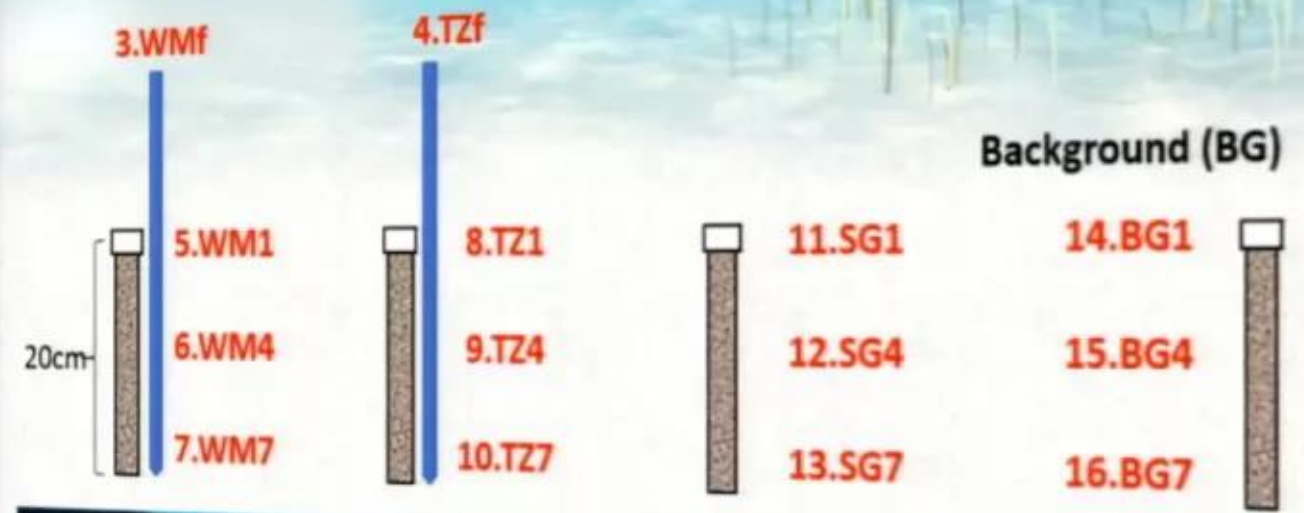


- 1. Field Negative Control
- 2. Surface Seawater

White Mat (WM) Transition Zone (TZ) Sea grass(SG)



1  
00:00:12,049 --> 00:00:09,259  
good afternoon everyone my name is khan

2  
00:00:14,660 --> 00:00:12,059  
Sindhu I'm a PhD student from the

3  
00:00:18,040 --> 00:00:14,670  
University of Southern California so

4  
00:00:21,859 --> 00:00:18,050  
today I'm going to introduce my research

5  
00:00:25,939 --> 00:00:21,869  
special microbial community hydrothermal

6  
00:00:29,179 --> 00:00:25,949  
system I think in previous talk they

7  
00:00:32,179 --> 00:00:29,189  
already talked about a lot early life an

8  
00:00:35,360 --> 00:00:32,189  
extremum file why we need to focus on

9  
00:00:39,350 --> 00:00:35,370  
the hydrothermal system so I don't want

10  
00:00:41,869 --> 00:00:39,360  
to keep repeating it so um Luke Raja I

11  
00:00:43,850 --> 00:00:41,879  
want to ask in my research is I want to

12  
00:00:46,639 --> 00:00:43,860  
figure out the inter reaction the

13  
00:00:48,229 --> 00:00:46,649

linkage between a microorganism and a

14

00:00:51,979 --> 00:00:48,239

geochemical cycle in the high

15

00:00:54,279 --> 00:00:51,989

temperature system so there are three

16

00:00:57,650 --> 00:00:54,289

different types of a hydrothermal system

17

00:00:59,389 --> 00:00:57,660

like the terrestrial hydrothermal system

18

00:01:01,729 --> 00:00:59,399

the most famous example is the

19

00:01:03,680 --> 00:01:01,739

Yellowstone National Park and the deep

20

00:01:07,270 --> 00:01:03,690

sea hydrothermal systems such as a black

21

00:01:10,219 --> 00:01:07,280

smoker or losses city both of them were

22

00:01:12,500 --> 00:01:10,229

investigated a lot like in previous talk

23

00:01:15,530 --> 00:01:12,510

and but I focus on the show sea

24

00:01:17,480 --> 00:01:15,540

hydrothermal system shows the

25

00:01:19,700 --> 00:01:17,490

hydrothermal system are geochemical and

26

00:01:22,280 --> 00:01:19,710

the physical transition between the

27

00:01:26,359 --> 00:01:22,290

other two systems it's more complicated

28

00:01:30,289 --> 00:01:26,369

than the other two and two systems and

29

00:01:33,109 --> 00:01:30,299

it's very interested but however not too

30

00:01:35,480 --> 00:01:33,119

much research come here so the show sea

31

00:01:40,700 --> 00:01:35,490

hydrothermal just like a golden my to

32

00:01:46,280 --> 00:01:40,710

open up so my someone inside located at

33

00:01:52,310 --> 00:01:46,290

the middle island greece it's on South

34

00:01:55,219 --> 00:01:52,320

agency sauce agency and lost iconic

35

00:01:58,670 --> 00:01:55,229

event it's 300 meter off shore of the

36

00:02:01,880 --> 00:01:58,680

paleo crow repair and the water taps is

37

00:02:04,429 --> 00:02:01,890

around 12 meters and this is a first

38

00:02:06,050 --> 00:02:04,439

difficulty I met right style this

39

00:02:09,290 --> 00:02:06,060

project because I don't know how to swim

40

00:02:12,480 --> 00:02:09,300

and we need to do scout school dive in

41

00:02:14,910 --> 00:02:12,490

to codex simple so my advisor

42

00:02:19,290 --> 00:02:14,920

young man's he helped me to collect all

43

00:02:22,500 --> 00:02:19,300

example in last summer so and that this

44

00:02:26,970 --> 00:02:22,510

is my symbol inside so the white men are

45

00:02:30,060 --> 00:02:26,980

covered on the vent so and the UM 2

46

00:02:32,310 --> 00:02:30,070

meter away from the AL Central vent

47

00:02:35,040 --> 00:02:32,320

there are some secrets cover on the

48

00:02:36,720 --> 00:02:35,050

sediment in the between a secret area

49

00:02:40,560 --> 00:02:36,730

and the white man area there's a

50

00:02:43,530 --> 00:02:40,570

transition zone so we collect the for

51  
00:02:47,010 --> 00:02:43,540  
sediment core is around 20 centimeters

52  
00:02:49,800 --> 00:02:47,020  
in four different place and applause the

53  
00:02:52,770 --> 00:02:49,810  
background oh area is like around 80

54  
00:02:55,260 --> 00:02:52,780  
meter away from this vent and we also

55  
00:02:58,430 --> 00:02:55,270  
collect some surface sediment poor fool

56  
00:03:01,170 --> 00:02:58,440  
is when he flew it and the barrel film

57  
00:03:03,690 --> 00:03:01,180  
so this is how we collected sediment the

58  
00:03:08,130 --> 00:03:03,700  
coal under a water and we bring this

59  
00:03:10,170 --> 00:03:08,140  
settlement co to import and user rhizome

60  
00:03:12,360 --> 00:03:10,180  
and the average 2 centimeter with

61  
00:03:14,520 --> 00:03:12,370  
drilling a hole and I put the rice on

62  
00:03:18,030 --> 00:03:14,530  
inside and they collect OLAP hole

63  
00:03:20,610 --> 00:03:18,040

through it and a lost Pope really simple

64

00:03:25,170 --> 00:03:20,620

are we useful at your chemical data

65

00:03:29,900 --> 00:03:25,180

analysis and the low temperature and the

66

00:03:34,620 --> 00:03:29,910

ph I would were measured in the field so

67

00:03:40,110 --> 00:03:34,630

this is a transect of the simple inside

68

00:03:43,410 --> 00:03:40,120

leg here so this part did this is most

69

00:03:46,140 --> 00:03:43,420

close to Levin sauce so the temperature

70

00:03:49,260 --> 00:03:46,150

is around 80 degrees celsius and the

71

00:03:52,410 --> 00:03:49,270

decreased to 20 degrees sauces during

72

00:03:55,110 --> 00:03:52,420

like 20 centimeters times 2 meter scale

73

00:04:07,230 --> 00:03:55,120

and a pH increased from four to eight

74

00:04:09,840 --> 00:04:07,240

and so I first I predict if the venue

75

00:04:13,770 --> 00:04:09,850

food and icy water only mix to each

76

00:04:16,800 --> 00:04:13,780

other look um the profile the pattern

77

00:04:20,190 --> 00:04:16,810

gradient should be curly at with balls

78

00:04:23,340 --> 00:04:20,200

are the depths and the distance but when

79

00:04:25,820 --> 00:04:23,350

I take a look at my geochemical data so

80

00:04:28,369 --> 00:04:25,830

like the soffit megan is and

81

00:04:31,659 --> 00:04:28,379

total dissolved nitrogen the only

82

00:04:35,510 --> 00:04:31,669

function with the distance and the

83

00:04:38,809 --> 00:04:35,520

dissolved organic carbon create with the

84

00:04:42,909 --> 00:04:38,819

depth and I or arsenic they are more

85

00:04:46,089 --> 00:04:42,919

complicated so we I cannot see any very

86

00:04:51,140 --> 00:04:46,099

clear pattern associated with just

87

00:04:53,480 --> 00:04:51,150

distance or depth so it might be some

88

00:04:55,999 --> 00:04:53,490

other thing dry regulates that your

89

00:04:57,830 --> 00:04:56,009

chemical cycle here so microorganism

90

00:05:02,570 --> 00:04:57,840

will be the only answer in this

91

00:05:05,540 --> 00:05:02,580

environment so I choose a 16 sample and

92

00:05:08,809 --> 00:05:05,550

send forth Paris sequencing so it's

93

00:05:11,689 --> 00:05:08,819

included three our sample from each side

94

00:05:14,409 --> 00:05:11,699

medical from top middle and the button

95

00:05:17,360 --> 00:05:14,419

and the venting folate from my method

96

00:05:19,909 --> 00:05:17,370

porphyry foreign transition zone and the

97

00:05:25,510 --> 00:05:19,919

surface seawater and the fields uh

98

00:05:29,570 --> 00:05:25,520

negative control so this is a premier

99

00:05:41,390 --> 00:05:29,580

data I just got like around a month ago

100

00:05:45,079 --> 00:05:41,400

so in so um the i got like around 1.5

101  
00:05:48,019 --> 00:05:45,089  
million sequences and let's take root ah

102  
00:05:50,920 --> 00:05:48,029  
this colin so the four column is from

103  
00:05:55,490 --> 00:05:50,930  
four different as a diamond core and the

104  
00:05:58,809 --> 00:05:55,500  
secret and a big one call it looks very

105  
00:06:03,649 --> 00:05:58,819  
similar the microbial company just

106  
00:06:06,409 --> 00:06:03,659  
switch with the depth so that's don't in

107  
00:06:14,089 --> 00:06:06,419  
these three previous settlement co and

108  
00:06:16,999 --> 00:06:14,099  
tech roots the white mat first so the

109  
00:06:19,399 --> 00:06:17,009  
Tibbles the same hook is most close to

110  
00:06:20,959 --> 00:06:19,409  
event sauce it dominated with archaea

111  
00:06:24,709 --> 00:06:20,969  
it's like roughly seventy percent

112  
00:06:27,920 --> 00:06:24,719  
archaea in whole sample and it dominated

113  
00:06:30,409 --> 00:06:27,930

with Thomason otro for some high

114

00:06:33,350 --> 00:06:30,419

personal file and it switched to a queef

115

00:06:35,809 --> 00:06:33,360

it k and because the laws are kiala

116

00:06:38,329 --> 00:06:35,819

produce a lot of hydrogen and the loss

117

00:06:38,850 --> 00:06:38,339

aquafit equivocal i can use hydrogen as

118

00:06:46,559 --> 00:06:38,860

the

119

00:06:50,490 --> 00:06:46,569

decreased jolla community switch to a

120

00:06:52,499 --> 00:06:50,500

casino bacteria from acute loss on metal

121

00:06:56,790 --> 00:06:52,509

file and the Lake Hanna depth in the

122

00:07:00,149 --> 00:06:56,800

Arctic and the exec availment and the

123

00:07:04,890 --> 00:07:00,159

next part is the let's take you the blue

124

00:07:07,950 --> 00:07:04,900

part is a proteobacteria mmm so the

125

00:07:13,040 --> 00:07:07,960

proteobacteria is dominating all the

126

00:07:15,869 --> 00:07:13,050

sample except for the vents temple and

127

00:07:19,950 --> 00:07:15,879

they dominate with the epsilon and the

128

00:07:23,519 --> 00:07:19,960

Delta and this is in the community

129

00:07:26,580 --> 00:07:23,529

switch they cause the regular sulfa

130

00:07:31,290 --> 00:07:26,590

cycle in this area so the episode our

131

00:07:33,570 --> 00:07:31,300

product bacterially Liam Famers sulfur

132

00:07:36,659 --> 00:07:33,580

oxides and the lake and Proteus sulfate

133

00:07:39,089 --> 00:07:36,669

and the Delta proteobacteria they use of

134

00:07:41,820 --> 00:07:39,099

it a lot they are very famous in Arabic

135

00:07:46,019 --> 00:07:41,830

so we're reducing bacteria so based on

136

00:07:52,290 --> 00:07:46,029

my own geochemical profile and my

137

00:07:54,680 --> 00:07:52,300

community profile ah close 12 and it's

138

00:07:57,719 --> 00:07:54,690

not only the Vengeance that good

139

00:08:00,360 --> 00:07:57,729

seawater it also the Delta

140

00:08:03,809 --> 00:08:00,370

proteobacteria late use sulfate and a

141

00:08:07,439 --> 00:08:03,819

produce sulfide in the inner transition

142

00:08:10,230 --> 00:08:07,449

zone loss of software oxidizer that

143

00:08:15,300 --> 00:08:10,240

produces a lot of sulfate and the late

144

00:08:17,820 --> 00:08:15,310

decrease in the sequence area again so

145

00:08:20,399 --> 00:08:17,830

let's switch to a heat map so from the

146

00:08:25,050 --> 00:08:20,409

him away can see all the simple dominate

147

00:08:27,290 --> 00:08:25,060

with the proteobacteria and only in

148

00:08:31,379 --> 00:08:27,300

awhile mate I switch to a different

149

00:08:34,259 --> 00:08:31,389

microbial community in the tip-sample is

150

00:08:36,810 --> 00:08:34,269

switched archaea and initial sample is

151

00:08:40,110 --> 00:08:36,820

switched to make us and action or

152

00:08:43,469 --> 00:08:40,120

bacteria so if we calculate the

153

00:08:47,699 --> 00:08:43,479

correlation coefficient of each violin

154

00:08:51,020 --> 00:08:47,709

we can see the ocular always prefer live

155

00:08:55,850 --> 00:08:51,030

with the other archaea but I

156

00:08:58,580 --> 00:08:55,860

the other on aerobic bacteria file and

157

00:09:02,480 --> 00:08:58,590

they always prefer to grow with the

158

00:09:06,200 --> 00:09:02,490

other aerobic bacteria the only

159

00:09:10,340 --> 00:09:06,210

exception is the Tamaki ohta so tomorrow

160

00:09:14,810 --> 00:09:10,350

Kelly prefer those are with the

161

00:09:17,120 --> 00:09:14,820

cyanobacteria from accuse and they

162

00:09:20,540 --> 00:09:17,130

always go together and the

163

00:09:24,860 --> 00:09:20,550

proteobacteria if they show up in the in

164

00:09:30,190 --> 00:09:24,870

a simple you cannot see any and archaea

165

00:09:33,620 --> 00:09:30,200

in a simple so I want to know how to

166

00:09:36,830 --> 00:09:33,630

hold a cluster analysis and this is a

167

00:09:39,020 --> 00:09:36,840

calculation result so the secrets in the

168

00:09:41,600 --> 00:09:39,030

background it always costs together and

169

00:09:43,640 --> 00:09:41,610

the transition zone and the wine met no

170

00:09:46,660 --> 00:09:43,650

matter I user or community or the

171

00:09:54,860 --> 00:09:46,670

bacterial community to calculate it and

172

00:09:59,540 --> 00:09:54,870

the next part I use a so track to so to

173

00:10:02,660 --> 00:09:59,550

check the microorganism how to mix with

174

00:10:05,270 --> 00:10:02,670

seawater and the venue fluid so I set up

175

00:10:07,580 --> 00:10:05,280

a three different sources so like

176

00:10:10,930 --> 00:10:07,590

seawater penguin statements and the

177

00:10:14,750 --> 00:10:10,940

venting sediment so based on this result

178

00:10:17,590 --> 00:10:14,760

regular white net area they dominated

179

00:10:21,080 --> 00:10:17,600

with definitely dominate with the vent

180

00:10:24,680 --> 00:10:21,090

sediment microbial community but the

181

00:10:26,240 --> 00:10:24,690

backgrounds and the secrets determinate

182

00:10:28,610 --> 00:10:26,250

with the sediment of the ground

183

00:10:30,920 --> 00:10:28,620

settlement microbial community but in a

184

00:10:34,700 --> 00:10:30,930

transition zone that all mix with

185

00:10:38,810 --> 00:10:34,710

seawater trans a background settlement

186

00:10:42,260 --> 00:10:38,820

and the venting sediment so the

187

00:10:46,520 --> 00:10:42,270

microbial community it just makes from

188

00:10:49,130 --> 00:10:46,530

the sea water and the van andel event so

189

00:10:51,710 --> 00:10:49,140

they mix with each other and the left

190

00:10:57,530 --> 00:10:51,720

some unknown and this is the next step I

191

00:11:00,830 --> 00:10:57,540

I need to figure out in so the roughly

192

00:11:03,940 --> 00:11:00,840

summary of my research the geochemistry

193

00:11:05,890 --> 00:11:03,950

is controlled by microbial community

194

00:11:08,500 --> 00:11:05,900

even though microbial come here just mix

195

00:11:11,020 --> 00:11:08,510

with water and the venting fluid but

196

00:11:15,160 --> 00:11:11,030

because of microbial community they have

197

00:11:18,340 --> 00:11:15,170

a different metabolisms in here late so

198

00:11:20,590 --> 00:11:18,350

they regulate the geochemical cycle in

199

00:11:23,170 --> 00:11:20,600

this system it's become so different

200

00:11:31,350 --> 00:11:23,180

it's not only just associated with depth

201  
00:11:34,720 --> 00:11:31,360  
and distance so um next step I need to

202  
00:11:39,190 --> 00:11:34,730  
finish a qualify of the function gene to

203  
00:11:42,180 --> 00:11:39,200  
figure out how much a what kind of my

204  
00:11:45,580 --> 00:11:42,190  
table isn't located in each side and

205  
00:11:47,950 --> 00:11:45,590  
around a prayer crust and to predict the

206  
00:11:50,410 --> 00:11:47,960  
functional profile of a microbial

207  
00:11:53,800 --> 00:11:50,420  
community with ste this turns depth

208  
00:11:57,490 --> 00:11:53,810  
temperature pH or even each different on

209  
00:12:01,000 --> 00:11:57,500  
your chemical profile and i will run

210  
00:12:04,420 --> 00:12:01,010  
some metagenomics analysis I just my

211  
00:12:08,350 --> 00:12:04,430  
proposal just got um proved by the

212  
00:12:10,960 --> 00:12:08,360  
carbon observatory and the fondant i can

213  
00:12:14,140 --> 00:12:10,970

send the meta-genome make sequencing for

214

00:12:18,790 --> 00:12:14,150

them and the future work i will come by

215

00:12:20,470 --> 00:12:18,800

a previous data i already finished like

216

00:12:23,710 --> 00:12:20,480

the cultural and a thermodynamic

217

00:12:27,790 --> 00:12:23,720

calculation and hope i can contract the

218

00:12:32,620 --> 00:12:27,800

whole biogeochemical cycle model in this

219

00:12:36,580 --> 00:12:32,630

and show a hydrothermal systems and a

220

00:12:47,070 --> 00:12:36,590

new thing for my advisory and all the

221

00:12:47,080 --> 00:12:53,430

okay we have time for a few questions

222

00:12:58,180 --> 00:12:55,780

yeah thank you that was a fantastic talk

223

00:12:59,650 --> 00:12:58,190

and it sounds like really fun work I'm

224

00:13:02,110 --> 00:12:59,660

curious if you think the reason that

225

00:13:05,140 --> 00:13:02,120

you're not seeing archaea in the samples

226

00:13:06,490 --> 00:13:05,150

with proteobacteria is solely spatially

227

00:13:07,750 --> 00:13:06,500

related so that you're just not

228

00:13:09,280 --> 00:13:07,760

collecting samples with our key in them

229

00:13:11,320 --> 00:13:09,290

because they're not in that part of the

230

00:13:13,090 --> 00:13:11,330

water column or if there is an out

231

00:13:15,520 --> 00:13:13,100

competition of some form that having pro

232

00:13:16,900 --> 00:13:15,530

do is in your sample automatically means

233

00:13:18,600 --> 00:13:16,910

that they're doing something that the

234

00:13:30,530 --> 00:13:18,610

archaea then can't survive in that area

235

00:13:38,040 --> 00:13:34,760

so actually they still have a like

236

00:13:41,010 --> 00:13:38,050

little bit archaea in the other color

237

00:13:43,800 --> 00:13:41,020

just not too much because the

238

00:13:47,040 --> 00:13:43,810

temperature is much lower than event so

239

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

i think the most of our Kia survive here

240

00:13:53,070 --> 00:13:49,060

they need a high temperature and the low

241

00:13:56,300 --> 00:13:53,080

pH a violent so okay that's why less we

242

00:14:03,480 --> 00:13:56,310

should a community okay thanks very much