

this program we greatly appreciate it so

1571

01:13:17,150 --> 01:13:13,730

moving on from there we'll go ahead and

1572

01:13:19,340 --> 01:13:17,160

hand hand out the awards or hand out the

1573

01:13:22,970 --> 01:13:19,350

certificates we'll start with the first

1574

01:13:24,650 --> 01:13:22,980

year students and you don't have to get

1575

01:13:26,450 --> 01:13:24,660

up or say anything or do anything if you

1576

01:13:28,160 --> 01:13:26,460

want to you know if you want to you're

1577

01:13:31,720 --> 01:13:28,170

welcome to but know no pressure

1578

01:13:35,690 --> 01:13:31,730

so I'm gonna share my screen here we go

1579

01:13:38,120 --> 01:13:35,700

see if this works it worked before that

1580

01:13:40,970 --> 01:13:38,130

looking good can everybody see the

1581

01:13:45,740 --> 01:13:40,980

yep yeah Mike can you fullscreen that

1582

01:13:48,970 --> 01:13:45,750

sure I think I can let's try no I can't

1583

01:13:54,670 --> 01:13:48,980

hang on hell it's pretty good pretty big

1584

01:13:58,340 --> 01:13:55,880

there we go

1585

01:13:59,060 --> 01:13:58,350

awesome thanks done thanks so much Mike

1586

01:14:02,990 --> 01:13:59,070

appreciate it

1587

01:14:07,640 --> 01:14:03,000

that worked for us though well I don't

1588

01:14:11,180 --> 01:14:07,650

think it could be any bigger okay sorry

1589

01:14:14,450 --> 01:14:11,190

about that so let's make sure first yeah

1590

01:14:16,610 --> 01:14:14,460

so um yeah so these are the certificates

1591

01:14:18,680 --> 01:14:16,620

basically the you know sniff cough

1592

01:14:20,960 --> 01:14:18,690

completion or diploma if you will that

1593

01:14:22,460 --> 01:14:20,970

we hand to the students they are

1594

01:14:24,680 --> 01:14:22,470

unsigned at this point because we

1595

01:14:26,420 --> 01:14:24,690

couldn't coordinate that rapidly enough

1596

01:14:28,610 --> 01:14:26,430

but they will be signed will they'll be

1597

01:14:31,340 --> 01:14:28,620

sent out and signed to each student sent

1598

01:14:32,810 --> 01:14:31,350

to their homes so I'm just gonna go

1599

01:14:34,130 --> 01:14:32,820

ahead and read this out the first one

1600

01:14:36,650 --> 01:14:34,140

I'll read and then we'll read off the

1601

01:14:39,320 --> 01:14:36,660

name so you can see it says astrobiology

1602

01:14:41,960 --> 01:14:39,330

student intern program award to in this

1603

01:14:43,880 --> 01:14:41,970

case Fletcher bocce on today's date for

1604

01:14:45,290 --> 01:14:43,890

your outstanding performance commitment

1605

01:14:47,270 --> 01:14:45,300

and dedication in support of the

1606

01:14:50,120 --> 01:14:47,280

partnership between Lassen Volcanic

1607

01:14:51,920 --> 01:14:50,130

National Arts NASA Ames Research Center

1608

01:14:53,600 --> 01:14:51,930

and red bluff high school in the

1609

01:14:56,180 --> 01:14:53,610

collection of scientific data through

1610

01:14:58,040 --> 01:14:56,190

laboratory and field work this work has

1611

01:15:00,230 --> 01:14:58,050

increased our understanding of lassen in

1612

01:15:02,330 --> 01:15:00,240

ways that will enhance astrobiology as

1613

01:15:04,520 --> 01:15:02,340

well as the mission of the National

1614

01:15:08,780 --> 01:15:04,530

Aeronautics and Space Administration in

1615

01:15:10,370 --> 01:15:08,790

the National Park Service so again like

1616

01:15:12,380 --> 01:15:10,380

to present this one to Fletcher Bucky

1617

01:15:16,580 --> 01:15:12,390

Fletcher great job this year thank you

1618

01:15:21,650 --> 01:15:16,590

so much next award goes to Dean

1619

01:15:23,450 --> 01:15:21,660

Breckinridge Dean great great work hey

1620

01:15:24,500 --> 01:15:23,460

Mike Skinner I don't think the slides

1621

01:15:26,570 --> 01:15:24,510

are changing so maybe you have to hit

1622

01:15:28,160 --> 01:15:26,580

escape and just scroll old-fashioned

1623

01:15:31,310 --> 01:15:28,170

style sorry about that

1624

01:15:33,680 --> 01:15:31,320

that's okay thanks for the heads up okay

1625

01:15:35,930 --> 01:15:33,690

good yeah it's working now okay cool

1626  
01:15:38,870 --> 01:15:35,940  
thanks yeah so Dean Breckenridge just

1627  
01:15:40,640 --> 01:15:38,880  
like I said next is Mary courier Mary

1628  
01:15:41,870 --> 01:15:40,650  
nice work really good job this year

1629  
01:15:45,740 --> 01:15:41,880  
thanks so much for being a part of the

1630  
01:15:48,650 --> 01:15:45,750  
program next is Lachlan Dean

1631  
01:15:50,060 --> 01:15:48,660  
Lockley a nice job thanks so much great

1632  
01:15:51,589 --> 01:15:50,070  
great work this year and thanks for

1633  
01:15:54,660 --> 01:15:51,599  
being part of the program

1634  
01:15:55,350 --> 01:15:54,670  
next up is freesia geillis freesia

1635  
01:15:57,029 --> 01:15:55,360  
Thanks

1636  
01:15:59,299 --> 01:15:57,039  
thanks again for your participation it

1637  
01:16:02,970 --> 01:15:59,309  
was a lot of fun working with you

1638  
01:16:08,419 --> 01:16:02,980

next is Grace Gallagher thank you so

1639

01:16:14,850 --> 01:16:08,429

much grace next up is Reese Gambetta

1640

01:16:20,340 --> 01:16:14,860

thank you grease okay and Ilana Garrity

1641

01:16:23,310 --> 01:16:20,350

nice job Lana next up is Emma Hale Thank

1642

01:16:31,640 --> 01:16:27,180

next is Alisa Harrison thanks a lot

1643

01:16:37,810 --> 01:16:31,650

Alisa great work this year Brayden Klein

1644

01:16:37,820 --> 01:16:41,810

Andreea marques

1645

01:16:47,159 --> 01:16:45,779

Samantha Paul oh and that's and that's

1646

01:16:49,290 --> 01:16:47,169

the end of the first year student so I

1647

01:16:50,879 --> 01:16:49,300

just want to say thanks to all the

1648

01:16:53,489 --> 01:16:50,889

first-year students you guys all did a

1649

01:16:55,169 --> 01:16:53,499

really wonderful job and for those

1650

01:17:00,179 --> 01:16:55,179

listening out there I think mr. Michael

1651  
01:17:02,159 --> 01:17:00,189  
touched on this but you know just I I

1652  
01:17:05,810 --> 01:17:02,169  
have to hand it to you all for your

1653  
01:17:09,290 --> 01:17:05,820  
dedication to making this happen tonight

1654  
01:17:12,089 --> 01:17:09,300  
this was you know a challenge that you

1655  
01:17:14,699 --> 01:17:12,099  
overcame with with beauty and grace it

1656  
01:17:15,719 --> 01:17:14,709  
was amazing so next up second-year

1657  
01:17:18,719 --> 01:17:15,729  
students

1658  
01:17:20,639 --> 01:17:18,729  
TC Timothy Drury TC thank you so much

1659  
01:17:22,709 --> 01:17:20,649  
for your participation these last two

1660  
01:17:26,189 --> 01:17:22,719  
years you have really done a wonderful

1661  
01:17:28,529 --> 01:17:26,199  
job in the program and we really look

1662  
01:17:32,250 --> 01:17:28,539  
forward to seeing where you go in the

1663  
01:17:37,310 --> 01:17:32,260

future and and hearing from you thank

1664

01:17:41,129 --> 01:17:37,320

you so much TC nice work kay Lewis L

1665

01:17:42,689 --> 01:17:41,139

again great job we helping to lead the

1666

01:17:44,669 --> 01:17:42,699

class thank you so much for your

1667

01:17:46,379 --> 01:17:44,679

participation in these last two years

1668

01:17:48,479 --> 01:17:46,389

it's a really excellent job we look

1669

01:17:49,229 --> 01:17:48,489

forward to seeing and hearing from you

1670

01:17:53,399 --> 01:17:49,239

in the future

1671

01:17:56,939 --> 01:17:53,409

a schmee car again

1672

01:18:00,659 --> 01:17:56,949

great work I've never in my life had

1673

01:18:03,479 --> 01:18:00,669

such an amazing video performed for us

1674

01:18:05,369 --> 01:18:03,489

as you did as you helped engineer last

1675

01:18:07,469 --> 01:18:05,379

year that was really just that was

1676

01:18:09,000 --> 01:18:07,479

outstanding and thanks so much for your

1677

01:18:12,830 --> 01:18:09,010

participation in the program and your

1678

01:18:18,649 --> 01:18:15,410

and last hill saying Sahil great work

1679

01:18:21,649 --> 01:18:18,659

again really appreciate your your effort

1680

01:18:23,120 --> 01:18:21,659

and all of your of your dedication to

1681

01:18:26,330 --> 01:18:23,130

program these two years we really

1682

01:18:28,850 --> 01:18:26,340

appreciate it you did a great job so

1683

01:18:31,310 --> 01:18:28,860

we'll move on to the mentors the two

1684

01:18:32,870 --> 01:18:31,320

mentors we would like to acknowledge

1685

01:18:35,270 --> 01:18:32,880

tonight I'm actually gonna start with

1686

01:18:38,660 --> 01:18:35,280

Tammy Boyd first I'll end with mr.

1687

01:18:40,220 --> 01:18:38,670

Michael but Tammy thanks so much for

1688

01:18:43,129 --> 01:18:40,230

your participation in the program it's

1689

01:18:44,770 --> 01:18:43,139

been wonderful having you aboard and for

1690

01:18:47,959 --> 01:18:44,780

those that don't know this is Tammy's

1691

01:18:50,870 --> 01:18:47,969

first year I believe I believe we saw

1692

01:18:53,330 --> 01:18:50,880

her this last summer but yeah you know

1693

01:18:55,100 --> 01:18:53,340

welcome aboard thank you so much for all

1694

01:18:56,359 --> 01:18:55,110

of your contributions to the program and

1695

01:18:59,959 --> 01:18:56,369

we're really looking forward to working

1696

01:19:02,629 --> 01:18:59,969

with you again next year and last of

1697

01:19:04,280 --> 01:19:02,639

course but not least is mr. Michael mr.

1698

01:19:07,970 --> 01:19:04,290

Michael thank you so much for your

1699

01:19:11,390 --> 01:19:07,980

continued support of this program 12

1700

01:19:13,550 --> 01:19:11,400

years has gone by very fast and I'm this

1701

01:19:16,070 --> 01:19:13,560

program has grown tremendously with your

1702

01:19:20,540 --> 01:19:16,080

assistance in leadership so thank you so

1703

01:19:22,609 --> 01:19:20,550

much thank you for always finding the

1704

01:19:25,580 --> 01:19:22,619

best and the brightest that the school

1705

01:19:27,620 --> 01:19:25,590

has we're never disappointed and this

1706

01:19:30,550 --> 01:19:27,630

year is no exception so this has been

1707

01:19:32,959 --> 01:19:30,560

really wonderful so thank you so much

1708

01:19:35,540 --> 01:19:32,969

for all of your hard work we really

1709

01:19:39,379 --> 01:19:37,250

and yeah I think that pretty much

1710

01:19:41,479 --> 01:19:39,389

summarizes the evening for those

1711

01:19:44,149 --> 01:19:41,489

students who are still online with us um

1712

01:19:47,270 --> 01:19:44,159

I just want to say there's a I was gonna

1713

01:19:49,280 --> 01:19:47,280

give a shout out also to another effort

1714

01:19:52,310 --> 01:19:49,290

the blue marble space is to do science

1715

01:19:56,240 --> 01:19:52,320

makes which is saggin that org so it's

1716

01:19:58,100 --> 01:19:56,250

essentially an outreach program by early

1717

01:20:01,450 --> 01:19:58,110

career astrobiologists and it's a great

1718

01:20:06,050 --> 01:20:01,460

way to kind of stay involved in

1719

01:20:07,939 --> 01:20:06,060

astrobiology it's sort of at a public

1720

01:20:09,649 --> 01:20:07,949

informational level so if you guys are

1721

01:20:12,290 --> 01:20:09,659

you know if you've enjoyed what you've

1722

01:20:13,580 --> 01:20:12,300

done here and want to stay involved as

1723

01:20:16,100 --> 01:20:13,590

you go to college especially if it's

1724

01:20:22,810 --> 01:20:16,110

stuck in your students but for for those

1725

01:20:29,780 --> 01:20:27,230

et org and it's a great resource for you

1726

01:20:33,770 --> 01:20:29,790

- oh it's a great resource for you to be

1727

01:20:36,380 --> 01:20:33,780

access so anyway thank you again and I

1728

01:20:38,600 --> 01:20:36,390

think that perhaps that then Mike did

1729

01:20:40,790 --> 01:20:38,610

you have anything you wanted to follow

1730

01:20:43,050 --> 01:20:40,800

up with

1731

01:20:45,150 --> 01:20:43,060

let me just make a quick comment these

1732

01:20:47,010 --> 01:20:45,160

will be signed before they're accepted

1733

01:20:49,020 --> 01:20:47,020

before the students receive them but

1734

01:20:51,240 --> 01:20:49,030

again the logistics of this current

1735

01:20:54,720 --> 01:20:51,250

situation that delay that until after

1736

01:20:58,850 --> 01:20:54,730

presentation tonight but otherwise yeah

1737

01:21:06,120 --> 01:21:02,810

well thank you all for for participating

1738

01:21:08,189 --> 01:21:06,130

again I to reiterate what I said at the

1739

01:21:12,300 --> 01:21:08,199

beginning we all really hope that

1740

01:21:14,040 --> 01:21:12,310

everyone's safe and sound and and taking

1741

01:21:16,500 --> 01:21:14,050

care of yourselves and those around you

1742

01:21:18,840 --> 01:21:16,510

and we really appreciate the support

1743

01:21:23,010 --> 01:21:18,850

that all of you given this program and

1744

01:21:26,220 --> 01:21:23,020

and we're hoping that for that support

1745

01:21:29,220 --> 01:21:26,230

to continue and yeah just just thank you

1746

01:21:30,870 --> 01:21:29,230

for everything and that being said if

1747

01:21:32,700 --> 01:21:30,880

you have any questions that come up or

1748

01:21:35,490 --> 01:21:32,710

whatever feel free to reach out and

1749

01:21:37,740 --> 01:21:35,500

we'll do the best we can to to answer

1750

01:21:40,110 --> 01:21:37,750

them and I think with that I'm just

1751

01:21:41,010 --> 01:21:40,120

we're just gonna end it so have a good

1752

01:21:43,910 --> 01:21:41,020

evening everybody

1753

01:21:54,130 --> 01:21:43,920

and we will see you again next year