
AbSciCon
2019

1
00:00:00,790 --> 00:00:07,320
[Music]

2
00:00:11,420 --> 00:00:09,130
[Applause]

3
00:00:13,310 --> 00:00:11,430
so Maggie did a really excellent job

4
00:00:15,260 --> 00:00:13,320
highlighting all the field work that

5
00:00:17,150 --> 00:00:15,270
we've been doing and some of the data

6
00:00:18,620 --> 00:00:17,160
sets that I haven't even seen them yet

7
00:00:20,690 --> 00:00:18,630
so I'm really excited to see what's

8
00:00:23,210 --> 00:00:20,700
coming out of these and what I wanted to

9
00:00:24,890 --> 00:00:23,220
do is take a bit of a step back and talk

10
00:00:27,130 --> 00:00:24,900
about the system as a whole and our

11
00:00:29,569 --> 00:00:27,140
rationale for why we're doing this work

12
00:00:31,640 --> 00:00:29,579
so especially digging into the role of

13
00:00:34,640 --> 00:00:31,650

ionic composition and concentration in

14
00:00:37,010 --> 00:00:34,650
these environments and I just wanted to

15
00:00:38,810 --> 00:00:37,020
say thank you to Mike OA Michael eyes

16
00:00:40,490 --> 00:00:38,820
Chris card Maggie was bored and also we

17
00:00:43,790 --> 00:00:40,500
have collaborated she way oh no Virginia

18
00:00:45,439 --> 00:00:43,800
Walker and Jack szostak so the

19
00:00:46,790 --> 00:00:45,449
inspiration for this project actually

20
00:00:48,979 --> 00:00:46,800
came from D HAP's

21
00:00:50,990 --> 00:00:48,989
deep hyper saline anoxic brian's there

22
00:00:53,209 --> 00:00:51,000
were two specific papers which you

23
00:00:56,270 --> 00:00:53,219
haven't read a kinky that were

24
00:00:59,810 --> 00:00:56,280
looking at ATP and DNA preservation in

25
00:01:01,490 --> 00:00:59,820
these hyper saline anoxic brines and the

26
00:01:03,470 --> 00:01:01,500
interesting thing is that DNA can

27
00:01:06,230 --> 00:01:03,480
potentially be formed can protect

28
00:01:07,610 --> 00:01:06,240
maintain its conformational e active AB

29
00:01:09,680 --> 00:01:07,620
so that was really interesting and I

30
00:01:11,270 --> 00:01:09,690
wanted to delve into what is it about

31
00:01:14,359 --> 00:01:11,280
these salts and why some salts are

32
00:01:17,060 --> 00:01:14,369
better than others at doing this so some

33
00:01:18,740 --> 00:01:17,070
definitions first off water activity I'm

34
00:01:19,850 --> 00:01:18,750
sure a lot of us are familiar with it

35
00:01:21,770 --> 00:01:19,860
but I just want to go over it a little

36
00:01:24,830 --> 00:01:21,780
bit there one dynamic availability of

37
00:01:27,200 --> 00:01:24,840
water so pure water has an AW of 1 and

38
00:01:28,850 --> 00:01:27,210

the limits of life are is currently

39
00:01:31,280 --> 00:01:28,860
around zero point six zero five this is

40
00:01:34,580 --> 00:01:31,290
zero terilyn tolerant fungi that can

41
00:01:36,679 --> 00:01:34,590
grow off of sucrose solutions but

42
00:01:39,050 --> 00:01:36,689
different salts affect this differently

43
00:01:40,580 --> 00:01:39,060
so magnesium sulfate at saturation has a

44
00:01:43,459 --> 00:01:40,590
water activity of zero point eight six

45
00:01:47,660 --> 00:01:43,469
but magnesium chloride at saturation has

46
00:01:49,100 --> 00:01:47,670
a water activity down around 0.33 so

47
00:01:51,289 --> 00:01:49,110
these two salts obviously have very

48
00:01:53,420 --> 00:01:51,299
different solubility Center there are

49
00:01:56,779 --> 00:01:53,430
there ion pairing is really affecting

50
00:01:58,969 --> 00:01:56,789
how water activity is is determined in

51
00:02:00,590 --> 00:01:58,979
the system and the thing that I want to

52
00:02:02,600 --> 00:02:00,600
drive home and something to think about

53
00:02:04,130 --> 00:02:02,610
going forward is that we usually use

54
00:02:06,950 --> 00:02:04,140
water activities the metric for

55
00:02:09,109 --> 00:02:06,960
habitability but it's really important

56
00:02:12,320 --> 00:02:09,119
to understand that these values aren't

57
00:02:15,230 --> 00:02:12,330
all equally habitable so NaCl system

58
00:02:17,509 --> 00:02:15,240
with 0.67 is how tubule mgcl2 system at

59
00:02:19,699 --> 00:02:17,519
the same water activity is not and that

60
00:02:22,070 --> 00:02:19,709
has to do with these ions in the

61
00:02:25,390 --> 00:02:22,080
Hofmeister series this is actually

62
00:02:27,350 --> 00:02:25,400
anything news published first in 1888

63
00:02:30,980 --> 00:02:27,360

it's a little bit complicated to just

64
00:02:33,290 --> 00:02:30,990
look at the anions on the bottom these

65
00:02:35,600 --> 00:02:33,300
are ordered from cosmic shellcode which

66
00:02:38,630 --> 00:02:35,610
are tell which are stabilizing to K

67
00:02:40,280 --> 00:02:38,640
atrophic destabilizing and this is both

68
00:02:42,860 --> 00:02:40,290
for how they affect the structure of

69
00:02:45,320 --> 00:02:42,870
water and differing biological molecules

70
00:02:49,070 --> 00:02:45,330
specifically proteins and lipids so

71
00:02:52,160 --> 00:02:49,080
these cosmic ropes here can salt out

72
00:02:54,140 --> 00:02:52,170
proteins in solution and so they're but

73
00:02:55,960 --> 00:02:54,150
they'll do an opposite thing for DNA

74
00:02:59,090 --> 00:02:55,970
whereas these are going to destabilize

75
00:03:00,860 --> 00:02:59,100
proteins in solution the cations get

76
00:03:02,450 --> 00:03:00,870
even more complicated this is ordered

77
00:03:05,600 --> 00:03:02,460
with respect to their effects on water

78
00:03:07,190 --> 00:03:05,610
but you have to flip it with her in

79
00:03:09,200 --> 00:03:07,200
order and therefore their effects on

80
00:03:10,670 --> 00:03:09,210
biological molecules and dependent it

81
00:03:11,870 --> 00:03:10,680
depends on what biological molecule

82
00:03:13,400 --> 00:03:11,880
you're talking about so it's really

83
00:03:16,820 --> 00:03:13,410
complicated and it's not well understood

84
00:03:18,260 --> 00:03:16,830
and the reason that we're specifically

85
00:03:20,000 --> 00:03:18,270
looking at magnesium sulphate

86
00:03:22,940 --> 00:03:20,010
environments is because we've got this

87
00:03:24,950 --> 00:03:22,950
that interesting dichotomy which oops

88
00:03:28,580 --> 00:03:24,960

sorry we've got this interesting

89
00:03:31,540 --> 00:03:28,590
dichotomy between this cosmic OPIC anion

90
00:03:33,680 --> 00:03:31,550
and this potentially k topic for biology

91
00:03:35,449 --> 00:03:33,690
cation so that's why we're looking at my

92
00:03:38,770 --> 00:03:35,459
knees himself--a there's also an

93
00:03:41,240 --> 00:03:38,780
extensive evidence for the salt on Mars

94
00:03:43,640 --> 00:03:41,250
but this salt is not highly common on

95
00:03:47,090 --> 00:03:43,650
earth and the majority of system studies

96
00:03:48,979 --> 00:03:47,100
are NaCl so as Maggie said we're looking

97
00:03:51,590 --> 00:03:48,989
at these three lakes in the middle of

98
00:03:53,810 --> 00:03:51,600
nowhere BC it is fantastic you should

99
00:03:55,040 --> 00:03:53,820
definitely go the reason that these

100
00:03:56,780 --> 00:03:55,050
lakes are here is because they're

101
00:03:58,190 --> 00:03:56,790
located between the Cascades and the

102
00:04:00,320 --> 00:03:58,200
rocky mountains so we're in a rain

103
00:04:01,070 --> 00:04:00,330
shadow things are really really dry in

104
00:04:03,530 --> 00:04:01,080
this environment

105
00:04:04,729 --> 00:04:03,540
these are glacial Basin lakes grossly

106
00:04:06,920 --> 00:04:04,739
formed based on lakes

107
00:04:09,290 --> 00:04:06,930
closed basin and so that's why we're

108
00:04:11,479 --> 00:04:09,300
getting a huge concentration within the

109
00:04:13,550 --> 00:04:11,489
environment so we've already looked at

110
00:04:15,350 --> 00:04:13,560
these a little bit as Maggie pointed out

111
00:04:17,360 --> 00:04:15,360
these are spotted lakes which are unique

112
00:04:19,039 --> 00:04:17,370
to this part of the world we don't know

113
00:04:20,509 --> 00:04:19,049

about them anywhere else

114
00:04:21,800 --> 00:04:20,519
and we don't know why they're doing this

115
00:04:23,230 --> 00:04:21,810
so that's another question that's

116
00:04:26,180 --> 00:04:23,240
outstanding

117
00:04:28,250 --> 00:04:26,190
this crazy map is the geology of the

118
00:04:31,520 --> 00:04:28,260
area and why we have some really unique

119
00:04:33,529 --> 00:04:31,530
ions in solution so basically last

120
00:04:35,159 --> 00:04:33,539
chance lake is underlaying by both said

121
00:04:36,659 --> 00:04:35,169
basaltic volcanic rocks

122
00:04:38,399 --> 00:04:36,669
and whereas like Clinton the Basque

123
00:04:41,730 --> 00:04:38,409
Lakes are underlined by marine

124
00:04:43,350 --> 00:04:41,740
sedimentary rocks and then I should also

125
00:04:45,510 --> 00:04:43,360
point out that we've got grabbed and

126
00:04:46,200 --> 00:04:45,520
grano diuretic conclusions throughout

127
00:04:50,610 --> 00:04:46,210
the region

128
00:04:52,559 --> 00:04:50,620
this whole grey unit here is permeant

129
00:04:54,570 --> 00:04:52,569
upper Triassic limestone marble which is

130
00:04:55,559 --> 00:04:54,580
why we're having all that we have a lot

131
00:04:57,420 --> 00:04:55,569
of magnesium carbonate in the

132
00:04:59,100 --> 00:04:57,430
environment and there's also pirate and

133
00:05:02,610 --> 00:04:59,110
pure tight deposits which is where

134
00:05:03,839 --> 00:05:02,620
sulphuric acid is coming from so a

135
00:05:06,360 --> 00:05:03,849
little bit more about these spotted

136
00:05:09,480 --> 00:05:06,370
Lakes there they're temporally they're

137
00:05:12,119 --> 00:05:09,490
spatially stable over time so this image

138
00:05:14,850 --> 00:05:12,129

here was taken in 2016 and if you

139
00:05:16,459 --> 00:05:14,860
compare it to the 1918 paper the spots

140
00:05:19,980 --> 00:05:16,469
are in the same place they're not moving

141
00:05:21,749 --> 00:05:19,990
we don't know what's going on in this

142
00:05:23,909 --> 00:05:21,759
environment they never really dry out

143
00:05:25,499 --> 00:05:23,919
enough to really be able to dig down and

144
00:05:26,730 --> 00:05:25,509
it's also really difficult to core in

145
00:05:29,700 --> 00:05:26,740
this environment because there's a hard

146
00:05:32,430 --> 00:05:29,710
layer of salt about 30 centimeters down

147
00:05:33,959 --> 00:05:32,440
that you just smack into so we don't

148
00:05:35,760 --> 00:05:33,969
know what the hydrogen optical controls

149
00:05:37,140 --> 00:05:35,770
are and I've been chatting with Jill

150
00:05:39,809 --> 00:05:37,150
actually this week about maybe trying to

151
00:05:41,369 --> 00:05:39,819
do some resistivity here to get a handle

152
00:05:44,730 --> 00:05:41,379
on what the hydrology is of this

153
00:05:46,050 --> 00:05:44,740
environment so as Maggie touched in a

154
00:05:48,300 --> 00:05:46,060
little bit we want to constrain the

155
00:05:50,579 --> 00:05:48,310
physical chemistry of this environment

156
00:05:51,719 --> 00:05:50,589
and assess ions specific effects and

157
00:05:53,490 --> 00:05:51,729
that's why we're looking at both the

158
00:05:55,140 --> 00:05:53,500
sodium sulfate Lake and magnesium

159
00:05:58,019 --> 00:05:55,150
sulfate lake and the difference that

160
00:06:00,029 --> 00:05:58,029
these two cations have on biological

161
00:06:01,700 --> 00:06:00,039
stability I want to look at the

162
00:06:03,869 --> 00:06:01,710
characterizing the community of course

163
00:06:05,969 --> 00:06:03,879

and then assess this preservation

164
00:06:08,610 --> 00:06:05,979
potential looking in the salts the

165
00:06:10,170 --> 00:06:08,620
sediment of water column and also doing

166
00:06:13,490 --> 00:06:10,180
these sediment cores and looking at it

167
00:06:15,990 --> 00:06:13,500
across time and we're looking at sort of

168
00:06:18,600 --> 00:06:16,000
short-term bio signatures such as ATP

169
00:06:21,320 --> 00:06:18,610
and DNA and longer term bio signatures

170
00:06:23,430 --> 00:06:21,330
such as these lipids IPL versus core

171
00:06:24,180 --> 00:06:23,440
we're looking at amino acid

172
00:06:26,249 --> 00:06:24,190
rasterization

173
00:06:28,140 --> 00:06:26,259
and also I'm interested in sulfur

174
00:06:29,760 --> 00:06:28,150
fractionation at high salinities in this

175
00:06:35,159 --> 00:06:29,770
environment which for which there is a

176
00:06:37,320 --> 00:06:35,169
lot so Clinton Lee this is the scoring

177
00:06:40,439 --> 00:06:37,330
for the first time many thanks to yarrow

178
00:06:42,089 --> 00:06:40,449
expert for showing us how to do it you

179
00:06:44,059 --> 00:06:42,099
might note that the core head is above

180
00:06:47,760 --> 00:06:44,069
the water this is really difficult to do

181
00:06:48,870 --> 00:06:47,770
and your boards float when it's really a

182
00:06:50,610 --> 00:06:48,880
float they float any

183
00:06:53,250 --> 00:06:50,620
but when the barns are this dense they

184
00:06:54,840 --> 00:06:53,260
really float away we got back but it

185
00:06:56,460 --> 00:06:54,850
this was a challenging environment to

186
00:06:58,860 --> 00:06:56,470
work in we had and they're supposed to

187
00:07:00,720 --> 00:06:58,870
be dry this is the dry season I'll note

188
00:07:02,430 --> 00:07:00,730

that there's 8 centimeters of water on

189
00:07:06,780 --> 00:07:02,440
top of this Lake and wheat so to get it

190
00:07:09,420 --> 00:07:06,790
to the spots we had to do this sorry but

191
00:07:11,460 --> 00:07:09,430
there is there was still coherent sub

192
00:07:13,590 --> 00:07:11,470
aqueous salt about 27 meters below the

193
00:07:16,350 --> 00:07:13,600
surface that was really neat that's like

194
00:07:17,550 --> 00:07:16,360
number 2 is in much drier location so we

195
00:07:19,800 --> 00:07:17,560
could get to those pools which was

196
00:07:21,540 --> 00:07:19,810
fantastic we had hydrogen sulfide

197
00:07:24,120 --> 00:07:21,550
bubbling up underneath the salt crust

198
00:07:26,550 --> 00:07:24,130
and forming iron sulphides and if you

199
00:07:29,040 --> 00:07:26,560
pull that out you can see photosynthetic

200
00:07:33,540 --> 00:07:29,050
layers and then also black you're black

201
00:07:35,430 --> 00:07:33,550
anoxic layer right here also there's

202
00:07:38,400 --> 00:07:35,440
this these great little brine shrimp

203
00:07:40,650 --> 00:07:38,410
that were only in pools that had a water

204
00:07:42,240 --> 00:07:40,660
activity above 0.9 so in our really

205
00:07:45,930 --> 00:07:42,250
shallow pools they didn't exist in me

206
00:07:47,400 --> 00:07:45,940
just from branch and breaks and then

207
00:07:50,280 --> 00:07:47,410
finally last chance lake which is our

208
00:07:52,200 --> 00:07:50,290
sodium sulfate that chemistry is wrong

209
00:07:54,420 --> 00:07:52,210
but it's okay

210
00:07:55,710 --> 00:07:54,430
we didn't have salt precipitating in the

211
00:07:57,120 --> 00:07:55,720
lake here we think that's because it's a

212
00:07:58,980 --> 00:07:57,130
much more soluble salt and the only

213
00:08:01,140 --> 00:07:58,990

places we got it run trees and branches

214
00:08:03,750 --> 00:08:01,150
that were along the margins again this

215
00:08:06,180 --> 00:08:03,760
was supposed to be completely dry so it

216
00:08:08,520 --> 00:08:06,190
was an ideal but we got some still got

217
00:08:10,580 --> 00:08:08,530
some really interesting data so this is

218
00:08:13,590 --> 00:08:10,590
ICP I see data from the fall

219
00:08:15,300 --> 00:08:13,600
we've got concentration millimolar here

220
00:08:17,790 --> 00:08:15,310
and salinity grams per liter on the

221
00:08:19,710 --> 00:08:17,800
x-axis or the y-axis and then of the

222
00:08:21,270 --> 00:08:19,720
different lakes so Salt Lake and Last

223
00:08:22,500 --> 00:08:21,280
Chance were flooded so we only have one

224
00:08:23,970 --> 00:08:22,510
data point but we got the three

225
00:08:26,150 --> 00:08:23,980
different pools for Bass Lake and you

226
00:08:29,130 --> 00:08:26,160
can see the water activity data here

227
00:08:32,219 --> 00:08:29,140
below so I'll highlight the fact that

228
00:08:34,400 --> 00:08:32,229
Salt Lake and Last Chance because they

229
00:08:37,620 --> 00:08:34,410
were flooded had fairly low salinities

230
00:08:39,630 --> 00:08:37,630
sorry um salinity for lots last year

231
00:08:41,670 --> 00:08:39,640
Salt Lake was 90 grams per liter and

232
00:08:43,950 --> 00:08:41,680
then we were at a hundred and sixty

233
00:08:46,680 --> 00:08:43,960
grams per liter and I'd like to draw

234
00:08:48,450 --> 00:08:46,690
your attention to this I said it was

235
00:08:50,100 --> 00:08:48,460
sodium sulfate the literature says that

236
00:08:53,100 --> 00:08:50,110
sodium sulfate and it was most

237
00:08:54,930 --> 00:08:53,110
definitely not sodium sulfate when we

238
00:08:57,210 --> 00:08:54,940

sampled so there's something really

239
00:08:59,730 --> 00:08:57,220
interesting going on there it might be a

240
00:09:00,390 --> 00:08:59,740
temporal variation that occurs when you

241
00:09:02,310 --> 00:09:00,400
have

242
00:09:03,570 --> 00:09:02,320
a lot of a huge rain event so we're

243
00:09:05,850 --> 00:09:03,580
gonna have to go back and sample a few

244
00:09:07,590 --> 00:09:05,860
times to figure out what's going on here

245
00:09:10,110 --> 00:09:07,600
but we did get some really nice DeLuna

246
00:09:12,210 --> 00:09:10,120
tees here at 300 above 300 grams per

247
00:09:16,980 --> 00:09:12,220
liter salinity so this stuff was that

248
00:09:18,930 --> 00:09:16,990
maple syrup at this point so as Maggie

249
00:09:20,910 --> 00:09:18,940
mentioned we're taking sediment cores

250
00:09:23,070 --> 00:09:20,920
from all these environments so that we

251
00:09:25,170 --> 00:09:23,080
can sample down core and look at

252
00:09:27,630 --> 00:09:25,180
degradation of all of these various

253
00:09:31,080 --> 00:09:27,640
biomolecules of interest so the course

254
00:09:34,230 --> 00:09:31,090
from Lake Clinton and best like number

255
00:09:37,230 --> 00:09:34,240
two really good they have sedimentation

256
00:09:39,300 --> 00:09:37,240
rates of 0.01 centimeters per year so

257
00:09:44,130 --> 00:09:39,310
pretty low but pretty good correlation

258
00:09:48,120 --> 00:09:44,140
we have a couple of age we have a couple

259
00:09:50,520 --> 00:09:48,130
of age inversions here this is probably

260
00:09:52,050 --> 00:09:50,530
us kicking up the top layer of sediment

261
00:09:54,450 --> 00:09:52,060
because it was really hard to not

262
00:09:58,260 --> 00:09:54,460
disturb the area we're in and we're

263
00:09:59,760 --> 00:09:58,270

checking on hard water effects and as

264
00:10:01,440 --> 00:09:59,770
you can see Chris here trying

265
00:10:02,700 --> 00:10:01,450
desperately to get this core into the

266
00:10:04,440 --> 00:10:02,710
ground and this is where there was this

267
00:10:05,580 --> 00:10:04,450
hard layer of salt underneath and it was

268
00:10:07,620 --> 00:10:05,590
impossible to get through so we're

269
00:10:10,380 --> 00:10:07,630
working on that last chance like is

270
00:10:14,700 --> 00:10:10,390
really weird we don't quite know what's

271
00:10:18,030 --> 00:10:14,710
going on here we have a lot of age

272
00:10:21,120 --> 00:10:18,040
inversions within the down core so these

273
00:10:25,530 --> 00:10:21,130
two are outside of the circle here of

274
00:10:28,580 --> 00:10:25,540
the pond and then these two here are

275
00:10:31,170 --> 00:10:28,590
within the pond so this this should say

276
00:10:33,420 --> 00:10:31,180
Cordy by the way so this purple line

277
00:10:36,120 --> 00:10:33,430
here is Cordy you can see that we have

278
00:10:38,280 --> 00:10:36,130
Asian versions all over the place but

279
00:10:40,130 --> 00:10:38,290
then Corsi which was a little bit more

280
00:10:43,980 --> 00:10:40,140
towards the center of the pond is

281
00:10:46,200 --> 00:10:43,990
actually not too bad so what was

282
00:10:47,700 --> 00:10:46,210
interesting is with last chance lake is

283
00:10:49,680 --> 00:10:47,710
that we actually get sorting in these

284
00:10:52,740 --> 00:10:49,690
ponds but you don't see with the other

285
00:10:54,420 --> 00:10:52,750
ones so the freeze-thaw maybe may have

286
00:10:57,420 --> 00:10:54,430
an effect in why these ponds are forming

287
00:10:59,430 --> 00:10:57,430
but we don't see it in basque lake or

288
00:11:01,530 --> 00:10:59,440

salt lake but in last-chance lake it

289
00:11:03,180 --> 00:11:01,540
might be happening and that may be why

290
00:11:05,490 --> 00:11:03,190
we have all these Asian versions here

291
00:11:08,790 --> 00:11:05,500
because we're getting turnover of the

292
00:11:12,960 --> 00:11:08,800
substrate when we get freestyle action

293
00:11:14,220 --> 00:11:12,970
each each winter and again we went back

294
00:11:16,530 --> 00:11:14,230
in the winter in February

295
00:11:19,110 --> 00:11:16,540
- 30 Celsius that was a new one for me

296
00:11:19,980 --> 00:11:19,120
to do work in constantly but it was

297
00:11:21,450 --> 00:11:19,990
fantastic

298
00:11:23,550 --> 00:11:21,460
and we got some joint imagery and we're

299
00:11:25,560 --> 00:11:23,560
gonna go back to small and get some joan

300
00:11:29,640 --> 00:11:25,570
and hopefully some spectral imaging of

301
00:11:32,310 --> 00:11:29,650
the sights we do have some ATP brian

302
00:11:34,320 --> 00:11:32,320
data from the winter months the summer

303
00:11:36,530 --> 00:11:34,330
we had to figure out how to do this

304
00:11:39,300 --> 00:11:36,540
because they're so saline that they were

305
00:11:43,910 --> 00:11:39,310
causing saturation of the detector and

306
00:11:47,220 --> 00:11:43,920
inactivation of lewis if rays enzyme so

307
00:11:50,730 --> 00:11:47,230
you can see here that we have four

308
00:11:52,980 --> 00:11:50,740
clinton lake we had water at three

309
00:11:54,810 --> 00:11:52,990
different sites moving outwards from the

310
00:11:56,730 --> 00:11:54,820
shore so this is closest to the shore

311
00:12:00,570 --> 00:11:56,740
and this is closest to the center of the

312
00:12:04,380 --> 00:12:00,580
lake so you can see that free ATP is

313
00:12:05,970 --> 00:12:04,390

increasing but our cell cellular ATP is

314
00:12:09,030 --> 00:12:05,980
sort of staying a bit level it's not

315
00:12:12,210 --> 00:12:09,040
necessarily correlated with that with

316
00:12:14,310 --> 00:12:12,220
last chance lake we have this was the

317
00:12:16,880 --> 00:12:14,320
first to drill spots the ice had frozen

318
00:12:20,220 --> 00:12:16,890
to the bed but right out into the third

319
00:12:22,470 --> 00:12:20,230
spot we got Brian finally and we could

320
00:12:25,890 --> 00:12:22,480
sample that so we had fairly high levels

321
00:12:27,210 --> 00:12:25,900
and then same with Pascal ate the two

322
00:12:29,940 --> 00:12:27,220
ponds that we had sampled in the summer

323
00:12:31,320 --> 00:12:29,950
had frozen directly to the bed and so

324
00:12:33,360 --> 00:12:31,330
baths like two point three which

325
00:12:35,700 --> 00:12:33,370
originally had that high water activity

326
00:12:38,640 --> 00:12:35,710
and had the brine shrimp in it that was

327
00:12:41,160 --> 00:12:38,650
what we were looking at with our ATP and

328
00:12:42,900 --> 00:12:41,170
we had very high cellular ATP in this

329
00:12:46,020 --> 00:12:42,910
environment which may be reflective of

330
00:12:49,260 --> 00:12:46,030
those higher water activities I wish I

331
00:12:51,330 --> 00:12:49,270
had cell data to compare this to for you

332
00:12:52,890 --> 00:12:51,340
and it's coming imminently but we

333
00:12:56,280 --> 00:12:52,900
couldn't get it in time for today

334
00:12:59,640 --> 00:12:56,290
unfortunately and then just to follow up

335
00:13:01,320 --> 00:12:59,650
from that we did look at the ices and

336
00:13:05,850 --> 00:13:01,330
there's not really a strong correlation

337
00:13:07,530 --> 00:13:05,860
with distance from the shore LCL is

338
00:13:09,120 --> 00:13:07,540

constant across the three different

339
00:13:11,820 --> 00:13:09,130
sites and then we have a lot of

340
00:13:13,350 --> 00:13:11,830
variation in beale and that's like - and

341
00:13:14,540 --> 00:13:13,360
we don't know why that is so it's still

342
00:13:17,790 --> 00:13:14,550
something we're looking into

343
00:13:20,340 --> 00:13:17,800
so to finish up salinity in the lakes

344
00:13:21,840 --> 00:13:20,350
range from 80 grams per liter to 300

345
00:13:25,470 --> 00:13:21,850
grams per liter with water Shiva tees

346
00:13:28,080 --> 00:13:25,480
down to saturation for the brine

347
00:13:30,180 --> 00:13:28,090
sediment ages date back as far as 6000

348
00:13:33,140 --> 00:13:30,190
years for Salt Lake 5,000 for Last

349
00:13:35,570 --> 00:13:33,150
Chance and 3,400 for a basket number two

350
00:13:38,460 --> 00:13:35,580
we're gonna be recollecting ATP data

351
00:13:40,470 --> 00:13:38,470
along the seat with this year and

352
00:13:42,540 --> 00:13:40,480
looking at we're really curious about

353
00:13:44,400 --> 00:13:42,550
whether or not ATP is being concentrated

354
00:13:46,470 --> 00:13:44,410
within a cells because that happens a

355
00:13:49,260 --> 00:13:46,480
lot inside hyper saline environments to

356
00:13:51,600 --> 00:13:49,270
be used as a biological Cosmodrome and

357
00:13:54,090 --> 00:13:51,610
so trying to get at this idea of like is

358
00:13:56,520 --> 00:13:54,100
ATP RA to P values representative of

359
00:13:57,990 --> 00:13:56,530
cellular of microbial activity and

360
00:14:00,030 --> 00:13:58,000
microbial biomass in these environments

361
00:14:01,890 --> 00:14:00,040
or is it an artifact and you're getting

362
00:14:04,860 --> 00:14:01,900
at really high values because it's being

363
00:14:07,650 --> 00:14:04,870

preserved sequencing is currently

364
00:14:10,530 --> 00:14:07,660
underway and we're also back in the lab

365
00:14:12,450 --> 00:14:10,540
conducting an empirical test so where we

366
00:14:13,770 --> 00:14:12,460
created magnesium sulfate sodium sulfate

367
00:14:14,430 --> 00:14:13,780
sodium chloride and magnesium chloride

368
00:14:17,100 --> 00:14:14,440
brines

369
00:14:21,050 --> 00:14:17,110
a range of different concentrations and

370
00:14:23,820 --> 00:14:21,060
we're doing incubations of DNA plasmid

371
00:14:27,720 --> 00:14:23,830
ATP molecules and we'll be selecting

372
00:14:29,130 --> 00:14:27,730
some IPL to do incubation experiments to

373
00:14:31,890 --> 00:14:29,140
look at what the empirical rates of

374
00:14:33,240 --> 00:14:31,900
degradation are and to compare that to

375
00:14:36,630 --> 00:14:33,250
what we're seeing in our sites

376
00:14:39,810 --> 00:14:36,640
so just wanted to say thank you to the

377
00:14:42,750 --> 00:14:39,820
NASA X biology Fund for funding this

378
00:14:45,570 --> 00:14:42,760
work jacob Bufo mariachi was rodrigo

379
00:14:47,160 --> 00:14:45,580
peter Doron Hema Dan Kirchner ER Oxford

380
00:14:48,990 --> 00:14:47,170
Quinn go vagus is like the best

381
00:14:52,560 --> 00:14:49,000
veterinarian ever and gave us our Ellen

382
00:14:54,150 --> 00:14:52,570
to in the field Richard Fineman and then

383
00:14:57,480 --> 00:14:54,160
the caribou Lodge staff which is very

384
00:14:58,980 --> 00:14:57,490
key and providing that ladle and letting

385
00:15:01,290 --> 00:14:58,990
us get down to the sediment underneath

386
00:15:03,300 --> 00:15:01,300
the ice so thank you very much for

387
00:15:05,940 --> 00:15:03,310
sticking it out for Friday and I'll take

388
00:15:11,689 --> 00:15:08,949

[Applause]

389
00:15:14,259 --> 00:15:11,699
all right we have time for one quick

390
00:15:21,620 --> 00:15:17,660
all right I have one actually in in your

391
00:15:24,199 --> 00:15:21,630
conclusion I'm I'm a yes

392
00:15:27,710 --> 00:15:24,209
maybe I'm misunderstood but I thought

393
00:15:31,699 --> 00:15:27,720
that Cosmo drop were like the effect of

394
00:15:35,240 --> 00:15:31,709
salt or onion scallions on protein so

395
00:15:39,350 --> 00:15:35,250
I'm a bit confused how ATP could be a

396
00:15:41,269 --> 00:15:39,360
molecule being a Cosmo drop so like

397
00:15:43,400 --> 00:15:41,279
different types of molecules can also be

398
00:15:46,280 --> 00:15:43,410
cosmic chops and can also act to

399
00:15:50,660 --> 00:15:46,290
stabilize or destabilize potentially so

400
00:15:53,660 --> 00:15:50,670
it's possibility that ATP is is being

401
00:15:56,030 --> 00:15:53,670
concentrated in cells in that manner

402
00:15:58,670 --> 00:15:56,040
there's a paper that I think came out in

403
00:16:01,040 --> 00:15:58,680
2017 that talks about this is HIV as a

404
00:16:03,819 --> 00:16:01,050
biological hedge stroke I think is the

405
00:16:07,639 --> 00:16:03,829
paper and so you can look at that to