Lassen Astrobiology Intern
Recognition Night and Lecture

Wednesday, May 17, 2023

Livestream URL for online broadcast:
https://youtube.com/live/u5E0mPSegmI

7:00 – 7:05 PM	Welcome, Dave Michael, Science Instructor/Lassen Mentor
7:05 – 7:10 PM	Lassen Volcanic National Park Interpretation Programs Graciela Avila, National Park Service
7:10 – 7:15 PM	"Mars Exploration, Lassen and Life," Dr. David Des Marais, Space Scientist, NASA Ames Research Center
7:15 – 7:45 PM	Presentation by Lassen Astrobiology Student Interns
7:45 – 8:00 PM	Questions and answers fielded by Interns, Dr. David Des Marais, Dr. Niki Parenteau
8:00 – 8:15 PM	Student recognition and certificate presentation, Mike Kubo, NASA Ames Research Center

1
00:00:09,850 --> 00:00:02,600
foreign

2
00:00:14,209 --> 00:00:12,830
my name is David Michael I am a science

3
00:00:16,490 --> 00:00:14,219
teacher here at Red Bluff High School

4
00:00:19,670 --> 00:00:16,500
and I'd like to welcome everyone tonight

5
00:00:22,310 --> 00:00:19,680
to a presentation of discovery of

6
00:00:23,750 --> 00:00:22,320
findings by some students that we have

7
00:00:26,450 --> 00:00:23,760
at Red Bluff High School

8
00:00:28,490 --> 00:00:26,460
we have some a class here it's uh we

9
00:00:31,310 --> 00:00:28,500
call it a NASA class where our students

10
00:00:35,030 --> 00:00:31,320
are interns who are working with NASA

11
00:00:37,370 --> 00:00:35,040
scientists studying much of what's going

12
00:00:39,709 --> 00:00:37,380
on up at Lassen Volcanic National Park

13
00:00:42,770 --> 00:00:39,719

and so it's a partnership I mean our

14
00:00:45,470 --> 00:00:42,780
high school our students and then NASA's

15
00:00:47,869 --> 00:00:45,480
aimed Research Center and three

16
00:00:49,850 --> 00:00:47,879
particular special scientists down there

17
00:00:51,770 --> 00:00:49,860
as well as last in Volcanic National

18
00:00:52,850 --> 00:00:51,780
Park and some of the park rangers that

19
00:00:55,150 --> 00:00:52,860
are up there

20
00:00:58,430 --> 00:00:55,160
uh research that our students do

21
00:01:01,010 --> 00:00:58,440
encompasses a wide range of things

22
00:01:03,229 --> 00:01:01,020
um it's kind of modeled after the study

23
00:01:05,149 --> 00:01:03,239
of astrobiology which may be a little

24
00:01:06,469 --> 00:01:05,159
bit fuzzy to you in terms of meaning

25
00:01:09,469 --> 00:01:06,479
right now but something you're going to

26
00:01:12,050 --> 00:01:09,479
learn about as the night goes on and the

27
00:01:14,690 --> 00:01:12,060
students have a great opportunity in

28
00:01:17,510 --> 00:01:14,700
this program to not only work with NASA

29
00:01:20,390 --> 00:01:17,520
scientists but more specifically they're

30
00:01:22,310 --> 00:01:20,400
able to learn from these scientists and

31
00:01:23,870 --> 00:01:22,320
do a lot of the skills that they learn

32
00:01:25,789 --> 00:01:23,880
in the classroom here at Red Bluff

33
00:01:27,590 --> 00:01:25,799
actually in the field up at Lassen Park

34
00:01:29,390 --> 00:01:27,600
under the guidance of these scientists

35
00:01:31,730 --> 00:01:29,400
and so because of that it's a really

36
00:01:34,429 --> 00:01:31,740
unique opportunity that these students

37
00:01:37,010 --> 00:01:34,439
really gain a lot from and so because of

38
00:01:39,530 --> 00:01:37,020

this we are extremely excited to have

39
00:01:41,330 --> 00:01:39,540
the opportunity for this program and

40
00:01:43,490 --> 00:01:41,340
just

41
00:01:45,830 --> 00:01:43,500
learn more and more from it every single

42
00:01:48,469 --> 00:01:45,840
year and our students just value it

43
00:01:50,030 --> 00:01:48,479
tremendously and so with with all this

44
00:01:52,130 --> 00:01:50,040
being said what we're hoping to do

45
00:01:54,530 --> 00:01:52,140
tonight is to share with you a little

46
00:01:55,490 --> 00:01:54,540
bit of what we discovered this year and

47
00:01:56,990 --> 00:01:55,500
so you're going to hear from the

48
00:01:58,249 --> 00:01:57,000
students at some point

49
00:02:00,170 --> 00:01:58,259
um here a little in a little bit they

50
00:02:01,910 --> 00:02:00,180
put together a presentation of all the

51
00:02:02,929 --> 00:02:01,920
hard work they did

52
00:02:05,330 --> 00:02:02,939
um and you're also going to hear from

53
00:02:07,969 --> 00:02:05,340
the scientists and and a very special

54
00:02:09,529 --> 00:02:07,979
Lassen park ranger as well so I'd like

55
00:02:14,630 --> 00:02:09,539
to introduce her first and so this is

56
00:02:15,770 --> 00:02:14,640
Ranger Rossi Avila Avila and she is

57
00:02:17,809 --> 00:02:15,780
going to

58
00:02:20,270 --> 00:02:17,819
um introduce you a little bit to what

59
00:02:22,250 --> 00:02:20,280
she does with the LA Boston Volcanic

60
00:02:25,369 --> 00:02:22,260
National Park and how this partnership

61
00:02:30,770 --> 00:02:25,379
kind of works from her end okay thank

62
00:02:38,270 --> 00:02:33,650
all right hit my unmute button

63
00:02:40,550 --> 00:02:38,280

and uh yes I am uh graci Avila Graciela

64
00:02:44,030 --> 00:02:40,560
Avila in the emails

65
00:02:47,750 --> 00:02:44,040
um if you see that name and I am really

66
00:02:50,990 --> 00:02:47,760
excited to be here tonight and

67
00:02:53,869 --> 00:02:51,000
um I am new to my position as of a few

68
00:02:55,910 --> 00:02:53,879
months at last Volcanic National Park I

69
00:02:58,610 --> 00:02:55,920
am the education specialist here I

70
00:03:00,890 --> 00:02:58,620
apologize for my cat she loves to jump

71
00:03:02,570 --> 00:03:00,900
in as soon as I start talking on a zoom

72
00:03:04,570 --> 00:03:02,580
meeting

73
00:03:09,050 --> 00:03:04,580
um you might see her tail over here

74
00:03:11,229 --> 00:03:09,060
and so I was an education specialist at

75
00:03:14,330 --> 00:03:11,239
Grand Canyon National Park for 10 years

76
00:03:16,610 --> 00:03:14,340
uh left that type of position went to

77
00:03:19,550 --> 00:03:16,620
Yellowstone for four years and now I'm

78
00:03:21,710 --> 00:03:19,560
back in education at Lassen

79
00:03:25,250 --> 00:03:21,720
super excited I love being back at

80
00:03:27,949 --> 00:03:25,260
Lassen and I all I know most of what I

81
00:03:29,869 --> 00:03:27,959
know about microbiology is actually from

82
00:03:32,930 --> 00:03:29,879
Yellowstone

83
00:03:35,210 --> 00:03:32,940
some people call lasted volcanic a

84
00:03:38,509 --> 00:03:35,220
little Yellowstone and I've been really

85
00:03:42,350 --> 00:03:38,519
surprised at the similarities in the

86
00:03:46,149 --> 00:03:42,360
microbiology again not a biologist so my

87
00:03:48,830 --> 00:03:46,159
surface level knowledge of that and um

88
00:03:50,990 --> 00:03:48,840

it's just really this is an ideal

89
00:03:53,390 --> 00:03:51,000
position this is such a great program

90
00:03:55,369 --> 00:03:53,400
it's like I learn all this at

91
00:03:57,530 --> 00:03:55,379
Yellowstone but I didn't see the

92
00:04:00,410 --> 00:03:57,540
connection with education and I saw the

93
00:04:03,289 --> 00:04:00,420
possibilities so here we are these

94
00:04:06,470 --> 00:04:03,299
students are amazing I got to meet them

95
00:04:09,770 --> 00:04:06,480
just one time hopefully more in the next

96
00:04:12,470 --> 00:04:09,780
few years but um got to go to the NASA

97
00:04:16,129 --> 00:04:12,480
Ames Research Center and and just kind

98
00:04:17,990 --> 00:04:16,139
of see the end product of where their

99
00:04:20,990 --> 00:04:18,000
where they're um

100
00:04:23,810 --> 00:04:21,000
field collection goes into the

101
00:04:26,150 --> 00:04:23,820
Laboratories and

102
00:04:31,430 --> 00:04:26,160
um just the contribution is amazing I've

103
00:04:34,189 --> 00:04:31,440
learned just very skim knowledge of how

104
00:04:37,010 --> 00:04:34,199
much this kind of research can further

105
00:04:38,030 --> 00:04:37,020
medicine and

106
00:04:41,629 --> 00:04:38,040
um

107
00:04:44,510 --> 00:04:41,639
uh studies of space and

108
00:04:47,749 --> 00:04:44,520
backwards to what what kind of life

109
00:04:50,030 --> 00:04:47,759
started on Earth and how

110
00:04:52,670 --> 00:04:50,040
um so that's just been an amazing

111
00:04:54,409 --> 00:04:52,680
process to see and I hope that the

112
00:04:58,909 --> 00:04:54,419
students know that

113
00:05:01,790 --> 00:04:58,919

even you know this this kind of study is

114
00:05:04,370 --> 00:05:01,800
um it's so important for the world it

115
00:05:05,810 --> 00:05:04,380
connects with a lot of national parks

116
00:05:07,490 --> 00:05:05,820
out there but really

117
00:05:10,430 --> 00:05:07,500
for the whole world and even if they

118
00:05:13,249 --> 00:05:10,440
don't end up going into microbiology I

119
00:05:15,710 --> 00:05:13,259
hope some of them do but it's just such

120
00:05:19,189 --> 00:05:15,720
a great opportunity to learn

121
00:05:22,490 --> 00:05:19,199
a science Works how the world works

122
00:05:23,749 --> 00:05:22,500
how the world was formed and where's the

123
00:05:26,749 --> 00:05:23,759
rest of life

124
00:05:29,390 --> 00:05:26,759
so those are my thoughts without knowing

125
00:05:31,909 --> 00:05:29,400
a huge amount on this program

126
00:05:33,590 --> 00:05:31,919
um super privileged for being a part of

127
00:05:35,210 --> 00:05:33,600
all of it

128
00:05:38,689 --> 00:05:35,220
and thank you also from the

129
00:05:40,969 --> 00:05:38,699
superintendent of Lassen Volcanic he is

130
00:05:44,390 --> 00:05:40,979
the big supporter of this program he is

131
00:05:51,770 --> 00:05:44,400
so excited to to keep this partnership

132
00:05:56,749 --> 00:05:54,529
thank you Ranger Avila

133
00:05:59,330 --> 00:05:56,759
um next up we're going to hear from Dr

134
00:06:01,730 --> 00:05:59,340
Dave damaray he is

135
00:06:04,370 --> 00:06:01,740
really the The Guiding

136
00:06:07,370 --> 00:06:04,380
light of this program he is he's kind of

137
00:06:09,290 --> 00:06:07,380
Taken on the leadership role of it

138
00:06:11,330 --> 00:06:09,300

um he is one of three NASA scientists

139
00:06:12,710 --> 00:06:11,340
that works really really closely with

140
00:06:16,249 --> 00:06:12,720
our students here at Red Bluff High

141
00:06:18,050 --> 00:06:16,259
School and um as a as a lead space

142
00:06:20,749 --> 00:06:18,060
scientist with NASA's Ames Research

143
00:06:24,590 --> 00:06:20,759
Center his contributions to our

144
00:06:27,770 --> 00:06:24,600
understanding of space as well as here

145
00:06:29,450 --> 00:06:27,780
Earth is remarkable and so he's going to

146
00:06:31,129 --> 00:06:29,460
just say a few words

147
00:06:33,170 --> 00:06:31,139
um a little bit of trying to connect to

148
00:06:34,969 --> 00:06:33,180
Mars exploration

149
00:06:38,330 --> 00:06:34,979
um our research up at Lassen Park and

150
00:06:41,450 --> 00:06:38,340
then life in general so Dr damarin

151
00:06:43,070 --> 00:06:41,460
thanks to Mr Michael uh and I should

152
00:06:44,930 --> 00:06:43,080
follow Grace's lead and talk a little

153
00:06:46,550 --> 00:06:44,940
bit about my background I had an

154
00:06:48,650 --> 00:06:46,560
undergraduate degree in chemistry and

155
00:06:50,749 --> 00:06:48,660
then got into geology in grad school and

156
00:06:53,210 --> 00:06:50,759
geochemistry and then later on got into

157
00:06:55,430 --> 00:06:53,220
microbiology so I've been sort of

158
00:06:57,110 --> 00:06:55,440
touring through the disciplines and in a

159
00:06:59,390 --> 00:06:57,120
way that was turned out to be nicely

160
00:07:02,570 --> 00:06:59,400
suited to pursue a career in

161
00:07:04,670 --> 00:07:02,580
astrobiology so and I just retired

162
00:07:07,370 --> 00:07:04,680
actually last year after 46 years with

163
00:07:10,010 --> 00:07:07,380

NASA uh seeing a lot of stuff over the

164
00:07:11,990 --> 00:07:10,020
years and of course most excitingly Mars

165
00:07:15,110 --> 00:07:12,000
exploration that really took off in the

166
00:07:17,029 --> 00:07:15,120
90s so anyway I just thought I'd address

167
00:07:19,610 --> 00:07:17,039
a few of the connections between this

168
00:07:23,029 --> 00:07:19,620
class and uh being on astrobiology as

169
00:07:24,710 --> 00:07:23,039
NASA pursues it of course sort of from a

170
00:07:26,689 --> 00:07:24,720
historical point of view our missions to

171
00:07:29,870 --> 00:07:26,699
space are just a latest chapter and a

172
00:07:32,210 --> 00:07:29,880
long history of human exploration and uh

173
00:07:33,350 --> 00:07:32,220
when several famous explorers entered

174
00:07:35,570 --> 00:07:33,360
you know

175
00:07:37,670 --> 00:07:35,580
ventured into these unexplored regions

176
00:07:40,670 --> 00:07:37,680
their teams had experts in several

177
00:07:44,150 --> 00:07:40,680
disciplines cartography geology biology

178
00:07:47,270 --> 00:07:44,160
climate and climatology which sort of

179
00:07:49,189 --> 00:07:47,280
today we call atmospheric science uh and

180
00:07:51,490 --> 00:07:49,199
so as it searches for life beyond Earth

181
00:07:54,589 --> 00:07:51,500
NASA's astrobiology program

182
00:07:56,330 --> 00:07:54,599
must also include several disciplines to

183
00:07:58,490 --> 00:07:56,340
identify places that were the most

184
00:08:00,469 --> 00:07:58,500
favorable for life there's a lot of a

185
00:08:02,689 --> 00:08:00,479
lot of space out there and there's just

186
00:08:05,029 --> 00:08:02,699
only a few places perhaps that are most

187
00:08:08,089 --> 00:08:05,039
favorable for life and therefore give us

188
00:08:09,830 --> 00:08:08,099

our best chance of finding it to do this

189
00:08:11,809 --> 00:08:09,840
we must understand critical

190
00:08:13,850 --> 00:08:11,819
relationships between life and its

191
00:08:16,189 --> 00:08:13,860
environment and of course you can see

192
00:08:18,830 --> 00:08:16,199
how there's applications of that to many

193
00:08:20,450 --> 00:08:18,840
big challenges on the earth and the

194
00:08:22,369 --> 00:08:20,460
scientific method is really the most

195
00:08:25,249 --> 00:08:22,379
effective strategy for understanding

196
00:08:26,869 --> 00:08:25,259
these kinds of relationships and the

197
00:08:29,809 --> 00:08:26,879
bottom line is that the students in this

198
00:08:31,670 --> 00:08:29,819
class pursued a year-long project that

199
00:08:34,310 --> 00:08:31,680
strongly resembled astrobiology

200
00:08:37,130 --> 00:08:34,320
exploration they follow a scientific

201
00:08:39,649 --> 00:08:37,140
approach they made observations in a

202
00:08:41,870 --> 00:08:39,659
field trip to Lassen last fall they made

203
00:08:44,690 --> 00:08:41,880
hypotheses to try to explain what they

204
00:08:46,310 --> 00:08:44,700
observed they tested these hypotheses in

205
00:08:48,230 --> 00:08:46,320
several lab experiments that they

206
00:08:50,509 --> 00:08:48,240
performed and they reported their

207
00:08:52,490 --> 00:08:50,519
findings in written reports and of

208
00:08:53,630 --> 00:08:52,500
course by an oral presentation to you

209
00:08:55,790 --> 00:08:53,640
all tonight

210
00:08:57,769 --> 00:08:55,800
so projects such as theirs are actually

211
00:08:59,389 --> 00:08:57,779
really improving our strategies to

212
00:09:01,310 --> 00:08:59,399
search for evidence of Life on Mars

213
00:09:02,650 --> 00:09:01,320

where is the most promising places to

214
00:09:05,750 --> 00:09:02,660
search

215
00:09:07,910 --> 00:09:05,760
but this project resembles a new and

216
00:09:09,949 --> 00:09:07,920
critical approach to science also namely

217
00:09:12,410 --> 00:09:09,959
what we call interdisciplinary research

218
00:09:14,210 --> 00:09:12,420
so you have the multiple disciplines but

219
00:09:16,550 --> 00:09:14,220
the big problems demand that these

220
00:09:18,470 --> 00:09:16,560
diverse disciplines require each other

221
00:09:20,449 --> 00:09:18,480
and work together in order to achieve

222
00:09:23,090 --> 00:09:20,459
progress and you can think of several

223
00:09:25,310 --> 00:09:23,100
examples today and the new new kind of

224
00:09:27,590 --> 00:09:25,320
civil engineering that is in the world

225
00:09:30,170 --> 00:09:27,600
today really embodies this just in terms

226
00:09:32,210 --> 00:09:30,180
of applications on Earth anyway this

227
00:09:34,790 --> 00:09:32,220
experience has taught critical thinking

228
00:09:37,430 --> 00:09:34,800
Stills that will be valuable regardless

229
00:09:39,590 --> 00:09:37,440
of their career choices and of course

230
00:09:42,910 --> 00:09:39,600
their generation will continue the human

231
00:09:46,250 --> 00:09:42,920
exploration imperative to explore

232
00:09:48,230 --> 00:09:46,260
the world around us and Beyond so that's

233
00:09:51,530 --> 00:09:48,240
pretty much a summary and I'll pass it

234
00:09:58,009 --> 00:09:55,070
thank you Dr Demaree and uh just and

235
00:09:59,449 --> 00:09:58,019
next up on our evening's agenda um we're

236
00:10:02,870 --> 00:09:59,459
gonna hear from the students and they

237
00:10:05,090 --> 00:10:02,880
have put together a a presentation that

238
00:10:07,070 --> 00:10:05,100

really summarizes and that's the key it

239
00:10:09,170 --> 00:10:07,080
summarizes their work

240
00:10:10,190 --> 00:10:09,180
um as Dr Dan Murray introduced to you

241
00:10:12,710 --> 00:10:10,200
all

242
00:10:14,930 --> 00:10:12,720
um a lot goes into this program from the

243
00:10:16,550 --> 00:10:14,940
beginning of the year till now

244
00:10:19,610 --> 00:10:16,560
um the students have been up to Lassen

245
00:10:21,410 --> 00:10:19,620
Park they have discovered and observed

246
00:10:23,030 --> 00:10:21,420
things up there and then they've taken

247
00:10:25,730 --> 00:10:23,040
their discoveries back to the classroom

248
00:10:28,370 --> 00:10:25,740
and in the labs we've basically tried to

249
00:10:30,050 --> 00:10:28,380
replicate the findings and from this

250
00:10:31,610 --> 00:10:30,060
from the experiments that they've done

251
00:10:33,889 --> 00:10:31,620
they have been able to draw some

252
00:10:36,650 --> 00:10:33,899
conclusions and write about it

253
00:10:39,290 --> 00:10:36,660
um at the end of it they've compiled a

254
00:10:40,329 --> 00:10:39,300
rather large report for a high school

255
00:10:43,370 --> 00:10:40,339
student

256
00:10:44,750 --> 00:10:43,380
summarizing everything that they've done

257
00:10:46,610 --> 00:10:44,760
um the reports that they've turned in

258
00:10:49,190 --> 00:10:46,620
this year range anywhere from 20 to 30

259
00:10:52,910 --> 00:10:49,200
pages depending on the students and was

260
00:10:55,610 --> 00:10:52,920
really really thorough and encompassing

261
00:10:58,069 --> 00:10:55,620
um what we're trying to do tonight is to

262
00:11:00,530 --> 00:10:58,079
summarize that and that's hard to do in

263
00:11:02,509 --> 00:11:00,540

in one evening it's hard to do in in one

264
00:11:04,610 --> 00:11:02,519
presentation but they've come together

265
00:11:06,410 --> 00:11:04,620
as a group and they've worked together

266
00:11:08,690 --> 00:11:06,420
as a class here to put together a

267
00:11:11,090 --> 00:11:08,700
presentation that really does I think a

268
00:11:13,250 --> 00:11:11,100
pretty good job of showing exactly what

269
00:11:15,470 --> 00:11:13,260
they've done so they're gonna we're

270
00:11:17,150 --> 00:11:15,480
gonna play that for you right now

271
00:11:19,550 --> 00:11:17,160
um when we're done with it if you do

272
00:11:21,170 --> 00:11:19,560
have questions we'll be happy to take

273
00:11:22,790 --> 00:11:21,180
some time to to answer those questions

274
00:11:26,210 --> 00:11:22,800
and to share with you a little bit more

275
00:11:28,790 --> 00:11:26,220
as far as what they found and um without

276
00:11:31,069 --> 00:11:28,800
anything further I think we're ready for

277
00:11:33,230 --> 00:11:31,079
the presentation

278
00:11:34,790 --> 00:11:33,240
good evening ladies and gentlemen my

279
00:11:36,410 --> 00:11:34,800
name is John Sheffield I've been a part

280
00:11:37,670 --> 00:11:36,420
of this program for two years and

281
00:11:39,170 --> 00:11:37,680
tonight I'll be your Master of

282
00:11:41,509 --> 00:11:39,180
Ceremonies leading you through this

283
00:11:43,670 --> 00:11:41,519
presentation this presentation is the

284
00:11:45,470 --> 00:11:43,680
culmination of my classmates and my own

285
00:11:47,449 --> 00:11:45,480
research and experiments over the year

286
00:11:50,090 --> 00:11:47,459
starting the night off we will first

287
00:11:51,710 --> 00:11:50,100
explain what astral biology is followed

288
00:11:53,870 --> 00:11:51,720

with an introduction to the field sites

289
00:11:55,550 --> 00:11:53,880
we tested and how we tested them then

290
00:11:58,009 --> 00:11:55,560
the experiments we designed to test

291
00:11:59,930 --> 00:11:58,019
certain aspects of these field sites and

292
00:12:02,090 --> 00:11:59,940
what these experiments told us about the

293
00:12:04,069 --> 00:12:02,100
field sites to conclude the presentation

294
00:12:06,530 --> 00:12:04,079
we will discuss how this all relates to

295
00:12:08,750 --> 00:12:06,540
our questions about astrobiology and now

296
00:12:10,730 --> 00:12:08,760
to start us off we have Evelyn fucci a

297
00:12:13,150 --> 00:12:10,740
first year in this program introducing

298
00:12:15,949 --> 00:12:13,160
what is astrobiology

299
00:12:18,110 --> 00:12:15,959
astrobiology is the investigation of the

300
00:12:20,389 --> 00:12:18,120
origins distribution and future of life

301
00:12:22,190 --> 00:12:20,399
in the universe a key aspect of

302
00:12:23,750 --> 00:12:22,200
astrobiology is to search for and

303
00:12:25,670 --> 00:12:23,760
characterize the full diversity of

304
00:12:27,829 --> 00:12:25,680
habitable environments both on Ancient

305
00:12:29,329 --> 00:12:27,839
Earth and on other planets

306
00:12:30,889 --> 00:12:29,339
the origins of such habitable

307
00:12:32,210 --> 00:12:30,899
environments in the universe are

308
00:12:34,090 --> 00:12:32,220
attributed to the presence of

309
00:12:36,410 --> 00:12:34,100
life-sustaining elements in the cosmos

310
00:12:38,329 --> 00:12:36,420
volcanic activity and its interactions

311
00:12:39,829 --> 00:12:38,339
with water are key aspects of ancient

312
00:12:42,650 --> 00:12:39,839
habitable environments we have seen

313
00:12:44,389 --> 00:12:42,660

evidence of on Ancient Earth evidence of

314
00:12:46,370 --> 00:12:44,399
such interactions has been discovered on

315
00:12:48,230 --> 00:12:46,380
Mars and these interactions have also

316
00:12:49,670 --> 00:12:48,240
probably occurred on other earth-like

317
00:12:52,370 --> 00:12:49,680
planets distributed throughout the

318
00:12:54,949 --> 00:12:52,380
Universe and now Lindsay foe discussing

319
00:12:56,810 --> 00:12:54,959
our interest in Lassen

320
00:13:00,050 --> 00:12:56,820
thank you Evelyn

321
00:13:03,290 --> 00:13:00,060
lassens environments are an analog for

322
00:13:06,829 --> 00:13:03,300
astrobiology research on Ancient Mars

323
00:13:08,810 --> 00:13:06,839
Earth and Mars shared hydrothermal and

324
00:13:12,050 --> 00:13:08,820
volcanic activity in habitable

325
00:13:14,930 --> 00:13:12,060
environments Lassen has a remarkable

326
00:13:18,170 --> 00:13:14,940
variety of hydrothermal sites one of

327
00:13:20,990 --> 00:13:18,180
which is Bumpus hell Bumpus hell has

328
00:13:23,629 --> 00:13:21,000
similarities with both ancient Earth and

329
00:13:26,150 --> 00:13:23,639
Ancient Mars Bumpus hell contains

330
00:13:28,790 --> 00:13:26,160
sources of energy and water from the

331
00:13:32,269 --> 00:13:28,800
solutes in Hot Springs and various

332
00:13:35,090 --> 00:13:32,279
oxidized chemical species the Park's

333
00:13:37,970 --> 00:13:35,100
dynamic range of conditions are able to

334
00:13:41,090 --> 00:13:37,980
sustain this large diversity of

335
00:13:44,389 --> 00:13:41,100
microbial species a similar environment

336
00:13:47,269 --> 00:13:44,399
existed on Ancient Earth as it also

337
00:13:49,730 --> 00:13:47,279
comprised High volcanic activity and

338
00:13:51,769 --> 00:13:49,740

abundance of water and biodiversity

339
00:13:54,949 --> 00:13:51,779
across different environmental

340
00:13:57,410 --> 00:13:54,959
parameters on Mars there are remnants of

341
00:14:00,250 --> 00:13:57,420
ancient lava flows including on goose of

342
00:14:03,170 --> 00:14:00,260
crater faults and hydrothermal release

343
00:14:05,870 --> 00:14:03,180
all of which are responsible for

344
00:14:08,829 --> 00:14:05,880
modifying and creating much of present

345
00:14:11,750 --> 00:14:08,839
Warner Valley from Bedrock to Springs

346
00:14:15,410 --> 00:14:11,760
indicating evidence of hydrothermal

347
00:14:18,110 --> 00:14:15,420
activity and therefore Life on Mars I

348
00:14:20,030 --> 00:14:18,120
now introduce Tyler Peterson with

349
00:14:22,490 --> 00:14:20,040
habitability

350
00:14:24,530 --> 00:14:22,500
thank you Lindsay here we have a Venn

351
00:14:26,930 --> 00:14:24,540
diagram showing the requirements for

352
00:14:28,790 --> 00:14:26,940
habitility habitability is the

353
00:14:31,370 --> 00:14:28,800
sustainability of an environment for

354
00:14:33,889 --> 00:14:31,380
life in the top left we have solvents

355
00:14:36,050 --> 00:14:33,899
which is typically water in the bottom

356
00:14:38,389 --> 00:14:36,060
left we have energy typically sunlight

357
00:14:40,970 --> 00:14:38,399
in the top right we have raw materials

358
00:14:43,430 --> 00:14:40,980
such as carbon hydrogen nitrogen oxygen

359
00:14:44,930 --> 00:14:43,440
phosphorus and sulfur these are the

360
00:14:46,790 --> 00:14:44,940
building blocks of life

361
00:14:48,650 --> 00:14:46,800
in the bottom right we have favorable

362
00:14:52,129 --> 00:14:48,660
conditions such as moderate temperature

363
00:14:54,470 --> 00:14:52,139

and pH and relatively low salinity

364
00:14:56,750 --> 00:14:54,480
in order to have a habitable environment

365
00:14:58,490 --> 00:14:56,760
all four of these conditions must be

366
00:15:01,129 --> 00:14:58,500
present in different ranges of these

367
00:15:03,710 --> 00:15:01,139
conditions will still support life

368
00:15:05,870 --> 00:15:03,720
thank you Tyler after learning about the

369
00:15:08,090 --> 00:15:05,880
connection of Astral biology to Lassen

370
00:15:09,769 --> 00:15:08,100
Volcanic National Park we set out to

371
00:15:11,509 --> 00:15:09,779
different hydrothermal sites in which we

372
00:15:13,610 --> 00:15:11,519
use different meters to test these

373
00:15:15,949 --> 00:15:13,620
hydrothermal sites for the explanation

374
00:15:20,150 --> 00:15:15,959
of these meters we have Izzy carbonel

375
00:15:22,610 --> 00:15:20,160
introducing field and lab sites

376
00:15:25,009 --> 00:15:22,620
from the sites to be detailed in the

377
00:15:28,069 --> 00:15:25,019
following slides the teams collected two

378
00:15:30,829 --> 00:15:28,079
samples of solution microbial mass and

379
00:15:33,110 --> 00:15:30,839
gravel along with the physical samples

380
00:15:36,710 --> 00:15:33,120
the teams collected readings of

381
00:15:39,590 --> 00:15:36,720
temperature pH a measure of how acidic

382
00:15:43,610 --> 00:15:39,600
or alkaline assumptions is encompassing

383
00:15:46,490 --> 00:15:43,620
high acidity like lemons at PH2 to more

384
00:15:50,389 --> 00:15:46,500
alkaline substances such as bleach at pH

385
00:15:53,030 --> 00:15:50,399
12 with 7 indicating neutrality and

386
00:15:54,590 --> 00:15:53,040
lastly conductivity a measure of

387
00:15:57,230 --> 00:15:54,600
dissolved solids

388
00:15:59,629 --> 00:15:57,240

all environmental attributes crucial to

389
00:16:01,910 --> 00:15:59,639
the survival of organisms

390
00:16:04,790 --> 00:16:01,920
the conductivity meter measured in

391
00:16:06,710 --> 00:16:04,800
microsiemens per centimeter standard

392
00:16:08,870 --> 00:16:06,720
unit of measurement for electrical

393
00:16:12,530 --> 00:16:08,880
conductivity with distilled water

394
00:16:15,290 --> 00:16:12,540
normally ranging from 5 10 to 3 micro

395
00:16:17,870 --> 00:16:15,300
Siemens per centimeter the instruments

396
00:16:20,150 --> 00:16:17,880
both measured for temperature and were

397
00:16:22,850 --> 00:16:20,160
team specific so readings collected

398
00:16:26,269 --> 00:16:22,860
weekly for each experiment were measured

399
00:16:30,290 --> 00:16:28,670
thank you Izzy now with these meters and

400
00:16:32,569 --> 00:16:30,300
probes we set out to five different

401
00:16:34,790 --> 00:16:32,579
field sites across Warner Valley which

402
00:16:37,069 --> 00:16:34,800
allows us in one field trip to visit a

403
00:16:39,110 --> 00:16:37,079
variety of conditions in PH conductivity

404
00:16:40,910 --> 00:16:39,120
and temperature upon entering winter

405
00:16:43,189 --> 00:16:40,920
Valley first year and second year

406
00:16:45,590 --> 00:16:43,199
interns were broken up evenly and set

407
00:16:47,449 --> 00:16:45,600
out to record not only data Finance but

408
00:16:49,730 --> 00:16:47,459
the physical characteristic of each

409
00:16:52,009 --> 00:16:49,740
field site these distinctly different

410
00:16:54,230 --> 00:16:52,019
field sites are mainstream including

411
00:16:55,689 --> 00:16:54,240
mainstream below Paddle Wheel Creek and

412
00:16:58,490 --> 00:16:55,699
mainstream below Devil's Kitchen

413
00:17:00,230 --> 00:16:58,500

alkaline spring Paddle Wheel Creek and

414
00:17:02,030 --> 00:17:00,240
Devil's Kitchen to start your

415
00:17:06,829 --> 00:17:02,040
introduction to these field sites we

416
00:17:11,510 --> 00:17:09,110
thanks John

417
00:17:13,429 --> 00:17:11,520
padawilla creek site we saw a stream

418
00:17:15,350 --> 00:17:13,439
that originated from a spring on the

419
00:17:18,230 --> 00:17:15,360
mountain not too far away from where we

420
00:17:20,510 --> 00:17:18,240
were in terms of life we saw that there

421
00:17:22,789 --> 00:17:20,520
was a variety of vegetation in and

422
00:17:25,069 --> 00:17:22,799
around the stream as well as possible

423
00:17:28,909 --> 00:17:25,079
algae within the Stream

424
00:17:32,270 --> 00:17:28,919
it had a pretty neutral pH of 7.6 a low

425
00:17:35,350 --> 00:17:32,280
conductivity of 83 micro semen and a

426
00:17:37,970 --> 00:17:35,360
temperature of 14 degrees Celsius or

427
00:17:40,850 --> 00:17:37,980
58.4 degrees Fahrenheit

428
00:17:42,730 --> 00:17:40,860
basically this water has less dissolved

429
00:17:46,310 --> 00:17:42,740
solids in it than most well water

430
00:17:48,770 --> 00:17:46,320
suggesting no volcanic interaction now

431
00:17:51,049 --> 00:17:48,780
Sam will be telling you about mainstream

432
00:17:53,270 --> 00:17:51,059
mainstream is not unlike any other

433
00:17:54,710 --> 00:17:53,280
ordinary Mountain stream the samples we

434
00:17:56,930 --> 00:17:54,720
took were from the crystal clear water

435
00:17:58,669 --> 00:17:56,940
from said location this stream was

436
00:18:00,650 --> 00:17:58,679
fairly shallow with a depth ranging from

437
00:18:02,810 --> 00:18:00,660
around one to three feet deep differing

438
00:18:04,669 --> 00:18:02,820

on location the connectivity was

439
00:18:07,130 --> 00:18:04,679
reasonably low with it being 140

440
00:18:09,470 --> 00:18:07,140
microsiemens and a fairly neutral pH of

441
00:18:11,090 --> 00:18:09,480
7.2 as a detective

442
00:18:13,430 --> 00:18:11,100
the temperature measured around 14

443
00:18:16,010 --> 00:18:13,440
degrees Celsius it is surrounded by an

444
00:18:17,630 --> 00:18:16,020
abundance of leafy green vegetation that

445
00:18:19,730 --> 00:18:17,640
grows in and around the stream with

446
00:18:21,770 --> 00:18:19,740
animal life being prevalent based on

447
00:18:23,210 --> 00:18:21,780
these numbers and observations we can

448
00:18:25,010 --> 00:18:23,220
infer that there is little to no

449
00:18:27,470 --> 00:18:25,020
evidence of volcanic activity in the

450
00:18:29,029 --> 00:18:27,480
Stream just as Panama wheel Creek now

451
00:18:30,950 --> 00:18:29,039
Mickey is going to introduce Devil's

452
00:18:37,130 --> 00:18:30,960
Kitchen

453
00:18:39,230 --> 00:18:37,140
is different from all the other sites

454
00:18:41,330 --> 00:18:39,240
there was no vegetation within the

455
00:18:43,549 --> 00:18:41,340
immediate vicinity of this site the air

456
00:18:45,470 --> 00:18:43,559
had a pungent smell of hydrogen sulfide

457
00:18:47,990 --> 00:18:45,480
which has a distinguishable rotten egg

458
00:18:49,669 --> 00:18:48,000
smell we sampled from a very shallow

459
00:18:52,190 --> 00:18:49,679
stream that eventually ran into

460
00:18:55,789 --> 00:18:52,200
mainstream the stream had a cloudy white

461
00:18:58,010 --> 00:18:55,799
color the pH was 2.0 which is extremely

462
00:19:00,669 --> 00:18:58,020
low the temperature was 52 degrees

463
00:19:03,710 --> 00:19:00,679

Celsius and the conductivity was

464
00:19:06,169 --> 00:19:03,720
5760 micro Siemens which is well over

465
00:19:07,970 --> 00:19:06,179
all the other sites the site had many

466
00:19:10,430 --> 00:19:07,980
Jagged rocks and it is clear that they

467
00:19:12,350 --> 00:19:10,440
had been degraded over time due to the

468
00:19:14,690 --> 00:19:12,360
extreme acidity of the water

469
00:19:16,370 --> 00:19:14,700
the hot and acidic water were clear

470
00:19:18,650 --> 00:19:16,380
indicators that there is volcanic

471
00:19:20,750 --> 00:19:18,660
activity present at this site we noticed

472
00:19:22,669 --> 00:19:20,760
brown and green spots and filaments that

473
00:19:24,710 --> 00:19:22,679
could be microbes and now I'm going to

474
00:19:28,070 --> 00:19:24,720
hand it to Sabian Hamilton who is going

475
00:19:30,289 --> 00:19:28,080
to talk about the alkaline spring

476
00:19:32,210 --> 00:19:30,299
thank you Mickey Lassen Volcanic

477
00:19:34,390 --> 00:19:32,220
National Park is an amazing example of

478
00:19:36,770 --> 00:19:34,400
hydrothermal activity in microbial life

479
00:19:38,150 --> 00:19:36,780
alkaline streams vents lay on a fault

480
00:19:40,490 --> 00:19:38,160
line as there's a sharp difference in

481
00:19:42,230 --> 00:19:40,500
height there is steam rising from the

482
00:19:43,130 --> 00:19:42,240
water itself because it has hydrothermal

483
00:19:45,169 --> 00:19:43,140
features

484
00:19:47,029 --> 00:19:45,179
there were dead bugs and animals caught

485
00:19:48,350 --> 00:19:47,039
trying to cross the stream and along the

486
00:19:49,909 --> 00:19:48,360
side of the stream there were smooth

487
00:19:52,250 --> 00:19:49,919
rocks coated in a layer of white

488
00:19:53,990 --> 00:19:52,260

minerals plant diversity around the

489
00:19:55,909 --> 00:19:54,000
perimeter of the stream can grow very

490
00:19:57,650 --> 00:19:55,919
well however the plants exposed to the

491
00:19:59,990 --> 00:19:57,660
water directly die

492
00:20:02,210 --> 00:20:00,000
it is easily noticeable that there is an

493
00:20:03,890 --> 00:20:02,220
abundance of microbes submerged in the

494
00:20:06,289 --> 00:20:03,900
water at alkaline stream more than any

495
00:20:07,909 --> 00:20:06,299
other field site

496
00:20:10,310 --> 00:20:07,919
Sabia for

497
00:20:12,049 --> 00:20:10,320
field size we took our recorded data and

498
00:20:14,510 --> 00:20:12,059
samples back to the lab to test

499
00:20:16,370 --> 00:20:14,520
parameters we set up that mimics the

500
00:20:18,770 --> 00:20:16,380
distinctly different environments found

501
00:20:20,990 --> 00:20:18,780
in each Werner Valley Field site our

502
00:20:23,270 --> 00:20:21,000
first experiment which began in November

503
00:20:25,669 --> 00:20:23,280
was the introduction of rock powder to

504
00:20:27,529 --> 00:20:25,679
different solutions in the creation of

505
00:20:30,169 --> 00:20:27,539
this experiment we set up five different

506
00:20:32,330 --> 00:20:30,179
flasks which varied based on ph and

507
00:20:34,850 --> 00:20:32,340
temperature and took weekly recordings

508
00:20:36,610 --> 00:20:34,860
testing how these variables affect the

509
00:20:38,630 --> 00:20:36,620
conductivity of each solution

510
00:20:43,190 --> 00:20:38,640
introducing these Rock dissolution

511
00:20:43,200 --> 00:20:47,930
as John has just

512
00:20:51,470 --> 00:20:49,250
maintaining the effects of different

513
00:20:52,490 --> 00:20:51,480

parameters on Rock dissolution in Warner

514
00:20:54,470 --> 00:20:52,500
Valley

515
00:20:56,570 --> 00:20:54,480
in order to do so we devised a set of

516
00:20:58,970 --> 00:20:56,580
hypotheses as a class which we then

517
00:21:00,890 --> 00:20:58,980
tested across five different parameters

518
00:21:02,750 --> 00:21:00,900
the first experiment involved using day

519
00:21:05,150 --> 00:21:02,760
site Rock powder and was conducted at

520
00:21:07,010 --> 00:21:05,160
PH2 and 50 degrees Celsius

521
00:21:08,930 --> 00:21:07,020
the remaining four experiments were

522
00:21:11,750 --> 00:21:08,940
conducted with basalt rock at both 25

523
00:21:14,510 --> 00:21:11,760
and 50 degrees Celsius and at PH2 and pH

524
00:21:16,730 --> 00:21:14,520
5. we deliberately selected these pH

525
00:21:19,190 --> 00:21:16,740
levels and temperatures to closely mimic

526
00:21:21,289 --> 00:21:19,200
the field sites with PH2 being similar

527
00:21:24,049 --> 00:21:21,299
to that of Devil's Kitchen and ph-5

528
00:21:25,549 --> 00:21:24,059
reflecting the natural pH of rainfall we

529
00:21:27,470 --> 00:21:25,559
believe that these experiments have

530
00:21:28,970 --> 00:21:27,480
yielded valuable insights into the

531
00:21:30,950 --> 00:21:28,980
complex mechanisms behind Rock

532
00:21:32,810 --> 00:21:30,960
dissolution and we look forward to

533
00:21:34,909 --> 00:21:32,820
sharing our findings with you all

534
00:21:37,310 --> 00:21:34,919
now dive deeper into the impact that

535
00:21:38,810 --> 00:21:37,320
water Rock reactions have on the pH of a

536
00:21:41,029 --> 00:21:38,820
solution

537
00:21:42,770 --> 00:21:41,039
one of the hypotheses we tested during

538
00:21:44,570 --> 00:21:42,780

our experiments was whether aqueous

539
00:21:46,370 --> 00:21:44,580
Solutions interacting with rocks would

540
00:21:48,350 --> 00:21:46,380
lead to an increase in the pH of the

541
00:21:50,330 --> 00:21:48,360
solution over time we found this

542
00:21:52,070 --> 00:21:50,340
hypothesis to be true through weekly pH

543
00:21:55,010 --> 00:21:52,080
measurements and the need for additional

544
00:21:56,750 --> 00:21:55,020
acid to be added in fact regardless of

545
00:21:59,029 --> 00:21:56,760
the experimental conditions the pH of

546
00:22:01,130 --> 00:21:59,039
all solutions Rose every week as

547
00:22:02,930 --> 00:22:01,140
evidenced by the bar graph before you

548
00:22:04,669 --> 00:22:02,940
the bars in the graph represent the

549
00:22:06,470 --> 00:22:04,679
total amount of acid that was added to

550
00:22:08,930 --> 00:22:06,480
each experiment to keep the pH levels

551
00:22:11,510 --> 00:22:08,940
stable throughout the testing period

552
00:22:13,850 --> 00:22:11,520
this need for continual acid addition is

553
00:22:15,830 --> 00:22:13,860
the result of water Rock reactions in

554
00:22:17,810 --> 00:22:15,840
which the cations in the dissolved Rock

555
00:22:18,830 --> 00:22:17,820
contribute to the rise in pH of the

556
00:22:21,470 --> 00:22:18,840
solution

557
00:22:23,090 --> 00:22:21,480
had we not titrated weekly the final pH

558
00:22:25,010 --> 00:22:23,100
levels would have been significantly

559
00:22:27,289 --> 00:22:25,020
higher than the starting levels

560
00:22:28,970 --> 00:22:27,299
moving on I'm pleased to introduce Gage

561
00:22:31,010 --> 00:22:28,980
Lawrence who will be speaking on the

562
00:22:33,529 --> 00:22:31,020
effects that pH and temperature have on

563
00:22:35,630 --> 00:22:33,539

the speed of rock dissolution

564
00:22:37,310 --> 00:22:35,640
thank you Jordan and our Rock

565
00:22:38,990 --> 00:22:37,320
dissolution experiment we explored two

566
00:22:41,450 --> 00:22:39,000
of the main factors in how fast rocks

567
00:22:43,310 --> 00:22:41,460
dissolve in A3 Solutions pH and

568
00:22:45,649 --> 00:22:43,320
temperature these factors are chosen

569
00:22:47,690 --> 00:22:45,659
based on a two hypothesis

570
00:22:49,610 --> 00:22:47,700
one that temperature is all routes

571
00:22:51,350 --> 00:22:49,620
faster and the other that more acidic pH

572
00:22:52,970 --> 00:22:51,360
dissolve rocks faster

573
00:22:54,289 --> 00:22:52,980
how to show the effective pH in

574
00:22:56,270 --> 00:22:54,299
temperatures through net conductivity

575
00:22:58,070 --> 00:22:56,280
which measures the amount of ions in the

576
00:22:59,990 --> 00:22:58,080
solution non-accounting hydrogen ions

577
00:23:02,750 --> 00:23:00,000
from the pH to better measure the effect

578
00:23:04,010 --> 00:23:02,760
of pH because it limits ph's effect on

579
00:23:05,630 --> 00:23:04,020
conductivity

580
00:23:08,149 --> 00:23:05,640
the temperatures were set at 50 degrees

581
00:23:09,470 --> 00:23:08,159
and 25 degrees Celsius so we can measure

582
00:23:11,270 --> 00:23:09,480
the difference in how fast the Rocks

583
00:23:13,010 --> 00:23:11,280
dissolve in different temperatures

584
00:23:14,870 --> 00:23:13,020
as you can see on the draft the 50

585
00:23:16,250 --> 00:23:14,880
degree experiment had a much higher net

586
00:23:18,649 --> 00:23:16,260
conductivity at the end of the

587
00:23:21,770 --> 00:23:18,659
experiment compared to the 25 degree

588
00:23:22,970 --> 00:23:21,780

experiment by 189 micro Siemens

589
00:23:25,430 --> 00:23:22,980
showing that a higher temperature

590
00:23:26,570 --> 00:23:25,440
dissolved rocks at a higher rate than a

591
00:23:28,789 --> 00:23:26,580
lower temperature

592
00:23:31,370 --> 00:23:28,799
the second factor that we explored was

593
00:23:33,049 --> 00:23:31,380
the effect of pH the pH was set at two

594
00:23:35,330 --> 00:23:33,059
and the other at five so we can measure

595
00:23:36,470 --> 00:23:35,340
the effective pH on how fast rods

596
00:23:38,090 --> 00:23:36,480
dissolve

597
00:23:40,010 --> 00:23:38,100
as you can see on the draft the

598
00:23:41,750 --> 00:23:40,020
experiment with a pH of two the Rocks

599
00:23:44,029 --> 00:23:41,760
developed much faster having a net

600
00:23:45,830 --> 00:23:44,039
conductivity that was 2002 micro Siemens

601
00:23:47,930 --> 00:23:45,840
more than the experiment with the pH

602
00:23:49,970 --> 00:23:47,940
five at the end of the experiment

603
00:23:51,770 --> 00:23:49,980
showing the more acidic pH caused the

604
00:23:53,570 --> 00:23:51,780
rust dissolve at a higher rate not of a

605
00:23:55,850 --> 00:23:53,580
more basic pH

606
00:23:57,770 --> 00:23:55,860
ultimately our experiment shows that a

607
00:23:59,930 --> 00:23:57,780
more acidic to pH and a higher

608
00:24:01,669 --> 00:23:59,940
temperature dissolves rocks faster than

609
00:24:03,830 --> 00:24:01,679
a more basic pH and a lower temperature

610
00:24:06,289 --> 00:24:03,840
which gives us an amazing insight into

611
00:24:08,510 --> 00:24:06,299
the water chemistry at the field sites

612
00:24:13,730 --> 00:24:08,520
thank you

613
00:24:15,710 --> 00:24:13,740

of pH in temperature on a rock powder

614
00:24:18,049 --> 00:24:15,720
solution we set out to our second

615
00:24:20,270 --> 00:24:18,059
experiment which was the incubation of

616
00:24:22,549 --> 00:24:20,280
microbe cultures these cultures

617
00:24:24,950 --> 00:24:22,559
originated from the Warner Valley Field

618
00:24:27,470 --> 00:24:24,960
sites previously introduced The

619
00:24:29,270 --> 00:24:27,480
Experiment began assigning each intern a

620
00:24:31,789 --> 00:24:29,280
column containing a small culture of

621
00:24:34,549 --> 00:24:31,799
microbes and for the next 10 weeks track

622
00:24:36,649 --> 00:24:34,559
growth found within the columns during

623
00:24:38,690 --> 00:24:36,659
this period we were asked to create an

624
00:24:41,230 --> 00:24:38,700
experimental column and change one

625
00:24:44,510 --> 00:24:41,240
variable being either temperature pH

626
00:24:46,970 --> 00:24:44,520
total dissolved solids or light with

627
00:24:48,770 --> 00:24:46,980
this I'd like to introduce Evelyn fucci

628
00:24:51,770 --> 00:24:48,780
explaining the effects of temperature

629
00:24:53,630 --> 00:24:51,780
change on microbe incubations

630
00:24:55,190 --> 00:24:53,640
the first condition that we chose to

631
00:24:57,169 --> 00:24:55,200
study was the importance of temperature

632
00:24:58,850 --> 00:24:57,179
found at the field sites in order to

633
00:25:00,470 --> 00:24:58,860
determine if the microbes are

634
00:25:02,210 --> 00:25:00,480
temperature dependent

635
00:25:04,010 --> 00:25:02,220
temperature is one of the most important

636
00:25:05,810 --> 00:25:04,020
factors that can affect the growth and

637
00:25:07,850 --> 00:25:05,820
survival of microbes due to the fact

638
00:25:10,430 --> 00:25:07,860

that it influences metabolic processes

639
00:25:12,409 --> 00:25:10,440
and the fact that it varies site to site

640
00:25:14,270 --> 00:25:12,419
in this example we lower the temperature

641
00:25:16,370 --> 00:25:14,280
of the hair like filament since it comes

642
00:25:17,990 --> 00:25:16,380
from a higher temperature field site the

643
00:25:20,810 --> 00:25:18,000
temperature was lowered from 45 degrees

644
00:25:22,250 --> 00:25:20,820
Celsius to 21 degrees Celsius our

645
00:25:24,049 --> 00:25:22,260
hypothesis was that the hair like

646
00:25:25,970 --> 00:25:24,059
filament would not be able to tolerate

647
00:25:28,070 --> 00:25:25,980
the drop in temperature

648
00:25:29,570 --> 00:25:28,080
over the course of 10 weeks we observed

649
00:25:31,490 --> 00:25:29,580
the filament's progression giving it

650
00:25:33,950 --> 00:25:31,500
fresh site water to feed it every four

651
00:25:35,750 --> 00:25:33,960
weeks as time went on the microbe

652
00:25:37,430 --> 00:25:35,760
yellowed showing its decrease in growth

653
00:25:39,350 --> 00:25:37,440
throughout this time whereas the control

654
00:25:41,330 --> 00:25:39,360
kept at warmer conditions similar to

655
00:25:43,190 --> 00:25:41,340
where it was found thrived

656
00:25:45,049 --> 00:25:43,200
experiments with different microbes

657
00:25:46,970 --> 00:25:45,059
testing the same variable yielded

658
00:25:48,470 --> 00:25:46,980
similar results proving that the

659
00:25:50,510 --> 00:25:48,480
microbes are in fact temperature

660
00:25:52,370 --> 00:25:50,520
dependent and that their ideal growth

661
00:25:55,190 --> 00:25:52,380
occurs at temperatures near where they

662
00:25:57,110 --> 00:25:55,200
were found and now Ethan Lugo discussing

663
00:26:00,169 --> 00:25:57,120

the effects of pH

664
00:26:03,169 --> 00:26:00,179
now in this experiment we investigated

665
00:26:05,269 --> 00:26:03,179
the effects of pH on microbial growth

666
00:26:07,310 --> 00:26:05,279
microbes are sensitive to changes in

667
00:26:08,930 --> 00:26:07,320
their environment and pH is one of the

668
00:26:10,610 --> 00:26:08,940
key factors that can influence their

669
00:26:12,890 --> 00:26:10,620
growth and survival

670
00:26:15,289 --> 00:26:12,900
by altering the pH of the growth medium

671
00:26:17,330 --> 00:26:15,299
and making temperature a constant we can

672
00:26:18,950 --> 00:26:17,340
observe changes in microbial growth and

673
00:26:20,630 --> 00:26:18,960
determine how pH affects their

674
00:26:22,190 --> 00:26:20,640
development

675
00:26:23,990 --> 00:26:22,200
pictures shown are a concise

676
00:26:26,510 --> 00:26:24,000
representation of what happened in the

677
00:26:27,950 --> 00:26:26,520
microbes when changed from a ph of 7 to

678
00:26:29,450 --> 00:26:27,960
a pH of 5.

679
00:26:31,490 --> 00:26:29,460
as you can see in the pictures on the

680
00:26:33,169 --> 00:26:31,500
left the microbes grew normally or as

681
00:26:34,430 --> 00:26:33,179
they would with no effect due to the

682
00:26:35,690 --> 00:26:34,440
fact that this is the control of the

683
00:26:37,549 --> 00:26:35,700
experiment

684
00:26:38,810 --> 00:26:37,559
although the discrepancies between the

685
00:26:41,090 --> 00:26:38,820
pictures of the experiment at the

686
00:26:42,950 --> 00:26:41,100
beginning and end are subtle with

687
00:26:45,169 --> 00:26:42,960
careful observation you can see that the

688
00:26:46,549 --> 00:26:45,179

microbes have changed and are dying due

689
00:26:48,289 --> 00:26:46,559
to the yellowish color along the side

690
00:26:49,190 --> 00:26:48,299
with its stunted growth from the

691
00:26:51,409 --> 00:26:49,200
beginning

692
00:26:53,029 --> 00:26:51,419
this is evidence that the microorganisms

693
00:26:54,830 --> 00:26:53,039
struggle to grow because of the change

694
00:26:57,350 --> 00:26:54,840
in PH due to the findings of this

695
00:26:59,510 --> 00:26:57,360
experiment along with another experiment

696
00:27:00,769 --> 00:26:59,520
of similar caliper that is generally the

697
00:27:03,590 --> 00:27:00,779
same findings

698
00:27:04,730 --> 00:27:03,600
up next with Sam Cornelius with solute

699
00:27:07,010 --> 00:27:04,740
experiments

700
00:27:08,870 --> 00:27:07,020
thank you Ethan the next condition we

701
00:27:11,450 --> 00:27:08,880
chose to investigate was the addition of

702
00:27:13,070 --> 00:27:11,460
solutes microbes can be sensitive and

703
00:27:15,049 --> 00:27:13,080
solutes are an important factor in their

704
00:27:17,630 --> 00:27:15,059
growth in survival in this experiment

705
00:27:20,090 --> 00:27:17,640
300 microliters of sodium thiosulfate

706
00:27:21,350 --> 00:27:20,100
was added to the water from paduate and

707
00:27:24,169 --> 00:27:21,360
kept at room temperature for

708
00:27:26,330 --> 00:27:24,179
approximately 10 weeks as the week's

709
00:27:27,590 --> 00:27:26,340
progressed a large green Mass formed an

710
00:27:29,029 --> 00:27:27,600
experimental while nothing major

711
00:27:31,010 --> 00:27:29,039
happened in the control

712
00:27:33,049 --> 00:27:31,020
the mass appeared to be two small Moss

713
00:27:34,610 --> 00:27:33,059

balls surrounded by a thin blanket of

714
00:27:37,310 --> 00:27:34,620
algae where resembling that of a spider

715
00:27:38,690 --> 00:27:37,320
web overall the control was alive at the

716
00:27:40,310 --> 00:27:38,700
end of the 10 weeks but did not show

717
00:27:41,810 --> 00:27:40,320
nearly the amount of growth as the

718
00:27:43,549 --> 00:27:41,820
experimental did

719
00:27:45,289 --> 00:27:43,559
from this we can conclude that the

720
00:27:47,750 --> 00:27:45,299
microbes can withstand the addition of

721
00:27:50,090 --> 00:27:47,760
this solute up next will be Joey simonis

722
00:27:53,090 --> 00:27:50,100
with micro lights

723
00:27:55,490 --> 00:27:53,100
thank you Sam the last condition we

724
00:27:57,649 --> 00:27:55,500
experimented with was a light the reason

725
00:27:59,169 --> 00:27:57,659
we chose to explore this was because we

726
00:28:01,190 --> 00:27:59,179
observed what seemed to be

727
00:28:01,970 --> 00:28:01,200
non-phototrophic microbes at Devil's

728
00:28:04,130 --> 00:28:01,980
Kitchen

729
00:28:05,810 --> 00:28:04,140
because they weren't green we assumed

730
00:28:06,890 --> 00:28:05,820
the source of energy was something other

731
00:28:09,289 --> 00:28:06,900
than light

732
00:28:11,570 --> 00:28:09,299
in this experiment using iron eating

733
00:28:13,970 --> 00:28:11,580
microbes from Devil's Kitchen we tried

734
00:28:16,430 --> 00:28:13,980
to completely remove light except when

735
00:28:20,029 --> 00:28:16,440
checking the microbes adding 200

736
00:28:22,190 --> 00:28:20,039
microliters of Iron II chloride at a

737
00:28:24,950 --> 00:28:22,200
dilution ratio of one part Iron II

738
00:28:26,269 --> 00:28:24,960

chloride to 100 Parts water every week

739
00:28:28,370 --> 00:28:26,279
to feed them

740
00:28:30,590 --> 00:28:28,380
over the time of the experiment we

741
00:28:33,350 --> 00:28:30,600
witnessed no visible growth and a loss

742
00:28:35,810 --> 00:28:33,360
of a faint green Hue unlike the control

743
00:28:38,269 --> 00:28:35,820
which grew more and more green over time

744
00:28:41,090 --> 00:28:38,279
and now John

745
00:28:43,010 --> 00:28:41,100
thank you Joey with observations taken

746
00:28:44,810 --> 00:28:43,020
from the Warner Valley Field sites and

747
00:28:47,029 --> 00:28:44,820
the last two experiments which have

748
00:28:49,010 --> 00:28:47,039
given us physical data on how rocks and

749
00:28:51,230 --> 00:28:49,020
microbes are reacting in these simulated

750
00:28:53,090 --> 00:28:51,240
environments we were tasked to compile

751
00:28:55,070 --> 00:28:53,100
this information to create our

752
00:28:57,169 --> 00:28:55,080
interpretation of how can an area

753
00:28:59,450 --> 00:28:57,179
spanning a couple of Miles have such

754
00:29:01,610 --> 00:28:59,460
vastly different environments and what

755
00:29:03,950 --> 00:29:01,620
is the geological process that affects

756
00:29:05,870 --> 00:29:03,960
each site to answer this question I'd

757
00:29:08,690 --> 00:29:05,880
like to introduce Aubry Norton covering

758
00:29:11,510 --> 00:29:08,700
padawillo Creek's interpretation

759
00:29:13,970 --> 00:29:11,520
thank you John evidence of activity

760
00:29:16,250 --> 00:29:13,980
appears in three forms tempter pH and

761
00:29:18,289 --> 00:29:16,260
sulfate levels since petal Creek has a

762
00:29:20,389 --> 00:29:18,299
neutral pH has a low temperature along

763
00:29:22,130 --> 00:29:20,399

with low sulfate levels it indicates a

764
00:29:24,769 --> 00:29:22,140
lack of hydrothermal activity at the

765
00:29:26,330 --> 00:29:24,779
site paddle Creek gets its water from

766
00:29:28,310 --> 00:29:26,340
snowmount and rainfall that travels

767
00:29:30,409 --> 00:29:28,320
through the valley the pH of this water

768
00:29:33,350 --> 00:29:30,419
is around five while the creek has a pH

769
00:29:35,149 --> 00:29:33,360
of around 7.6 this can be explained by

770
00:29:37,490 --> 00:29:35,159
the rocket solution experiments where we

771
00:29:40,370 --> 00:29:37,500
are able to prove that pH increases over

772
00:29:42,289 --> 00:29:40,380
time as rock is dissolved into the water

773
00:29:43,970 --> 00:29:42,299
through the rock dissolution experiments

774
00:29:46,430 --> 00:29:43,980
we were also able to determine the

775
00:29:48,230 --> 00:29:46,440
environments with a more neutral pH and

776
00:29:50,389 --> 00:29:48,240
cooler temperature do dissolve Rock but

777
00:29:53,029 --> 00:29:50,399
on a much lower rate this will explain

778
00:29:54,830 --> 00:29:53,039
the low conductivity and why the pH is

779
00:29:57,409 --> 00:29:54,840
not acidic due to the small amount of

780
00:29:59,330 --> 00:29:57,419
solids dissolved the microbes at pedal

781
00:30:01,490 --> 00:29:59,340
Creek mostly consists of green algae

782
00:30:03,710 --> 00:30:01,500
that are able to survive and grow to the

783
00:30:05,630 --> 00:30:03,720
benign conditions that they live in in

784
00:30:07,730 --> 00:30:05,640
the biology experiments polarisely

785
00:30:10,130 --> 00:30:07,740
discussed we were able to show that

786
00:30:12,289 --> 00:30:10,140
environments with neutral PHS in cooler

787
00:30:14,269 --> 00:30:12,299
temperatures are able to offer more

788
00:30:16,549 --> 00:30:14,279

steady growth to a variety of microbes

789
00:30:19,010 --> 00:30:16,559
now Mauricio Tamaya will explain the

790
00:30:20,870 --> 00:30:19,020
Devil's Kitchen site thank you Aubry the

791
00:30:22,909 --> 00:30:20,880
Devil's Kitchen site showed prominent

792
00:30:25,490 --> 00:30:22,919
evidence of Lassen's magma chamber deep

793
00:30:28,010 --> 00:30:25,500
underground that releases volcanic gases

794
00:30:30,470 --> 00:30:28,020
along a fault line and boiling mud pots

795
00:30:32,029 --> 00:30:30,480
compared to other field sites a small

796
00:30:34,970 --> 00:30:32,039
stream in Devil's Kitchen has the

797
00:30:37,370 --> 00:30:34,980
highest sulfate levels at 21 millimoles

798
00:30:39,529 --> 00:30:37,380
the lowest pH of 2 comparable to lemon

799
00:30:43,190 --> 00:30:39,539
juice or vinegar high temperatures

800
00:30:45,470 --> 00:30:43,200
reaching 50 2 degrees Celsius or 125

801
00:30:48,110 --> 00:30:45,480
degrees Fahrenheit and high dissolved

802
00:30:50,470 --> 00:30:48,120
solids concentrations as indicated by

803
00:30:53,029 --> 00:30:50,480
the high conductivity of

804
00:30:55,010 --> 00:30:53,039
5760 micro Siemens

805
00:30:57,289 --> 00:30:55,020
we replicate this environment in our

806
00:31:00,010 --> 00:30:57,299
Rock dissolution experiments using hot

807
00:31:02,330 --> 00:31:00,020
plates and sulfuric acid to lower the ph

808
00:31:04,789 --> 00:31:02,340
these experimental conditions increase

809
00:31:06,710 --> 00:31:04,799
the solution of rocks increasing the

810
00:31:09,529 --> 00:31:06,720
quantitative of the solutions and the

811
00:31:12,470 --> 00:31:09,539
dissolved solids concentrations

812
00:31:14,990 --> 00:31:12,480
our experiments showed that both a low

813
00:31:16,610 --> 00:31:15,000

ph and high temperature can greatly

814
00:31:18,710 --> 00:31:16,620
increase the connectivity of solutions

815
00:31:21,230 --> 00:31:18,720
making values similar to our

816
00:31:23,389 --> 00:31:21,240
measurements at Devil's Kitchen in our

817
00:31:25,909 --> 00:31:23,399
laboratory incubation experiments with

818
00:31:28,070 --> 00:31:25,919
low ph and high temperature the microbes

819
00:31:30,230 --> 00:31:28,080
had less growth and diversity compared

820
00:31:32,570 --> 00:31:30,240
to other experiments with field sites

821
00:31:34,430 --> 00:31:32,580
that have more moderate conditions this

822
00:31:36,590 --> 00:31:34,440
along with a low PH in high temperatures

823
00:31:39,590 --> 00:31:36,600
at Devil's Kitchen LEDs with lower

824
00:31:41,750 --> 00:31:39,600
abundances of microbes next up Mia

825
00:31:43,070 --> 00:31:41,760
Gleason will now interpret mainstream at

826
00:31:45,710 --> 00:31:43,080
padawa Creek

827
00:31:47,870 --> 00:31:45,720
thank you Mauricio mainstream Boulevard

828
00:31:50,269 --> 00:31:47,880
Creek has similar conditions to the

829
00:31:52,490 --> 00:31:50,279
padal creek site due to their closeness

830
00:31:54,649 --> 00:31:52,500
this stream water is a blend of the

831
00:31:56,389 --> 00:31:54,659
acidic Devil's Kitchen water and the

832
00:31:58,370 --> 00:31:56,399
fresh Paddle Wheel Creek Water

833
00:32:00,710 --> 00:31:58,380
since there is no hydrothermal activity

834
00:32:02,750 --> 00:32:00,720
near the site mainstream below Paddle

835
00:32:05,149 --> 00:32:02,760
Wheel Creek has a low conductivity and

836
00:32:07,010 --> 00:32:05,159
sulfate input but there's a small amount

837
00:32:08,630 --> 00:32:07,020
of runoff from Devil's Kitchen making

838
00:32:10,430 --> 00:32:08,640

the conductivity higher than what is

839
00:32:12,830 --> 00:32:10,440
found at powder wheel Creek

840
00:32:14,090 --> 00:32:12,840
the sized pH and conductivity is

841
00:32:15,769 --> 00:32:14,100
explained through the rock dissolution

842
00:32:17,149 --> 00:32:15,779
experiments

843
00:32:19,490 --> 00:32:17,159
it was found that his Rock dissolves

844
00:32:20,810 --> 00:32:19,500
into the water the ph and conductivity

845
00:32:23,210 --> 00:32:20,820
will increase

846
00:32:25,310 --> 00:32:23,220
at mainstream it can be assumed that the

847
00:32:27,169 --> 00:32:25,320
pH is neutral because the Rocks within

848
00:32:28,190 --> 00:32:27,179
it have had time to dissolve into the

849
00:32:30,230 --> 00:32:28,200
Stream

850
00:32:32,149 --> 00:32:30,240
the water's cool temperature also

851
00:32:33,049 --> 00:32:32,159
contributed to the Rocks dissolving at a

852
00:32:35,450 --> 00:32:33,059
slow rate

853
00:32:37,490 --> 00:32:35,460
our biology incubation is done in class

854
00:32:39,710 --> 00:32:37,500
indicated that the mainstream below

855
00:32:42,830 --> 00:32:39,720
Paddlewheel creek site has a high amount

856
00:32:45,070 --> 00:32:42,840
of microbial diversity and abundance and

857
00:32:48,350 --> 00:32:45,080
not a change in the temperature and pH

858
00:32:51,649 --> 00:32:48,360
decreases both abundance and diversity

859
00:32:54,289 --> 00:32:51,659
and now Mauricio Tamayo will return to

860
00:32:56,990 --> 00:32:54,299
discuss the alkaline stream site thank

861
00:32:59,810 --> 00:32:57,000
you Mia as shown from our observations

862
00:33:02,210 --> 00:32:59,820
akline stream is a small stream flowing

863
00:33:04,430 --> 00:33:02,220

by a hill with a large abundance of dark

864
00:33:07,669 --> 00:33:04,440
green algae at the bottom with a small

865
00:33:10,370 --> 00:33:07,679
steam Rising reaching temperatures of 57

866
00:33:12,830 --> 00:33:10,380
degrees Celsius or 135 degrees

867
00:33:15,310 --> 00:33:12,840
Fahrenheit along with the second highest

868
00:33:18,470 --> 00:33:15,320
sulfate abundance at

869
00:33:21,409 --> 00:33:18,480
1947 micromoles showing evidence of

870
00:33:23,570 --> 00:33:21,419
hydrothermal vents although unlike those

871
00:33:25,930 --> 00:33:23,580
kitchen the aqualine stream doesn't

872
00:33:30,289 --> 00:33:25,940
follow its high connectivity and low PH

873
00:33:33,230 --> 00:33:30,299
rather it has a neutral pH of 7.1 along

874
00:33:34,370 --> 00:33:33,240
with a high conductivity of 640 micro

875
00:33:36,710 --> 00:33:34,380
Siemens

876
00:33:39,110 --> 00:33:36,720
other solutes at Devil's Kitchen are

877
00:33:40,730 --> 00:33:39,120
also prevalent at alkaline stream the

878
00:33:43,370 --> 00:33:40,740
presence of sulfate indicates that

879
00:33:44,870 --> 00:33:43,380
sulfuric acid existed Underground

880
00:33:47,450 --> 00:33:44,880
this along with the high temperatures

881
00:33:49,970 --> 00:33:47,460
would have increased the solubility of

882
00:33:52,970 --> 00:33:49,980
substances and the solution in the site

883
00:33:54,769 --> 00:33:52,980
which caused the pH to increase as it

884
00:33:58,009 --> 00:33:54,779
had more time to interact with the rock

885
00:34:00,289 --> 00:33:58,019
as our lab experiment showed what the

886
00:34:02,210 --> 00:34:00,299
neutral pH in high temperature the green

887
00:34:03,889 --> 00:34:02,220
filament microbes had a consistent and

888
00:34:07,669 --> 00:34:03,899

healthy amount of growth in the field

889
00:34:10,129 --> 00:34:07,679
and in our lab incubations but our lab

890
00:34:11,930 --> 00:34:10,139
observations also showed that these

891
00:34:14,690 --> 00:34:11,940
microbes did not tolerate different

892
00:34:17,329 --> 00:34:14,700
conditions perhaps explaining why they

893
00:34:19,790 --> 00:34:17,339
were not seen in other field sites

894
00:34:21,770 --> 00:34:19,800
thank you Mauricio from our first days

895
00:34:23,750 --> 00:34:21,780
in this program we were given crumbs to

896
00:34:26,510 --> 00:34:23,760
a complete answer of how this all

897
00:34:28,070 --> 00:34:26,520
relates to Mars past with the data we've

898
00:34:30,589 --> 00:34:28,080
collected from Labs as well as

899
00:34:32,869 --> 00:34:30,599
observations and interpretations we've

900
00:34:35,450 --> 00:34:32,879
made down at Warner Valley we believe we

901
00:34:37,430 --> 00:34:35,460
can better answer this final question to

902
00:34:39,230 --> 00:34:37,440
wrap our findings together it's my

903
00:34:42,050 --> 00:34:39,240
pleasure to introduce Evelyn groom

904
00:34:43,790 --> 00:34:42,060
presenting significance of study

905
00:34:45,109 --> 00:34:43,800
recent evidence from the spirit rover

906
00:34:47,329 --> 00:34:45,119
revealed the presence of hydrothermal

907
00:34:48,290 --> 00:34:47,339
features on Ancient Mars by finding

908
00:34:50,030 --> 00:34:48,300
environments on Earth the chair

909
00:34:51,950 --> 00:34:50,040
characteristics with Ancient Mars and

910
00:34:53,990 --> 00:34:51,960
can Arbor life such as Warner Valley and

911
00:34:55,490 --> 00:34:54,000
Western Volcanic National Park we can

912
00:34:57,290 --> 00:34:55,500
investigate the possibility of Life on

913
00:34:59,270 --> 00:34:57,300

Ancient Mars and the conditions of their

914
00:35:01,250 --> 00:34:59,280
witch it may have lived as more evidence

915
00:35:02,930 --> 00:35:01,260
from Earth and Mars is presented we can

916
00:35:05,150 --> 00:35:02,940
apply our findings from this program to

917
00:35:07,370 --> 00:35:05,160
guide the search all right ladies and

918
00:35:09,470 --> 00:35:07,380
gentlemen to finish off the night each

919
00:35:12,109 --> 00:35:09,480
student has prepared a short sentence or

920
00:35:14,630 --> 00:35:12,119
two discussing how this program has

921
00:35:21,349 --> 00:35:14,640
impacted them and to start us off will

922
00:35:26,569 --> 00:35:24,829
oh okay didn't see you there deciding on

923
00:35:28,069 --> 00:35:26,579
when impact was tough there are

924
00:35:30,050 --> 00:35:28,079
countless things you can talk about that

925
00:35:32,569 --> 00:35:30,060
this program has provided me from

926
00:35:35,390 --> 00:35:32,579
Hands-On learning experiences to lessons

927
00:35:37,670 --> 00:35:35,400
I can take off to college but you know

928
00:35:39,470 --> 00:35:37,680
after many hours editing this video that

929
00:35:42,650 --> 00:35:39,480
you guys have been watching it finally

930
00:35:45,069 --> 00:35:42,660
hit me handling criticism now to give

931
00:35:47,270 --> 00:35:45,079
you some sort of like

932
00:35:49,060 --> 00:35:47,280
understanding to what I'm talking about

933
00:35:53,930 --> 00:35:49,070
I have something to show you

934
00:35:59,270 --> 00:35:56,329
now what I have in my hand here is 20

935
00:36:01,670 --> 00:35:59,280
Pages representing the 14 through 20

936
00:36:04,310 --> 00:36:01,680
pages long on each student's National

937
00:36:06,290 --> 00:36:04,320
report was this report was not something

938
00:36:08,150 --> 00:36:06,300

you waited till the last minute this was

939
00:36:09,950 --> 00:36:08,160
the cumulative of an entire year and I

940
00:36:12,530 --> 00:36:09,960
can tell you firsthand each student

941
00:36:15,890 --> 00:36:12,540
worked really hard on this this along

942
00:36:18,710 --> 00:36:15,900
with the experiment and the presentation

943
00:36:20,510 --> 00:36:18,720
itself each student put a ton of time in

944
00:36:22,849 --> 00:36:20,520
this and I can tell you there were

945
00:36:24,950 --> 00:36:22,859
criticisms made along the way now this

946
00:36:26,690 --> 00:36:24,960
isn't a bad thing criticism is normal

947
00:36:29,329 --> 00:36:26,700
but I don't think there's any other

948
00:36:32,089 --> 00:36:29,339
class that will get you as used to it as

949
00:36:35,030 --> 00:36:32,099
this class does this is a class where

950
00:36:37,010 --> 00:36:35,040
you have to be able to take criticism or

951
00:36:38,810 --> 00:36:37,020
else you won't make it at all and I

952
00:36:41,210 --> 00:36:38,820
really think that is something you

953
00:36:43,250 --> 00:36:41,220
cannot find in juniors and seniors not

954
00:36:45,829 --> 00:36:43,260
only in our campus but in campuses

955
00:36:50,329 --> 00:36:48,349
my name is Marissa Tamara Perez and I've

956
00:36:51,849 --> 00:36:50,339
been part of NASA astrobiology program

957
00:36:54,589 --> 00:36:51,859
here at the high school for two years

958
00:36:57,349 --> 00:36:54,599
when I first joined I didn't know what

959
00:36:59,510 --> 00:36:57,359
astrology was over time with the help of

960
00:37:01,849 --> 00:36:59,520
other interns and as a scientist they

961
00:37:03,470 --> 00:37:01,859
helped me have a better understanding I

962
00:37:05,030 --> 00:37:03,480
joined a program because I enjoy

963
00:37:06,050 --> 00:37:05,040

learning about science particularly

964
00:37:07,730 --> 00:37:06,060
about space

965
00:37:09,349 --> 00:37:07,740
and there's always something new to

966
00:37:10,609 --> 00:37:09,359
learn about and by having the

967
00:37:12,950 --> 00:37:10,619
opportunity to be part of the program

968
00:37:15,109 --> 00:37:12,960
you open new doors for me after high

969
00:37:16,310 --> 00:37:15,119
school and I'd like to thank the NASA

970
00:37:20,270 --> 00:37:16,320
scientists who helped us throughout the

971
00:37:23,990 --> 00:37:22,069
my name is Aubry Norton and this has

972
00:37:25,370 --> 00:37:24,000
been my second year in this program I

973
00:37:26,990 --> 00:37:25,380
have loved my time in this internship

974
00:37:28,970 --> 00:37:27,000
because of my love for Science and My

975
00:37:30,890 --> 00:37:28,980
Love for learning the ability to work

976
00:37:32,270 --> 00:37:30,900
with and learn from NASA scientists is a

977
00:37:34,370 --> 00:37:32,280
phenomenal and completely unique

978
00:37:36,170 --> 00:37:34,380
opportunity to Red Bluff High School it

979
00:37:37,670 --> 00:37:36,180
has been a huge impact in preparing me

980
00:37:39,829 --> 00:37:37,680
for my studies After High School and

981
00:37:41,450 --> 00:37:39,839
becoming a more well-rounded student for

982
00:37:43,190 --> 00:37:41,460
these Reasons I'm incredibly grateful

983
00:37:44,930 --> 00:37:43,200
for the effort put forth as an NASA

984
00:37:46,730 --> 00:37:44,940
scientist the last Volcanic National

985
00:37:49,609 --> 00:37:46,740
Park Rangers and Mr Michael for making

986
00:37:51,829 --> 00:37:49,619
this program possible

987
00:37:54,890 --> 00:37:51,839
second year intern this program has

988
00:37:57,829 --> 00:37:54,900

given me both research experience and

989
00:38:00,589 --> 00:37:57,839
mentorship experience which I think that

990
00:38:04,010 --> 00:38:00,599
I could apply towards my educational

991
00:38:06,650 --> 00:38:04,020
journey and which I could apply towards

992
00:38:10,490 --> 00:38:06,660
my professional Journey towards a

993
00:38:14,810 --> 00:38:12,410
my name is Mia Gleason and I'm a second

994
00:38:16,310 --> 00:38:14,820
year intern from the NASA internship I

995
00:38:19,069 --> 00:38:16,320
learned a lot of valuable knowledge

996
00:38:21,109 --> 00:38:19,079
about Lassen Volcanic National Park

997
00:38:23,450 --> 00:38:21,119
without this internship I wouldn't have

998
00:38:26,750 --> 00:38:23,460
known how unique the features are within

999
00:38:30,589 --> 00:38:28,670
I would like to start by thanking

1000
00:38:33,109 --> 00:38:30,599
everyone who made this program possible

1001
00:38:35,870 --> 00:38:33,119
it was a fantastic experience about how

1002
00:38:38,030 --> 00:38:35,880
microbes in their environment interact

1003
00:38:39,589 --> 00:38:38,040
I think my favorite experience was our

1004
00:38:45,109 --> 00:38:39,599
field trip down to Ames Research

1005
00:38:48,770 --> 00:38:47,150
my name is Ethan Lugo and I'm really

1006
00:38:50,630 --> 00:38:48,780
interested in the future of space

1007
00:38:52,609 --> 00:38:50,640
exploration and with the connections

1008
00:38:54,650 --> 00:38:52,619
between lasso Volcanic National Park in

1009
00:38:56,510 --> 00:38:54,660
Mars this class has allowed me to expand

1010
00:38:58,250 --> 00:38:56,520
my knowledge on the subject thanks to

1011
00:39:00,770 --> 00:38:58,260
all the scientists including Mr Michael

1012
00:39:04,630 --> 00:39:00,780
I have grown my passion for space and

1013
00:39:08,450 --> 00:39:04,640

will continue to do so thank you

1014
00:39:09,950 --> 00:39:08,460
hey it's Mickey thank you guys for

1015
00:39:12,829 --> 00:39:09,960
giving me the opportunity to learn and

1016
00:39:14,510 --> 00:39:12,839
experience real field work thank you for

1017
00:39:16,370 --> 00:39:14,520
putting in the work and putting in the

1018
00:39:19,010 --> 00:39:16,380
hours to give us an educational yet

1019
00:39:20,750 --> 00:39:19,020
enjoyable time there isn't a single

1020
00:39:22,910 --> 00:39:20,760
person Among Us that hasn't been

1021
00:39:24,589 --> 00:39:22,920
benefited from this class

1022
00:39:26,390 --> 00:39:24,599
I think my favorite part of this year

1023
00:39:28,490 --> 00:39:26,400
was being able to go to the Ames

1024
00:39:30,170 --> 00:39:28,500
Research Center in City Hall the cool

1025
00:39:34,390 --> 00:39:30,180
things over there like the wind tunnel

1026
00:39:39,770 --> 00:39:37,190
I had scientific interests for a while

1027
00:39:42,290 --> 00:39:39,780
but I wasn't sure where to start with

1028
00:39:44,270 --> 00:39:42,300
NASA I was able to explore topics that I

1029
00:39:47,569 --> 00:39:44,280
was already familiar with as well as new

1030
00:39:49,910 --> 00:39:47,579
ones from geology to hydrology to

1031
00:39:51,829 --> 00:39:49,920
microbiology and Beyond

1032
00:39:53,630 --> 00:39:51,839
I especially enjoyed the chance to try

1033
00:39:55,370 --> 00:39:53,640
something out of my comfort zone as I

1034
00:40:01,370 --> 00:39:55,380
had never participated in scientific

1035
00:40:06,230 --> 00:40:03,770
the impact that the NASA internship

1036
00:40:07,810 --> 00:40:06,240
program had on me was all around A great

1037
00:40:10,970 --> 00:40:07,820
experience and I had an amazing time

1038
00:40:12,890 --> 00:40:10,980

learning how to use field equipment and

1039
00:40:15,069 --> 00:40:12,900
having a better way to bond with friends

1040
00:40:18,530 --> 00:40:15,079
than a normal class

1041
00:40:20,510 --> 00:40:18,540
my favorite part of the class was the

1042
00:40:25,790 --> 00:40:20,520
Ames Research Center field trip

1043
00:40:30,290 --> 00:40:28,550
um so I I learned a lot from this class

1044
00:40:33,770 --> 00:40:30,300
I didn't

1045
00:40:35,990 --> 00:40:33,780
I have hardly any experience with most

1046
00:40:38,750 --> 00:40:36,000
of the things we did except for in

1047
00:40:39,470 --> 00:40:38,760
chemistry so

1048
00:40:42,770 --> 00:40:39,480
um

1049
00:40:45,050 --> 00:40:42,780
I did learn a lot but one thing that I

1050
00:40:48,050 --> 00:40:45,060
think is a takeaway that I wasn't

1051
00:40:50,569 --> 00:40:48,060
expecting was learning just how

1052
00:40:52,670 --> 00:40:50,579
connected everything is and how

1053
00:40:58,790 --> 00:40:52,680
essential that is for life

1054
00:41:02,569 --> 00:41:01,069
hi my name's Izzy and before entering

1055
00:41:05,210 --> 00:41:02,579
this program I had very little

1056
00:41:07,010 --> 00:41:05,220
experience of scientific instruments and

1057
00:41:09,829 --> 00:41:07,020
The Limited experience with scientific

1058
00:41:12,650 --> 00:41:09,839
procedures I enjoyed seeing the progress

1059
00:41:14,930 --> 00:41:12,660
of not only my experiment both my fellow

1060
00:41:17,270 --> 00:41:14,940
interns experiments as well and I am

1061
00:41:20,089 --> 00:41:17,280
excited at the prospect of applying my

1062
00:41:22,430 --> 00:41:20,099
new skills and future personal and

1063
00:41:25,450 --> 00:41:22,440

professional projects I would like to

1064
00:41:29,210 --> 00:41:25,460
thank scientist desmara scientist Kubo

1065
00:41:31,790 --> 00:41:29,220
scientist parento and Mr Michael as well

1066
00:41:34,069 --> 00:41:31,800
as scientist cook and scientist mayor

1067
00:41:35,510 --> 00:41:34,079
and many others for making this program

1068
00:41:39,050 --> 00:41:35,520
possible

1069
00:41:43,910 --> 00:41:41,630
hi my name is Samantha Cornelius I'm

1070
00:41:46,130 --> 00:41:43,920
extremely appreciative of not all of the

1071
00:41:49,010 --> 00:41:46,140
opportunities that the NASA program has

1072
00:41:50,990 --> 00:41:49,020
given me and all of the people involved

1073
00:41:52,730 --> 00:41:51,000
I appreciate the diverse range of topics

1074
00:41:58,190 --> 00:41:52,740
we've covered this year my favorites

1075
00:42:01,910 --> 00:42:00,589
hey guys it's Evelyn first of all I just

1076
00:42:03,410 --> 00:42:01,920
wanted to say thank you so much to

1077
00:42:05,630 --> 00:42:03,420
everybody involved in these programs

1078
00:42:07,730 --> 00:42:05,640
that allowed us to do this it was so

1079
00:42:09,770 --> 00:42:07,740
much fun being with all of you guys and

1080
00:42:11,030 --> 00:42:09,780
learning from all of you guys and I just

1081
00:42:13,490 --> 00:42:11,040
wanted to say that it really helped me

1082
00:42:16,910 --> 00:42:13,500
solidify my interest in science as a

1083
00:42:20,210 --> 00:42:18,349
I just want to say thank you to everyone

1084
00:42:21,710 --> 00:42:20,220
involved I've had an amazing time

1085
00:42:23,510 --> 00:42:21,720
throughout the entire class and it's

1086
00:42:25,609 --> 00:42:23,520
been a great opportunity to see our

1087
00:42:27,710 --> 00:42:25,619
research is in stem what they really do

1088
00:42:28,790 --> 00:42:27,720

and really an insight into what my

1089
00:42:30,470 --> 00:42:28,800
career might look like in the future

1090
00:42:32,210 --> 00:42:30,480
which you don't get to see anywhere else

1091
00:42:33,710 --> 00:42:32,220
in high school so I really want to say

1092
00:42:37,370 --> 00:42:33,720
thank you for everyone that made that

1093
00:42:40,970 --> 00:42:39,050
I am immensely grateful for the

1094
00:42:42,950 --> 00:42:40,980
opportunity to participate in this NASA

1095
00:42:44,930 --> 00:42:42,960
program collecting samples from various

1096
00:42:53,030 --> 00:42:44,940
field sites alongside my classmates was

1097
00:42:56,390 --> 00:42:55,069
I cannot thank the organizers of this

1098
00:42:57,710 --> 00:42:56,400
program enough for this amazing

1099
00:42:59,750 --> 00:42:57,720
opportunity

1100
00:43:02,329 --> 00:42:59,760
thank you Jordan and once again I'd

1101
00:43:04,309 --> 00:43:02,339
really love to thank both Dave Nikki

1102
00:43:06,770 --> 00:43:04,319
Mike and Mr Michael for making this

1103
00:43:09,710 --> 00:43:06,780
program possible

1104
00:43:12,230 --> 00:43:09,720
I think that is it I have an Abrupt

1105
00:43:15,650 --> 00:43:12,240
ending there I realize but I

1106
00:43:17,390 --> 00:43:15,660
um I I think that's the end of it and we

1107
00:43:18,650 --> 00:43:17,400
just kind of had to throw in those just

1108
00:43:20,990 --> 00:43:18,660
make sure that you're all paying

1109
00:43:22,130 --> 00:43:21,000
attention make sure that you uh realize

1110
00:43:24,710 --> 00:43:22,140
that these are still high school

1111
00:43:26,510 --> 00:43:24,720
students and from time to time we all

1112
00:43:28,730 --> 00:43:26,520
tend to make mistakes

1113
00:43:30,290 --> 00:43:28,740

um and something happened there with

1114
00:43:32,030 --> 00:43:30,300
some of the Audio I don't really know

1115
00:43:33,650 --> 00:43:32,040
what it was but um obviously

1116
00:43:36,589 --> 00:43:33,660
unfortunately we couldn't hear from

1117
00:43:38,750 --> 00:43:36,599
everybody there at the end um

1118
00:43:40,910 --> 00:43:38,760
but with that being said

1119
00:43:43,790 --> 00:43:40,920
um what you just saw there was what

1120
00:43:46,430 --> 00:43:43,800
excuse me was really a summary

1121
00:43:47,809 --> 00:43:46,440
of the hard work that was done during

1122
00:43:50,510 --> 00:43:47,819
the course of the year and also you

1123
00:43:53,150 --> 00:43:50,520
heard from the students just what impact

1124
00:43:53,870 --> 00:43:53,160
this program had on them

1125
00:43:55,970 --> 00:43:53,880
um

1126
00:43:58,790 --> 00:43:55,980
at this point I think what I'd like to

1127
00:44:00,950 --> 00:43:58,800
do is just kind of open it up to

1128
00:44:03,410 --> 00:44:00,960
questions I don't know if there are any

1129
00:44:06,290 --> 00:44:03,420
in the chat or not so

1130
00:44:08,569 --> 00:44:06,300
um I'm just gonna allow I think Mike to

1131
00:44:10,430 --> 00:44:08,579
kind of filter through this and if there

1132
00:44:13,010 --> 00:44:10,440
are any questions we'll see if we can

1133
00:44:15,650 --> 00:44:13,020
address those and go from there

1134
00:44:18,109 --> 00:44:15,660
um I think in the meantime

1135
00:44:19,730 --> 00:44:18,119
what we'll do is

1136
00:44:21,349 --> 00:44:19,740
um because there are no questions we're

1137
00:44:23,329 --> 00:44:21,359
going to recognize the students for all

1138
00:44:27,589 --> 00:44:23,339

their hard work

1139
00:44:29,809 --> 00:44:27,599
and so Mike um Kubo is going to present

1140
00:44:31,609 --> 00:44:29,819
the students with some certificates and

1141
00:44:33,230 --> 00:44:31,619
just kind of acknowledge all the hard

1142
00:44:35,569 --> 00:44:33,240
work that they've done throughout the

1143
00:44:38,150 --> 00:44:35,579
course of the Year Mike

1144
00:44:40,190 --> 00:44:38,160
thanks Mr Michael I appreciate that um

1145
00:44:42,829 --> 00:44:40,200
hey everyone my name is Mike Kubo I'm a

1146
00:44:46,309 --> 00:44:42,839
researcher at nasaims Research Center uh

1147
00:44:47,870 --> 00:44:46,319
with Dr nimring and Dr peronto and this

1148
00:44:49,790 --> 00:44:47,880
is a part of the evening where we like

1149
00:44:50,690 --> 00:44:49,800
to recognize the students by awarding

1150
00:44:52,849 --> 00:44:50,700
them

1151
00:44:54,589 --> 00:44:52,859
um a certificate that you know a

1152
00:44:55,730 --> 00:44:54,599
certificate of completion that shows all

1153
00:44:58,670 --> 00:44:55,740
that they have accomplished during

1154
00:45:00,770 --> 00:44:58,680
during the year and so um because we're

1155
00:45:02,690 --> 00:45:00,780
doing this on Zoom as we have for the

1156
00:45:04,069 --> 00:45:02,700
last few years I'm going to start just

1157
00:45:06,109 --> 00:45:04,079
by showing you an example of the

1158
00:45:08,270 --> 00:45:06,119
certificate what it looks like and then

1159
00:45:10,910 --> 00:45:08,280
I will read off the names of all of the

1160
00:45:12,710 --> 00:45:10,920
um of all of the uh the students that

1161
00:45:14,210 --> 00:45:12,720
that are completing the program so first

1162
00:45:17,450 --> 00:45:14,220
of all

1163
00:45:19,849 --> 00:45:17,460

um oh hello thanks okay there we go

1164
00:45:21,890 --> 00:45:19,859
um yeah let me unblure this sorry

1165
00:45:23,930 --> 00:45:21,900
um it's a problem the blurring of the

1166
00:45:26,089 --> 00:45:23,940
background here we go

1167
00:45:27,050 --> 00:45:26,099
um so yeah it comes in this really

1168
00:45:29,589 --> 00:45:27,060
beautiful

1169
00:45:32,089 --> 00:45:29,599
um blue envelope and inside the

1170
00:45:34,309 --> 00:45:32,099
certificate will look like this

1171
00:45:37,750 --> 00:45:34,319
and I'm going to start by sharing my

1172
00:45:41,530 --> 00:45:37,760
screen of all the certificates

1173
00:45:44,630 --> 00:45:41,540
and hang on one second

1174
00:45:47,630 --> 00:45:44,640
technical difficulty there we go there

1175
00:45:49,970 --> 00:45:47,640
we go great okay wonderful so um I'm

1176
00:45:52,370 --> 00:45:49,980
going to start by reading all let me

1177
00:45:54,770 --> 00:45:52,380
skip back to the top here start by

1178
00:45:56,809 --> 00:45:54,780
reading all the names of um of the of

1179
00:45:58,550 --> 00:45:56,819
the students that participated

1180
00:45:59,210 --> 00:45:58,560
um and just very quickly I just want to

1181
00:46:00,950 --> 00:45:59,220
say

1182
00:46:04,010 --> 00:46:00,960
um how much of a pleasure this program

1183
00:46:05,270 --> 00:46:04,020
is to help administer and and Mentor

1184
00:46:06,530 --> 00:46:05,280
these students

1185
00:46:09,290 --> 00:46:06,540
um you know we've been doing this

1186
00:46:11,510 --> 00:46:09,300
program now for 15 years it's hard to

1187
00:46:14,569 --> 00:46:11,520
believe that we have 15 program years

1188
00:46:16,670 --> 00:46:14,579

under our belt um and every year we are

1189
00:46:18,710 --> 00:46:16,680
just you know we're always Blown Away by

1190
00:46:21,410 --> 00:46:18,720
the quality of the students and the

1191
00:46:22,849 --> 00:46:21,420
quality of their work and um you know

1192
00:46:25,550 --> 00:46:22,859
the the grit and determination that

1193
00:46:26,990 --> 00:46:25,560
these students show taking on really a

1194
00:46:29,809 --> 00:46:27,000
big project really a college level

1195
00:46:31,370 --> 00:46:29,819
project in a high school class

1196
00:46:33,349 --> 00:46:31,380
um and I just want to say that you know

1197
00:46:34,730 --> 00:46:33,359
say this every year I've said this for

1198
00:46:37,970 --> 00:46:34,740
15 years

1199
00:46:40,849 --> 00:46:37,980
um every year we are more and more Blown

1200
00:46:42,950 --> 00:46:40,859
Away by the quality of the work and this

1201
00:46:44,809 --> 00:46:42,960
year is no exception

1202
00:46:47,329 --> 00:46:44,819
um the the presentation that the

1203
00:46:49,430 --> 00:46:47,339
students just gave was phenomenal and I

1204
00:46:51,770 --> 00:46:49,440
I truly I truly think it's the best

1205
00:46:53,809 --> 00:46:51,780
presentation we've seen yet so

1206
00:46:55,309 --> 00:46:53,819
um thank you all so much for um you know

1207
00:46:57,829 --> 00:46:55,319
thank you to the students for your hard

1208
00:46:59,270 --> 00:46:57,839
work and for putting on such a wonderful

1209
00:47:01,790 --> 00:46:59,280
um oral presentation

1210
00:47:03,410 --> 00:47:01,800
um for the end of the year and we wish

1211
00:47:05,630 --> 00:47:03,420
you the best of luck next year whether

1212
00:47:07,069 --> 00:47:05,640
you're a junior that's gonna continue on

1213
00:47:09,470 --> 00:47:07,079

it Red Bluff and hopefully in this

1214
00:47:11,089 --> 00:47:09,480
program or if you're a senior going on

1215
00:47:13,849 --> 00:47:11,099
to you know to bigger and better things

1216
00:47:15,470 --> 00:47:13,859
next year um thank you and good luck and

1217
00:47:18,530 --> 00:47:15,480
with that I'll read names

1218
00:47:20,150 --> 00:47:18,540
um on the um on the certificate so

1219
00:47:22,970 --> 00:47:20,160
uh the first person we'd like to

1220
00:47:25,309 --> 00:47:22,980
recognize is um our first year student

1221
00:47:28,130 --> 00:47:25,319
Jordan Brandt Jordan thank you so much

1222
00:47:30,530 --> 00:47:28,140
for your contributions to the program

1223
00:47:32,510 --> 00:47:30,540
next we have Mickey Cohn uh Mickey

1224
00:47:34,550 --> 00:47:32,520
thanks so much and I'll definitely never

1225
00:47:37,309 --> 00:47:34,560
forget you after that uh after that

1226
00:47:38,450 --> 00:47:37,319
impact statement at the end there thank

1227
00:47:40,370 --> 00:47:38,460
you so much Mickey thanks for your

1228
00:47:43,069 --> 00:47:40,380
contributions to the program

1229
00:47:44,630 --> 00:47:43,079
uh next we have Sabian Hamilton uh

1230
00:47:46,069 --> 00:47:44,640
savian thank you so much for your

1231
00:47:48,050 --> 00:47:46,079
contributions to the program we really

1232
00:47:50,750 --> 00:47:48,060
appreciate all of your hard work

1233
00:47:52,309 --> 00:47:50,760
uh next is Gage Lawrence Gage thank you

1234
00:47:53,690 --> 00:47:52,319
so much it was it was a nice impact

1235
00:47:55,130 --> 00:47:53,700
statement thank you so much for all of

1236
00:47:57,230 --> 00:47:55,140
your hard work and contributions to the

1237
00:47:59,150 --> 00:47:57,240
program

1238
00:48:00,950 --> 00:47:59,160

um next up we have Ethan Lugo Ethan

1239
00:48:02,569 --> 00:48:00,960
fantastic working with you thank you so

1240
00:48:05,210 --> 00:48:02,579
much for all of your hard work and and

1241
00:48:08,030 --> 00:48:05,220
what you did this year thank you

1242
00:48:09,589 --> 00:48:08,040
uh next up we have uh Bella Munoz fella

1243
00:48:11,510 --> 00:48:09,599
that was a very nice impact statement

1244
00:48:13,730 --> 00:48:11,520
and great job this year thank you so

1245
00:48:15,410 --> 00:48:13,740
much and um we wish you the best of

1246
00:48:17,510 --> 00:48:15,420
black kitten and thanks for all of your

1247
00:48:20,150 --> 00:48:17,520
hard work in the program

1248
00:48:21,410 --> 00:48:20,160
uh Nexus Tyler Peterson Tyler thanks so

1249
00:48:24,050 --> 00:48:21,420
much for all of your hard work it was

1250
00:48:26,450 --> 00:48:24,060
great working with you this year

1251
00:48:28,550 --> 00:48:26,460
next up we have Joey simonis Joey thank

1252
00:48:31,730 --> 00:48:28,560
you so much for your hard work and great

1253
00:48:35,390 --> 00:48:33,829
um we have Izzy carbonyl Izzy thank you

1254
00:48:37,069 --> 00:48:35,400
so much it was wonderful working with

1255
00:48:40,490 --> 00:48:37,079
you and thanks for all of your hard work

1256
00:48:44,630 --> 00:48:42,770
um next up is Samantha Cornelius Sam

1257
00:48:47,329 --> 00:48:44,640
thank you so much again for all of your

1258
00:48:49,309 --> 00:48:47,339
hard work and fantastic job

1259
00:48:51,890 --> 00:48:49,319
and I think last of the first year

1260
00:48:53,630 --> 00:48:51,900
students is uh Evelyn fucci Evelyn

1261
00:48:55,550 --> 00:48:53,640
fantastic job

1262
00:48:57,109 --> 00:48:55,560
um just outstanding outstanding work

1263
00:48:58,670 --> 00:48:57,119

thank you so much actually I think we

1264
00:49:00,290 --> 00:48:58,680
have one more and that's Lindsay Beau

1265
00:49:02,630 --> 00:49:00,300
that's right I thought I was thinking

1266
00:49:04,609 --> 00:49:02,640
where where was that where was Lindsay

1267
00:49:06,470 --> 00:49:04,619
um Lindsay fantastic job it was really

1268
00:49:08,510 --> 00:49:06,480
fun working with you

1269
00:49:10,550 --> 00:49:08,520
um yeah I hope I sure hope we get a

1270
00:49:12,109 --> 00:49:10,560
chance to see everyone uh up at Red

1271
00:49:14,150 --> 00:49:12,119
Bluff before before the end of the year

1272
00:49:16,010 --> 00:49:14,160
or at least uh online through the

1273
00:49:18,050 --> 00:49:16,020
through the class so Lindsay great job

1274
00:49:19,910 --> 00:49:18,060
thank you so much and and you have the

1275
00:49:21,410 --> 00:49:19,920
distinction of being one of our PC or

1276
00:49:22,970 --> 00:49:21,420
first year students and it was just a

1277
00:49:24,890 --> 00:49:22,980
real pleasure having you in the class so

1278
00:49:26,510 --> 00:49:24,900
thank you so much and thanks for all of

1279
00:49:27,770 --> 00:49:26,520
your hard work

1280
00:49:29,450 --> 00:49:27,780
um next up we will present the

1281
00:49:31,069 --> 00:49:29,460
certificates to the second year students

1282
00:49:34,010 --> 00:49:31,079
these are the students that returned

1283
00:49:37,550 --> 00:49:34,020
after doing one year in the program they

1284
00:49:38,450 --> 00:49:37,560
returned as mentors and team leads to to

1285
00:49:42,170 --> 00:49:38,460
help

1286
00:49:45,710 --> 00:49:42,180
year of students and sort of get a new

1287
00:49:47,270 --> 00:49:45,720
angle on um how to be a you know how to

1288
00:49:49,370 --> 00:49:47,280

how to do science and how to be a

1289
00:49:52,490 --> 00:49:49,380
scientist and part of that is through

1290
00:49:54,050 --> 00:49:52,500
mentoring and teaching and leading and

1291
00:49:55,670 --> 00:49:54,060
so um I'd like to recognize those

1292
00:49:57,470 --> 00:49:55,680
students next

1293
00:49:58,970 --> 00:49:57,480
um first up we have Edie groom Eve

1294
00:50:00,470 --> 00:49:58,980
fantastic job it's been wonderful

1295
00:50:02,690 --> 00:50:00,480
working with you we're really going to

1296
00:50:05,270 --> 00:50:02,700
miss you and best of luck next year I

1297
00:50:07,190 --> 00:50:05,280
I'd love to hear where you end up going

1298
00:50:09,770 --> 00:50:07,200
for college

1299
00:50:11,690 --> 00:50:09,780
uh next up we have Aubrey Norton Aubry

1300
00:50:12,589 --> 00:50:11,700
it's been really wonderful working with

1301
00:50:14,450 --> 00:50:12,599
you

1302
00:50:16,430 --> 00:50:14,460
um just so much so much fun getting to

1303
00:50:19,609 --> 00:50:16,440
see everybody you know all the second

1304
00:50:21,410 --> 00:50:19,619
year scenes um really really shine and

1305
00:50:23,450 --> 00:50:21,420
um take on the challenge and mentorship

1306
00:50:24,530 --> 00:50:23,460
and you did a fantastic job and we're

1307
00:50:25,790 --> 00:50:24,540
really looking forward to hearing what

1308
00:50:27,349 --> 00:50:25,800
you're doing next

1309
00:50:29,089 --> 00:50:27,359
thank you for your two years of service

1310
00:50:31,609 --> 00:50:29,099
to the program

1311
00:50:34,069 --> 00:50:31,619
uh next up we have John Sheffield John

1312
00:50:35,870 --> 00:50:34,079
MC as everyone knows John it was really

1313
00:50:37,490 --> 00:50:35,880

wonderful working with you

1314
00:50:39,530 --> 00:50:37,500
um fantastic job these two years and

1315
00:50:41,210 --> 00:50:39,540
thanks for stepping up to do you know to

1316
00:50:42,770 --> 00:50:41,220
be a leader in the class and for for

1317
00:50:45,230 --> 00:50:42,780
emceeing the program tonight it was

1318
00:50:47,990 --> 00:50:45,240
really wonderful job thank you

1319
00:50:50,150 --> 00:50:48,000
and that says Mauricio Tamayo Perez uh

1320
00:50:51,589 --> 00:50:50,160
Mauricio fantastic job and thanks for

1321
00:50:53,870 --> 00:50:51,599
stepping up and taking on a little

1322
00:50:55,069 --> 00:50:53,880
additional um responsibility and

1323
00:50:56,510 --> 00:50:55,079
leadership in the class we really

1324
00:50:58,790 --> 00:50:56,520
appreciate all of your hard work and

1325
00:51:00,230 --> 00:50:58,800
efforts it's been wonderful working with

1326
00:51:02,630 --> 00:51:00,240
you truly and look forward to hearing

1327
00:51:04,670 --> 00:51:02,640
what you what you're doing next year

1328
00:51:06,829 --> 00:51:04,680
and last we have Courtney White who was

1329
00:51:09,710 --> 00:51:06,839
with us tonight no Mia Gleason there she

1330
00:51:11,510 --> 00:51:09,720
is okay last is Mia Gleason Mia thank

1331
00:51:12,890 --> 00:51:11,520
you so much um for all of your hard work

1332
00:51:15,470 --> 00:51:12,900
it was wonderful seeing you come back

1333
00:51:16,849 --> 00:51:15,480
again this year and I really hope uh

1334
00:51:18,950 --> 00:51:16,859
really hope to get to chat with you

1335
00:51:21,470 --> 00:51:18,960
before you leave and um fantastic job

1336
00:51:22,970 --> 00:51:21,480
fantastic job um stepping up into the

1337
00:51:24,530 --> 00:51:22,980
into the role of a mentor and second

1338
00:51:26,569 --> 00:51:24,540

year students so thank you so much for

1339
00:51:29,089 --> 00:51:26,579
all of your hard work

1340
00:51:31,370 --> 00:51:29,099
um let me just there we go okay so uh

1341
00:51:33,470 --> 00:51:31,380
next up we'd like to recognize

1342
00:51:35,150 --> 00:51:33,480
um the other folks who make this program

1343
00:51:37,430 --> 00:51:35,160
possible

1344
00:51:38,809 --> 00:51:37,440
um you know the students always do a

1345
00:51:43,730 --> 00:51:38,819
fantastic job they always work super

1346
00:51:48,109 --> 00:51:46,730
for this program that works harder than

1347
00:51:50,390 --> 00:51:48,119
Mr Dave Michael

1348
00:51:51,290 --> 00:51:50,400
um again 15 years of partnership Mr

1349
00:51:53,690 --> 00:51:51,300
Michael

1350
00:51:54,770 --> 00:51:53,700
um I know it's hard to believe I think

1351
00:51:56,750 --> 00:51:54,780
um you know if we were to do

1352
00:51:59,210 --> 00:51:56,760
side-by-side photos of you and I 50

1353
00:52:01,069 --> 00:51:59,220
years ago we might not recognize each

1354
00:52:03,950 --> 00:52:01,079
other

1355
00:52:05,510 --> 00:52:03,960
but um no I'm joking but surely it's

1356
00:52:07,190 --> 00:52:05,520
been such a pleasure working with you

1357
00:52:08,829 --> 00:52:07,200
and we absolutely couldn't do this

1358
00:52:11,390 --> 00:52:08,839
without you and we really really value

1359
00:52:13,670 --> 00:52:11,400
your partnership and support in in this

1360
00:52:17,690 --> 00:52:13,680
program so thank you so much

1361
00:52:19,549 --> 00:52:17,700
and last Rossi Avila thank you so much

1362
00:52:21,950 --> 00:52:19,559
grafley for joining us this year this is

1363
00:52:23,809 --> 00:52:21,960

Gracie's first year in the program

1364
00:52:26,030 --> 00:52:23,819
um as our as our arranger partner with

1365
00:52:28,430 --> 00:52:26,040
last of Volcanic National Park and it's

1366
00:52:30,290 --> 00:52:28,440
been fantastic getting to know you and

1367
00:52:32,390 --> 00:52:30,300
we really appreciate your support the

1368
00:52:35,450 --> 00:52:32,400
park support and we really look forward

1369
00:52:37,430 --> 00:52:35,460
to continuing this program with you

1370
00:52:38,930 --> 00:52:37,440
um in future years so graci thank you so

1371
00:52:41,089 --> 00:52:38,940
much for all of your hard work as well

1372
00:52:42,710 --> 00:52:41,099
and again we couldn't do this we

1373
00:52:44,990 --> 00:52:42,720
couldn't have this program without you

1374
00:52:46,730 --> 00:52:45,000
in the Parks you know your support so

1375
00:52:48,049 --> 00:52:46,740
thank you everyone

1376
00:52:50,270 --> 00:52:48,059
um it's been wonderful with that I'll

1377
00:52:51,650 --> 00:52:50,280
give it back to Mr Michael

1378
00:52:52,790 --> 00:52:51,660
um to see if we have any questions from

1379
00:52:54,770 --> 00:52:52,800
the audience

1380
00:52:59,990 --> 00:52:54,780
um there have to be questions about that

1381
00:53:04,250 --> 00:53:02,329
and and there may be

1382
00:53:07,190 --> 00:53:04,260
um before we get to questions if there

1383
00:53:08,990 --> 00:53:07,200
are any I want to give some of these

1384
00:53:11,150 --> 00:53:09,000
students a chance if they're here I know

1385
00:53:13,309 --> 00:53:11,160
a couple of them are who unfortunately

1386
00:53:15,470 --> 00:53:13,319
we couldn't hear from during during the

1387
00:53:18,470 --> 00:53:15,480
presentation and so

1388
00:53:20,270 --> 00:53:18,480

um I don't know if Mauricio is here is

1389
00:53:22,010 --> 00:53:20,280
Mauricio on

1390
00:53:27,049 --> 00:53:22,020
let me see if you are just say something

1391
00:53:30,770 --> 00:53:29,329
okay what about Ethan I don't I have not

1392
00:53:32,150 --> 00:53:30,780
seen Ethan I know he had an obligation

1393
00:53:36,230 --> 00:53:32,160
tonight but I don't know if he's on or

1394
00:53:41,569 --> 00:53:38,870
and Izzy I think Izzy's on with us is he

1395
00:53:41,579 --> 00:53:44,930
is he unmuted

1396
00:53:48,230 --> 00:53:46,370
um

1397
00:53:50,690 --> 00:53:48,240
oh

1398
00:53:52,150 --> 00:53:50,700
Here Comes Mauricio so Mauricio we're

1399
00:53:55,609 --> 00:53:52,160
going back too

1400
00:53:59,089 --> 00:53:55,619
and so Mauricio if you want to do your

1401
00:54:01,250 --> 00:53:59,099
impact statement live I saw Izzy behind

1402
00:54:03,589 --> 00:54:01,260
you there so maybe you can do yours and

1403
00:54:07,190 --> 00:54:03,599
that is he can jump in and and do hers

1404
00:54:09,770 --> 00:54:07,200
and then we'll let let John go as well

1405
00:54:13,490 --> 00:54:09,780
and so if that works that would be great

1406
00:54:18,470 --> 00:54:15,349
it seems like the sound is a common

1407
00:54:20,990 --> 00:54:18,480
theme maybe they're just uh in a sound

1408
00:54:23,329 --> 00:54:21,000
like a sound room or something you know

1409
00:54:25,670 --> 00:54:23,339
quiet room maybe we just

1410
00:54:29,210 --> 00:54:25,680
are unable to hear them or maybe they

1411
00:54:33,170 --> 00:54:31,309
okay we have another technology Source

1412
00:54:35,690 --> 00:54:33,180
there so I think Mauricio is ready to go

1413
00:54:37,190 --> 00:54:35,700

so Mauricio if you want to share your

1414
00:54:39,770 --> 00:54:37,200
impact statement if you remember what

1415
00:54:44,510 --> 00:54:39,780
you said or or vaguely remember what you

1416
00:54:50,210 --> 00:54:47,890
thank you I hope you guys can hear me

1417
00:54:54,829 --> 00:54:50,220
so uh

1418
00:54:56,809 --> 00:54:54,839
I've been uh for two years I started my

1419
00:55:00,770 --> 00:54:56,819
and I want to give thanks to all of you

1420
00:55:02,809 --> 00:55:00,780
uh helped us out especially they're in

1421
00:55:05,990 --> 00:55:02,819
the in the scripts throughout the

1422
00:55:15,910 --> 00:55:06,000
presentation I agree time especially Mr

1423
00:55:15,920 --> 00:55:21,230
I appreciate it that's it

1424
00:55:24,410 --> 00:55:23,089
thank you Mauricio I know we're kind of

1425
00:55:25,790 --> 00:55:24,420
putting you on the spot there and it's

1426
00:55:27,770 --> 00:55:25,800
probably kind of tough to get the audio

1427
00:55:29,569 --> 00:55:27,780
to work and everything

1428
00:55:32,870 --> 00:55:29,579
um was Izzy behind you does she want to

1429
00:55:34,549 --> 00:55:32,880
jump in and use your your phone there or

1430
00:55:39,770 --> 00:55:34,559
she

1431
00:55:39,780 --> 00:55:44,210
before entering this program

1432
00:55:51,049 --> 00:55:47,650
unlimited scientific procedures

1433
00:55:53,750 --> 00:55:51,059
process of constructing hypotheses and

1434
00:55:56,450 --> 00:55:53,760
testing equipment and seeing the

1435
00:55:59,510 --> 00:55:56,460
progress of experiment above my fellow

1436
00:56:02,390 --> 00:55:59,520
in terms well and I am excited at the

1437
00:56:03,890 --> 00:56:02,400
prospect of a skills and future personal

1438
00:56:07,089 --> 00:56:03,900

and professional

1439
00:56:10,730 --> 00:56:07,099
Thank You Scientist desmara same

1440
00:56:13,549 --> 00:56:10,740
says parent you people as well as

1441
00:56:19,490 --> 00:56:13,559
Sanctus cook and scientist mayor this

1442
00:56:26,150 --> 00:56:22,549
great job thank you thank you Izzy

1443
00:56:27,770 --> 00:56:26,160
um I don't think Ethan or Sam are around

1444
00:56:29,930 --> 00:56:27,780
um and I haven't seen Tyler either so

1445
00:56:35,450 --> 00:56:29,940
the last person that's going to go is

1446
00:56:35,460 --> 00:56:43,569
John's right here

1447
00:56:48,170 --> 00:56:46,130
he has an impact statement and then he's

1448
00:56:52,430 --> 00:56:48,180
going to talk a little bit to the NASA

1449
00:56:57,770 --> 00:56:53,809
all right

1450
00:57:01,069 --> 00:56:57,780
um so I've been two years now and if one

1451
00:57:03,230 --> 00:57:01,079
impact I can say take is um handling

1452
00:57:06,530 --> 00:57:03,240
criticism this is a program where you're

1453
00:57:09,049 --> 00:57:06,540
critiqued a lot on things you hear and

1454
00:57:11,870 --> 00:57:09,059
it's honest you want the best work out

1455
00:57:14,870 --> 00:57:11,880
of us and compared to any other thing

1456
00:57:16,730 --> 00:57:14,880
you're getting that I know seniors who

1457
00:57:21,530 --> 00:57:16,740
will just get angry at that and this is

1458
00:57:23,410 --> 00:57:21,540
a class you cannot get mad you close you

1459
00:57:26,990 --> 00:57:23,420
have to work to be better

1460
00:57:29,510 --> 00:57:27,000
anywhere else thank you

1461
00:57:31,970 --> 00:57:29,520
uh

1462
00:57:35,750 --> 00:57:31,980
I was gonna do the

1463
00:57:39,829 --> 00:57:35,760

the okay okay cool cool all right

1464
00:57:43,250 --> 00:57:39,839
as a thank you to all the hours that

1465
00:57:46,670 --> 00:57:43,260
Dave Mickey and Mike Graham uh for it to

1466
00:57:49,730 --> 00:57:46,680
even function made a basket full of

1467
00:57:52,730 --> 00:57:49,740
locally grown and businesses around Red

1468
00:57:54,890 --> 00:57:52,740
Bluff it's just we want to thank you

1469
00:57:57,290 --> 00:57:54,900
guys for putting in so much I don't know

1470
00:58:04,490 --> 00:57:57,300
what we really could do with that

1471
00:58:08,049 --> 00:58:06,170
thanks so much Sean that's really kind

1472
00:58:13,309 --> 00:58:08,059
of you we really appreciate that thanks

1473
00:58:17,569 --> 00:58:15,829
and I realize without us all being there

1474
00:58:20,270 --> 00:58:17,579
in person it kind of loses a little bit

1475
00:58:22,010 --> 00:58:20,280
of the impact but they did um come up

1476
00:58:24,049 --> 00:58:22,020
with some really nice local things for

1477
00:58:25,670 --> 00:58:24,059
you guys and so we'll get that to you

1478
00:58:28,309 --> 00:58:25,680
when we get a chance

1479
00:58:30,290 --> 00:58:28,319
um and thank you again for all the time

1480
00:58:32,569 --> 00:58:30,300
for the uh

1481
00:58:34,370 --> 00:58:32,579
you know countless hours you guys put

1482
00:58:36,049 --> 00:58:34,380
into this all the energy you bring every

1483
00:58:37,490 --> 00:58:36,059
single time and

1484
00:58:39,349 --> 00:58:37,500
um obviously the program would not be

1485
00:58:42,049 --> 00:58:39,359
the same without you guys

1486
00:58:43,010 --> 00:58:42,059
um in addition to the Nikki and Dave and

1487
00:58:44,809 --> 00:58:43,020
Mike

1488
00:58:46,250 --> 00:58:44,819

um there's other scientists down at AMC

1489
00:58:48,470 --> 00:58:46,260
Research Center that helped out as well

1490
00:58:49,250 --> 00:58:48,480
and and so

1491
00:58:51,950 --> 00:58:49,260
um

1492
00:58:53,270 --> 00:58:51,960
just all the all the people it takes a

1493
00:58:54,650 --> 00:58:53,280
village and that Village has definitely

1494
00:58:55,849 --> 00:58:54,660
been helping us out for a lot of years

1495
00:58:58,430 --> 00:58:55,859
here and so we just couldn't be more

1496
00:59:00,829 --> 00:58:58,440
appreciative so thank you guys very much

1497
00:59:03,770 --> 00:59:00,839
and I just want to thank uh all you

1498
00:59:05,510 --> 00:59:03,780
folks up in Red Bluff in return uh it's

1499
00:59:07,549 --> 00:59:05,520
just been a nice grounding experience

1500
00:59:10,370 --> 00:59:07,559
for us step out of our bubble here in

1501
00:59:12,410 --> 00:59:10,380
the Bay Area and get up there and and uh

1502
00:59:14,930 --> 00:59:12,420
share some of our science with you and

1503
00:59:16,789 --> 00:59:14,940
and your energy and everything we're

1504
00:59:24,950 --> 00:59:16,799
deeply appreciated it's always a

1505
00:59:29,809 --> 00:59:28,430
okay I'm I still don't see any questions

1506
00:59:32,750 --> 00:59:29,819
so

1507
00:59:35,390 --> 00:59:32,760
um I think we're just gonna kinda I

1508
00:59:36,349 --> 00:59:35,400
guess that's it I guess we're done

1509
00:59:38,390 --> 00:59:36,359
um

1510
00:59:40,609 --> 00:59:38,400
unless I'm missing something

1511
00:59:42,530 --> 00:59:40,619
um is there anything else that that

1512
00:59:44,510 --> 00:59:42,540
we're gonna do that that I'm forgetting

1513
00:59:47,990 --> 00:59:44,520

about or or is that

1514
00:59:49,910 --> 00:59:48,000
the evening I I think that's it I I did

1515
00:59:51,530 --> 00:59:49,920
just want to take a moment actually now

1516
00:59:54,410 --> 00:59:51,540
that I'm thinking about it and I just

1517
00:59:56,870 --> 00:59:54,420
want to thank um Dr David DiMare for uh

1518
00:59:58,849 --> 00:59:56,880
15 years of leadership in this program

1519
01:00:01,430 --> 00:59:58,859
um as the as the principal investigator

1520
01:00:03,589 --> 01:00:01,440
the pi of this program

1521
01:00:05,809 --> 01:00:03,599
um we owe you a lot of thanks and

1522
01:00:07,430 --> 01:00:05,819
gratitude for all of the hard work

1523
01:00:09,109 --> 01:00:07,440
you've put in over the years and your

1524
01:00:11,270 --> 01:00:09,119
vision and Leadership to make this

1525
01:00:13,130 --> 01:00:11,280
program what it is so Dave from the

1526
01:00:15,049 --> 01:00:13,140
bottom of my heart and I know the bottom

1527
01:00:17,150 --> 01:00:15,059
of everybody's Hearts um thank you for

1528
01:00:19,490 --> 01:00:17,160
15 years it's been a wonderful time it's

1529
01:00:20,630 --> 01:00:19,500
been a lot of fun and uh hope you do

1530
01:00:23,990 --> 01:00:20,640
this

1531
01:00:26,569 --> 01:00:24,000
at least a little longer 15 years the

1532
01:00:28,609 --> 01:00:26,579
let's say 15 years more hopefully

1533
01:00:31,190 --> 01:00:28,619
great and uh just I just want to thank

1534
01:00:32,510 --> 01:00:31,200
you for that Mike and for everybody uh

1535
01:00:33,770 --> 01:00:32,520
but I want to just make another key

1536
01:00:35,630 --> 01:00:33,780
point in that is we're going to be

1537
01:00:37,910 --> 01:00:35,640
asking the students for feedback on this

1538
01:00:40,309 --> 01:00:37,920

year's course I know they a very nice

1539
01:00:42,530 --> 01:00:40,319
comments that we heard tonight but you

1540
01:00:45,349 --> 01:00:42,540
know down in the nitty-gritty how can we

1541
01:00:47,450 --> 01:00:45,359
do a better job and uh and that's been

1542
01:00:50,930 --> 01:00:47,460
the magic over these 15 years is your

1543
01:00:53,210 --> 01:00:50,940
feedback uh over those years and how

1544
01:00:55,910 --> 01:00:53,220
we've used that to leverage ourselves to

1545
01:00:58,789 --> 01:00:55,920
it better and better uh experiences so

1546
01:01:01,069 --> 01:00:58,799
please provide that feedback which uh

1547
01:01:03,890 --> 01:01:01,079
we'll send you the information forms for

1548
01:01:05,750 --> 01:01:03,900
that in the next day or two and um that

1549
01:01:08,270 --> 01:01:05,760
that'll just uh really complete the

1550
01:01:09,950 --> 01:01:08,280
circle for our annual experience thanks

1551
01:01:12,530 --> 01:01:09,960
so much

1552
01:01:16,010 --> 01:01:12,540
yeah I just want to toss in John here's

1553
01:01:18,170 --> 01:01:16,020
your chance to give us some feedback

1554
01:01:19,789 --> 01:01:18,180
based on your impact statement and I

1555
01:01:23,030 --> 01:01:19,799
will just take a moment I haven't really

1556
01:01:24,410 --> 01:01:23,040
spoken yet um as Mike pointed out we

1557
01:01:26,150 --> 01:01:24,420
wanted to give special thanks to Dave

1558
01:01:28,390 --> 01:01:26,160
who is now retired and so he's

1559
01:01:32,089 --> 01:01:28,400
volunteering his time for this program

1560
01:01:33,650 --> 01:01:32,099
uh so that shows his commitment and his

1561
01:01:37,069 --> 01:01:33,660
passion for

1562
01:01:41,809 --> 01:01:39,890
your long history of involvement with

1563
01:01:43,609 --> 01:01:41,819

the Mars program and your perspective

1564
01:01:46,849 --> 01:01:43,619
that's not something that we would be

1565
01:01:49,609 --> 01:01:46,859
able to have access to with any other

1566
01:01:51,770 --> 01:01:49,619
person so thank you for sharing that you

1567
01:01:53,690 --> 01:01:51,780
know the the long history and trajectory

1568
01:01:55,849 --> 01:01:53,700
of your career with us and with the

1569
01:01:58,549 --> 01:01:55,859
program and with the students and Mr

1570
01:02:01,549 --> 01:01:58,559
Michael I know that this program also

1571
01:02:03,770 --> 01:02:01,559
takes a lot of time and you have been

1572
01:02:06,650 --> 01:02:03,780
so supportive and so patient and so

1573
01:02:08,450 --> 01:02:06,660
giving of your time as well and we just

1574
01:02:11,150 --> 01:02:08,460
are deeply appreciative of that and

1575
01:02:13,309 --> 01:02:11,160
really want to recognize it and graci of

1576
01:02:14,450 --> 01:02:13,319
course the partnership with Lawson

1577
01:02:16,670 --> 01:02:14,460
um

1578
01:02:19,549 --> 01:02:16,680
I think that we probably pointed out

1579
01:02:21,670 --> 01:02:19,559
that this is the only program like it in

1580
01:02:24,710 --> 01:02:21,680
existence um it's a unique partnership

1581
01:02:27,289 --> 01:02:24,720
between the National Park Service and

1582
01:02:28,730 --> 01:02:27,299
NASA and a local high school that

1583
01:02:30,349 --> 01:02:28,740
doesn't exist for with any other

1584
01:02:32,329 --> 01:02:30,359
National Park

1585
01:02:35,150 --> 01:02:32,339
um so this is a very special program and

1586
01:02:37,250 --> 01:02:35,160
we're so grateful again that you guys

1587
01:02:38,690 --> 01:02:37,260
have been so accommodating and hosting

1588
01:02:41,329 --> 01:02:38,700

this out in the field and we get to use

1589
01:02:43,190 --> 01:02:41,339
Lawson as a natural laboratory which is

1590
01:02:46,730 --> 01:02:43,200
an amazing component of the program so

1591
01:02:50,870 --> 01:02:48,710
oh and the last little thing I was

1592
01:02:53,990 --> 01:02:50,880
telling Mike in listening to your

1593
01:02:56,150 --> 01:02:54,000
presentation you did such a fabulous job

1594
01:03:03,470 --> 01:02:56,160
and it sounded like I was listening to a

1595
01:03:09,049 --> 01:03:06,109
yeah no they uh they really nailed their

1596
01:03:10,430 --> 01:03:09,059
scripts it was a a very

1597
01:03:11,569 --> 01:03:10,440
um

1598
01:03:14,450 --> 01:03:11,579
I guess

1599
01:03:16,789 --> 01:03:14,460
very serious Endeavor they took on not

1600
01:03:19,010 --> 01:03:16,799
just preparing the the slides the

1601
01:03:21,349 --> 01:03:19,020
presentation part of it but then

1602
01:03:23,210 --> 01:03:21,359
um every word was crafted with with care

1603
01:03:25,250 --> 01:03:23,220
and so they just did a really good job

1604
01:03:26,750 --> 01:03:25,260
with what they said and so

1605
01:03:28,190 --> 01:03:26,760
um couldn't be happier with that so they

1606
01:03:32,990 --> 01:03:28,200
did a great job this year so thank you

1607
01:03:38,109 --> 01:03:36,170
okay and I think with that

1608
01:03:40,069 --> 01:03:38,119
um I think we're done for the evening

1609
01:03:41,809 --> 01:03:40,079
and so

1610
01:03:43,670 --> 01:03:41,819
um we'll end it right there thank you

1611
01:03:44,390 --> 01:03:43,680
all for for joining us

1612
01:03:46,490 --> 01:03:44,400
um

1613
01:03:48,710 --> 01:03:46,500

another year

1614
01:03:49,549 --> 01:03:48,720
um every year it does get better as Mike

1615
01:03:52,730 --> 01:03:49,559
said

1616
01:03:54,890 --> 01:03:52,740
um we we do definitely take feedback to

1617
01:03:56,329 --> 01:03:54,900
heart and we try to make things a little

1618
01:03:57,829 --> 01:03:56,339
bit smoother a little bit more

1619
01:04:00,109 --> 01:03:57,839
meaningful and impactful for the

1620
01:04:03,589 --> 01:04:00,119
students and that will continue to

1621
01:04:05,750 --> 01:04:03,599
happen so next year we'll hopefully be

1622
01:04:07,370 --> 01:04:05,760
doing a doing a little bit better job

1623
01:04:09,230 --> 01:04:07,380
than we demon did this year so that's

1624
01:04:12,589 --> 01:04:09,240
kind of the goal so thank you all for

1625
01:04:15,170 --> 01:04:12,599
joining us tonight and um I will see you

1626
01:04:16,520 --> 01:04:15,180
in school tomorrow and we'll be uh back

1627
01:04:21,250 --> 01:04:16,530
at it in the classroom

1628
01:04:21,260 --> 01:04:25,400
bye everybody