
AbSciCon
2019

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

2
00:00:12,160 --> 00:00:09,030
[Applause]

3
00:00:15,609 --> 00:00:12,170
I'm really excited to present on what is

4
00:00:17,679 --> 00:00:15,619
a very new project for me as well I want

5
00:00:19,929 --> 00:00:17,689
to begin by thanking my callers

6
00:00:22,569 --> 00:00:19,939
particularly Alex funfact the PI on this

7
00:00:24,159 --> 00:00:22,579
project and Chris Carr and then Hannity

8
00:00:26,049 --> 00:00:24,169
and Krishna is a former undergrad of

9
00:00:29,880 --> 00:00:26,059
mine who has done most of this work in

10
00:00:32,290 --> 00:00:29,890
the lab so very grateful to her as well

11
00:00:42,489 --> 00:00:32,300
and then our funding sources this is a

12
00:00:44,919 --> 00:00:42,499
recent Nessa exobiology funded okay okay

13
00:00:47,729 --> 00:00:44,929

so it shouldn't be surprising to any of

14
00:00:49,930 --> 00:00:47,739
us that salt is a good preservative

15
00:00:51,819 --> 00:00:49,940
right so humans have been preserving

16
00:00:54,189 --> 00:00:51,829
things in salt for a very long time and

17
00:00:57,009 --> 00:00:54,199
so there's an intuition here that this

18
00:00:58,660 --> 00:00:57,019
might work but understanding how this

19
00:01:01,180 --> 00:00:58,670
process works is really important for

20
00:01:02,889 --> 00:01:01,190
astrobiology because it's going to

21
00:01:04,420 --> 00:01:02,899
affect the bio signatures that we see we

22
00:01:07,030 --> 00:01:04,430
saw some really beautiful work from Lou

23
00:01:09,070 --> 00:01:07,040
yesterday showing these relict bio

24
00:01:12,370 --> 00:01:09,080
signatures and just like you know poor

25
00:01:13,870 --> 00:01:12,380
little eukaryotic shells hanging out but

26
00:01:15,460 --> 00:01:13,880
they still have lipids they still have

27
00:01:18,400 --> 00:01:15,470
bio signatures so we need to think about

28
00:01:19,600 --> 00:01:18,410
how these processes work and so key

29
00:01:21,550 --> 00:01:19,610
questions that we're asking on this

30
00:01:23,290 --> 00:01:21,560
project are do different salts preserve

31
00:01:27,070 --> 00:01:23,300
things differently we're working in

32
00:01:28,780 --> 00:01:27,080
magnesium sulfate brines and do

33
00:01:30,910 --> 00:01:28,790
different organic compounds preserve

34
00:01:32,800 --> 00:01:30,920
differently so our lipids different than

35
00:01:35,500 --> 00:01:32,810
DNA are different from RNA and so on

36
00:01:37,780 --> 00:01:35,510
alex is going to tell you all about why

37
00:01:38,170 --> 00:01:37,790
those things should be true and how that

38
00:01:40,180 --> 00:01:38,180

works

39
00:01:42,310 --> 00:01:40,190
I know very little about that and so the

40
00:01:43,870 --> 00:01:42,320
question I'll be asking is how is

41
00:01:46,150 --> 00:01:43,880
organic matter incorporated into

42
00:01:50,200 --> 00:01:46,160
sediments and salts in this kind of

43
00:01:53,500 --> 00:01:50,210
hyper saline basin okay so the sites we

44
00:01:57,010 --> 00:01:53,510
are headed to over here in the middle of

45
00:01:58,840 --> 00:01:57,020
fabulous nowhere British Columbia really

46
00:02:01,030 --> 00:01:58,850
the middle of nowhere guys it's great

47
00:02:06,850 --> 00:02:01,040
and so zooming into these lake sites

48
00:02:08,770 --> 00:02:06,860
there are three of them and so the

49
00:02:10,719 --> 00:02:08,780
farthest self is bath quake number two

50
00:02:12,190 --> 00:02:10,729
this is a site that has a variety of

51
00:02:13,660 --> 00:02:12,200
previous work on it just a little bit

52
00:02:15,850 --> 00:02:13,670
and you can see they're really beautiful

53
00:02:18,610 --> 00:02:15,860
so this is a little light in this view

54
00:02:20,620 --> 00:02:18,620
but you can see the spotted character of

55
00:02:22,090 --> 00:02:20,630
these Lakes so it's a basin that have

56
00:02:23,740 --> 00:02:22,100
sub brine pools that make

57
00:02:25,780 --> 00:02:23,750
I'm really interesting to look at and

58
00:02:27,910 --> 00:02:25,790
means you can run around on this and

59
00:02:29,500 --> 00:02:27,920
sample a bunch of different compositions

60
00:02:32,310 --> 00:02:29,510
all at the same time so that's pretty

61
00:02:35,020 --> 00:02:32,320
neat so that's one site and then we have

62
00:02:37,000 --> 00:02:35,030
Clinton lake or Salt Lake in the

63
00:02:38,110 --> 00:02:37,010

thriving metropolis of Clinton British

64
00:02:40,870 --> 00:02:38,120
Columbia

65
00:02:42,430 --> 00:02:40,880
it is sometimes a salt pan and sometimes

66
00:02:44,980 --> 00:02:42,440
more of a lake so you can see it there

67
00:02:47,890 --> 00:02:44,990
and then the optimistically Lane named

68
00:02:50,290 --> 00:02:47,900
last chance lake which is up here on the

69
00:02:52,270 --> 00:02:50,300
far north this one is interesting

70
00:02:54,340 --> 00:02:52,280
because it's a chemical comparison and

71
00:02:57,550 --> 00:02:54,350
so this one has some bicarbonate and

72
00:02:59,590 --> 00:02:57,560
some sodium in addition to the magnesium

73
00:03:00,970 --> 00:02:59,600
and sulfate which Alex will tell you all

74
00:03:04,750 --> 00:03:00,980
about whereas these ones are much more

75
00:03:06,940 --> 00:03:04,760
strict magnesium sulfate brines okay so

76
00:03:09,100 --> 00:03:06,950
what are we doing so the goal here is to

77
00:03:10,300 --> 00:03:09,110
figure out what's being produced in

78
00:03:11,860 --> 00:03:10,310
these systems and how that's being

79
00:03:14,500 --> 00:03:11,870
translated into various sedimentary

80
00:03:16,570 --> 00:03:14,510
archives and so you go to a lake collect

81
00:03:18,520 --> 00:03:16,580
some water in my case filter that water

82
00:03:20,620 --> 00:03:18,530
down onto glass fiber filters to collect

83
00:03:23,440 --> 00:03:20,630
organic matter that is being produced in

84
00:03:26,080 --> 00:03:23,450
situ then also go into the more solid

85
00:03:28,210 --> 00:03:26,090
reservoir so this is some green salt for

86
00:03:30,670 --> 00:03:28,220
you so these are organic compounds being

87
00:03:34,180 --> 00:03:30,680
incorporated into salts then also the

88
00:03:37,090 --> 00:03:34,190

sediments then collecting modern biomass

89
00:03:40,180 --> 00:03:37,100
so this is a beaker of slime collected

90
00:03:42,820 --> 00:03:40,190
by Chris Carr so this is a big microbial

91
00:03:44,140 --> 00:03:42,830
mat and then also things like macro

92
00:03:46,390 --> 00:03:44,150
biology so these little wee beasties

93
00:03:48,400 --> 00:03:46,400
swimming around because we need to know

94
00:03:49,600 --> 00:03:48,410
what sorts of organics are being

95
00:03:51,730 --> 00:03:49,610
produced in these systems and how

96
00:03:53,470 --> 00:03:51,740
they're getting incorporated so then

97
00:03:55,840 --> 00:03:53,480
this was the summer and I went along on

98
00:03:57,940 --> 00:03:55,850
this trip and is fabulous then we went

99
00:03:59,710 --> 00:03:57,950
in the winter and by we I mean I sent my

100
00:04:01,240 --> 00:03:59,720
for undergrad to go sample when the

101
00:04:05,140 --> 00:04:01,250
lakes looked a little bit more like this

102
00:04:08,140 --> 00:04:05,150
I had to teach and also I'm weak and so

103
00:04:10,990 --> 00:04:08,150
in this case you got a drill down

104
00:04:13,510 --> 00:04:11,000
through that ice to then tap into both

105
00:04:16,300 --> 00:04:13,520
the ice itself which we saw some posters

106
00:04:18,070 --> 00:04:16,310
on and you can melt that ice filter down

107
00:04:19,660 --> 00:04:18,080
onto the filter you can get the sub ice

108
00:04:22,420 --> 00:04:19,670
brine which I'll be referring to as

109
00:04:25,450 --> 00:04:22,430
brine as opposed to water filter those

110
00:04:28,480 --> 00:04:25,460
down and then also get down deep with a

111
00:04:31,870 --> 00:04:28,490
ladle and get some sediment out from

112
00:04:32,830 --> 00:04:31,880
beneath in addition to the salts okay so

113
00:04:34,540 --> 00:04:32,840

then what are we gonna do

114
00:04:35,280 --> 00:04:34,550
so everything in our little organic jars

115
00:04:36,540 --> 00:04:35,290
is the same

116
00:04:38,730 --> 00:04:36,550
and so we're gonna first freeze-drying

117
00:04:40,890 --> 00:04:38,740
homogenize that sample and then analyze

118
00:04:43,140 --> 00:04:40,900
a variety of bulk parameters and so I'm

119
00:04:44,550 --> 00:04:43,150
interested in carbon and carbon isotopes

120
00:04:46,470 --> 00:04:44,560
and organics and so you need to first

121
00:04:48,270 --> 00:04:46,480
characterize the inorganic baseline of

122
00:04:49,080 --> 00:04:48,280
those samples and so we're looking at

123
00:04:51,420 --> 00:04:49,090
things like dissolved inorganic

124
00:04:54,060 --> 00:04:51,430
concentrations and isotopes and isotopes

125
00:04:55,350 --> 00:04:54,070
of carbonate then D carbonate and focus

126
00:04:57,180 --> 00:04:55,360
on that organic matter so how much

127
00:04:58,950 --> 00:04:57,190
organic carbon is in there total organic

128
00:05:00,900 --> 00:04:58,960
carbon and total organic nitrogen and

129
00:05:03,600 --> 00:05:00,910
then what does the isotopic composition

130
00:05:05,670 --> 00:05:03,610
of those phases look like and then the

131
00:05:07,860 --> 00:05:05,680
real lab work fun begins and again bring

132
00:05:09,300 --> 00:05:07,870
in the undergrads and so this is where

133
00:05:11,250 --> 00:05:09,310
we spend a lot of time doing lipid

134
00:05:14,250 --> 00:05:11,260
extractions via super time intensive

135
00:05:15,930 --> 00:05:14,260
blyer approach which preserves intact

136
00:05:17,550 --> 00:05:15,940
polar lipids and so that allows us to

137
00:05:19,680 --> 00:05:17,560
look at those complete lipids together

138
00:05:21,680 --> 00:05:19,690

and then also you can hydrolyze these

139
00:05:24,210 --> 00:05:21,690
things separate them clean them up and

140
00:05:25,680 --> 00:05:24,220
identify compound specific biomarker

141
00:05:28,230 --> 00:05:25,690
abundances and hopefully eventually

142
00:05:32,010 --> 00:05:28,240
isotopes okay

143
00:05:33,150 --> 00:05:32,020
so first step look at the waters and so

144
00:05:34,500 --> 00:05:33,160
if we look at these things under the

145
00:05:36,300 --> 00:05:34,510
microscope with just a little bit of

146
00:05:38,850 --> 00:05:36,310
crystal violet stain you can see

147
00:05:40,620 --> 00:05:38,860
beautiful beautiful cells this is a 10

148
00:05:42,120 --> 00:05:40,630
micron scale bar and so these are

149
00:05:44,430 --> 00:05:42,130
actually algae so that's what's making

150
00:05:46,440 --> 00:05:44,440
these bright yellow but you can see

151
00:05:48,330 --> 00:05:46,450
abundant cells we don't have cell counts

152
00:05:51,330 --> 00:05:48,340
yet but these are all the same amount of

153
00:05:53,910 --> 00:05:51,340
fluid just in a little reservoir if we

154
00:05:55,950 --> 00:05:53,920
look at the sub ice rinds they look

155
00:05:57,390 --> 00:05:55,960
almost exactly the same and so I was

156
00:05:59,430 --> 00:05:57,400
surprised going in you still have those

157
00:06:03,540 --> 00:05:59,440
algal morphologies you still have nice

158
00:06:05,820 --> 00:06:03,550
REM cells all over the place so how much

159
00:06:07,860 --> 00:06:05,830
organic matter is there and so if we

160
00:06:09,300 --> 00:06:07,870
look at the total organic carbon you

161
00:06:11,250 --> 00:06:09,310
should maybe not be surprised that

162
00:06:12,330 --> 00:06:11,260
microbial mats are full of organic

163
00:06:13,890 --> 00:06:12,340

carbon

164
00:06:17,130 --> 00:06:13,900
but these sediments are also quite rich

165
00:06:18,900 --> 00:06:17,140
in organic carbon if we look at the

166
00:06:20,010 --> 00:06:18,910
total organic nitrogen you can see that

167
00:06:23,010 --> 00:06:20,020
that's mirroring the organic carbon

168
00:06:26,880 --> 00:06:23,020
really well it has like a r-squared of

169
00:06:29,040 --> 00:06:26,890
0.9 7 and slope of 10 to 1 so well

170
00:06:30,390 --> 00:06:29,050
correlated and so what did the isotopes

171
00:06:31,560 --> 00:06:30,400
of those look like so this is a little

172
00:06:33,900 --> 00:06:31,570
bit more interesting and here I've

173
00:06:36,360 --> 00:06:33,910
plotted these by Lake so the Basques

174
00:06:38,600 --> 00:06:36,370
Lakes last chance Lake and Salt Lake and

175
00:06:42,000 --> 00:06:38,610
then they're colored by what type of

176
00:06:43,680 --> 00:06:42,010
sample that was and so you can see some

177
00:06:46,170 --> 00:06:43,690
differences between the Basques Lakes

178
00:06:48,810 --> 00:06:46,180
they're relatively enriched compared to

179
00:06:50,370 --> 00:06:48,820
the last chance lake or salt lake you

180
00:06:52,350 --> 00:06:50,380
and also if you look at the colors of

181
00:06:54,240 --> 00:06:52,360
these can you can see that these salts

182
00:06:55,980 --> 00:06:54,250
are enriched relative to the sediments

183
00:06:59,490 --> 00:06:55,990
are enriched relative to the sub ice

184
00:07:01,140 --> 00:06:59,500
brines really clearly there so that's an

185
00:07:03,300 --> 00:07:01,150
interesting trend so we need to look at

186
00:07:04,830 --> 00:07:03,310
our inorganic phases to see how these

187
00:07:07,680 --> 00:07:04,840
compare because that's setting your

188
00:07:10,860 --> 00:07:07,690

baseline and so if we look at the

189
00:07:12,390 --> 00:07:10,870
isotopes of di C and of carbonate you

190
00:07:14,640 --> 00:07:12,400
can see that this does explain a little

191
00:07:16,170 --> 00:07:14,650
bit of these trends so in our di C for

192
00:07:18,180 --> 00:07:16,180
instance this one is quite enriched

193
00:07:19,530 --> 00:07:18,190
whereas this one is quite depleted so

194
00:07:22,740 --> 00:07:19,540
you've got about a five per mil spread

195
00:07:24,660 --> 00:07:22,750
there but this one isn't so this is not

196
00:07:26,100 --> 00:07:24,670
explaining all of our data which

197
00:07:27,800 --> 00:07:26,110
suggests that you might have some

198
00:07:30,810 --> 00:07:27,810
distinct biological fraction nations

199
00:07:33,150 --> 00:07:30,820
changing the organic isotopes within

200
00:07:34,980 --> 00:07:33,160
that system if we look at the nitrogen

201
00:07:37,050 --> 00:07:34,990
isotopes there are also some kind of

202
00:07:39,150 --> 00:07:37,060
interesting trends for those of you that

203
00:07:41,040 --> 00:07:39,160
work in the system so zero to fifteen

204
00:07:42,870 --> 00:07:41,050
that's a really enriched nitrogen

205
00:07:46,380 --> 00:07:42,880
isotopic value we're sitting here kind

206
00:07:48,210 --> 00:07:46,390
of around ten quite enriched just fixing

207
00:07:50,460 --> 00:07:48,220
in two out of the air you get zero or

208
00:07:52,290 --> 00:07:50,470
two and so these are super enriched

209
00:07:54,000 --> 00:07:52,300
suggesting processing of these of

210
00:07:55,530 --> 00:07:54,010
nitrogen in the system usually

211
00:07:59,240 --> 00:07:55,540
denitrification gets blamed on

212
00:08:01,410 --> 00:07:59,250
enrichments like this also though in

213
00:08:03,750 --> 00:08:01,420

alkaline lakes you have a scenario where

214
00:08:05,610 --> 00:08:03,760
pH matters because you can actually get

215
00:08:07,950 --> 00:08:05,620
enrichment of the nitrogen pool through

216
00:08:14,930 --> 00:08:07,960
the volatile loss of ammonia and so some

217
00:08:17,730 --> 00:08:14,940
of these points up here are in go back

218
00:08:19,440 --> 00:08:17,740
so last chance leak is actually much

219
00:08:20,970 --> 00:08:19,450
higher pH than the other ones and we see

220
00:08:24,660 --> 00:08:20,980
these enrichments most strongly within

221
00:08:26,190 --> 00:08:24,670
that system okay so total lipids how

222
00:08:28,140 --> 00:08:26,200
much lipid is in these phases and so

223
00:08:30,330 --> 00:08:28,150
these I'm showing you in terms of

224
00:08:35,130 --> 00:08:30,340
milligrams per liter filtered for the

225
00:08:37,320 --> 00:08:35,140
fluid phases or per gram solid with in

226
00:08:38,010 --> 00:08:37,330
things like them sediments and the salts

227
00:08:41,010 --> 00:08:38,020
and whatnot

228
00:08:43,589 --> 00:08:41,020
and so if we look at this you can see a

229
00:08:46,560 --> 00:08:43,599
decrease in abundance when you go from

230
00:08:49,890 --> 00:08:46,570
the water to the brine to the ice within

231
00:08:52,590 --> 00:08:49,900
our lipids per liter and so if the brine

232
00:08:54,390 --> 00:08:52,600
was just concentrating cells we would

233
00:08:56,250 --> 00:08:54,400
expect the opposite trend right because

234
00:08:57,750 --> 00:08:56,260
it's gonna sort of push the cells into

235
00:09:00,090 --> 00:08:57,760
the brine and then there's gonna be less

236
00:09:03,389 --> 00:09:00,100
in the ice more in the brine and so on

237
00:09:05,819 --> 00:09:03,399
and so you do see some degradation

238
00:09:07,230 --> 00:09:05,829

and then if we look at the sediment

239
00:09:11,069 --> 00:09:07,240
phrases so I keep getting the laser

240
00:09:13,230 --> 00:09:11,079
they're both green if we look at the

241
00:09:15,210 --> 00:09:13,240
sediments you can see that the sediments

242
00:09:16,829 --> 00:09:15,220
have essentially the same amount of

243
00:09:18,420 --> 00:09:16,839
organic matter as things like the

244
00:09:20,280 --> 00:09:18,430
microbial math and they're they're

245
00:09:23,460 --> 00:09:20,290
nearing brine shrimp and so these

246
00:09:25,319 --> 00:09:23,470
sediments are really organic rich and

247
00:09:27,120 --> 00:09:25,329
they have a lot of extractable lipid in

248
00:09:29,069 --> 00:09:27,130
there which is suggesting to me that

249
00:09:30,420 --> 00:09:29,079
we've got some really preferential

250
00:09:32,610 --> 00:09:30,430
preservation going on within these

251
00:09:36,030 --> 00:09:32,620
sediments I'm consistent with it being a

252
00:09:37,800 --> 00:09:36,040
salty you know environment you can also

253
00:09:39,600 --> 00:09:37,810
note that the abundance varies a little

254
00:09:40,769 --> 00:09:39,610
bit by lake so you see the blue one the

255
00:09:42,629 --> 00:09:40,779
light blue ones are down here in

256
00:09:45,980 --> 00:09:42,639
last-chance lake whereas those bass

257
00:09:48,030 --> 00:09:45,990
clicks seem to be preserving more

258
00:09:49,500 --> 00:09:48,040
extractable lipid and so we're

259
00:09:51,360 --> 00:09:49,510
interested in sort of delving into those

260
00:09:53,819 --> 00:09:51,370
trends see how they compare to chemistry

261
00:09:57,150 --> 00:09:53,829
and sort of flush out some of these

262
00:09:58,530 --> 00:09:57,160
hypotheses we went in with so though how

263
00:10:00,900 --> 00:09:58,540

much time do I have three minutes great

264
00:10:03,150 --> 00:10:00,910
um so this is hot off the presses data

265
00:10:05,160 --> 00:10:03,160
which is why it's in Excel and not

266
00:10:07,980 --> 00:10:05,170
something prettier so this is showing

267
00:10:11,250 --> 00:10:07,990
you those hydrolyzed lipids just a

268
00:10:15,720 --> 00:10:11,260
subset that have been quantified for

269
00:10:18,329 --> 00:10:15,730
their fatty acid characterization okay

270
00:10:20,009 --> 00:10:18,339
so if we look at these in a little bit

271
00:10:21,750 --> 00:10:20,019
more detail we see that the waters are a

272
00:10:23,430 --> 00:10:21,760
little bit different from the ices a

273
00:10:25,410 --> 00:10:23,440
little bit different from the sediments

274
00:10:26,850 --> 00:10:25,420
and mats in particular I think it's

275
00:10:28,829 --> 00:10:26,860
interesting these sediments seem to be

276
00:10:31,560 --> 00:10:28,839
incorporating some long-chain fatty

277
00:10:32,970 --> 00:10:31,570
acids or sort of mid chain that are more

278
00:10:34,439 --> 00:10:32,980
characteristic of algal primary

279
00:10:36,810 --> 00:10:34,449
productivity when you get into the Paleo

280
00:10:39,150 --> 00:10:36,820
climate literature but you do see sort

281
00:10:41,009 --> 00:10:39,160
of strange Peaks so this is a branched

282
00:10:43,259 --> 00:10:41,019
fatty acid showing up in the ice that's

283
00:10:44,550 --> 00:10:43,269
not really in anything else um so we

284
00:10:46,139 --> 00:10:44,560
definitely see some differences and this

285
00:10:49,620 --> 00:10:46,149
is just a subset so we'll delve into

286
00:10:51,420 --> 00:10:49,630
that in the future and so then the next

287
00:10:53,880 --> 00:10:51,430
steps this is my incoming graduate

288
00:10:55,650 --> 00:10:53,890

student Floyd and so he's going to take

289
00:10:58,139 --> 00:10:55,660
this project over from departing

290
00:10:59,460 --> 00:10:58,149
undergrad and we're gonna do we're gonna

291
00:11:01,500 --> 00:10:59,470
actually look at those intact polar

292
00:11:03,030 --> 00:11:01,510
lipids so this is what I showed you

293
00:11:04,920 --> 00:11:03,040
before this is just the fatty acid

294
00:11:06,600 --> 00:11:04,930
skeleton but lipids actually come in in

295
00:11:08,759 --> 00:11:06,610
big boy molecules like this and there's

296
00:11:11,220 --> 00:11:08,769
a lot of structural variability that is

297
00:11:12,960 --> 00:11:11,230
interesting and you can learn a lot more

298
00:11:15,929 --> 00:11:12,970
about who's making what based on the in

299
00:11:18,149 --> 00:11:15,939
tech polar lipids so yeah and so life

300
00:11:20,339 --> 00:11:18,159
usually they're they're thought to

301
00:11:21,899 --> 00:11:20,349
degrade very rapidly but we don't know

302
00:11:23,669 --> 00:11:21,909
how that works in salt so we're going to

303
00:11:25,409 --> 00:11:23,679
figure it out so we're going to do the

304
00:11:26,789 --> 00:11:25,419
modern sample set and then see how that

305
00:11:28,529 --> 00:11:26,799
extends in time both through some

306
00:11:30,329 --> 00:11:28,539
controlled experiments and then through

307
00:11:31,859 --> 00:11:30,339
an extension into the sedimentary

308
00:11:33,809 --> 00:11:31,869
archives which Alex will tell you a

309
00:11:35,639 --> 00:11:33,819
little bit more about on the bottom of

310
00:11:37,439 --> 00:11:35,649
these course cores are actually quite

311
00:11:40,649 --> 00:11:37,449
old and so we'll be able to track these

312
00:11:42,179 --> 00:11:40,659
bio signatures as they go or as they are

313
00:11:44,029 --> 00:11:42,189

accreted through time to really

314
00:11:46,769 --> 00:11:44,039
understand what degradation looks like

315
00:11:48,689 --> 00:11:46,779
and with that I will thank you for your

316
00:11:52,290 --> 00:11:48,699
attention now so for money and all the

317
00:11:59,599 --> 00:11:52,740
[Music]

318
00:12:11,290 --> 00:12:01,979
all right we have time for a couple of

319
00:12:18,940 --> 00:12:16,540
it's a race hey so can you talk a little

320
00:12:20,830 --> 00:12:18,950
bit more about the specific fatty acid

321
00:12:22,450 --> 00:12:20,840
that you saw in the ice and like why

322
00:12:24,790 --> 00:12:22,460
that might be there or what exactly that

323
00:12:27,220 --> 00:12:24,800
that is I have no idea so literally and

324
00:12:29,080 --> 00:12:27,230
I send me that data like three days ago

325
00:12:30,610 --> 00:12:29,090
and so I plotted up so branch fatty

326
00:12:32,470 --> 00:12:30,620
acids tend to be really characteristic

327
00:12:34,600 --> 00:12:32,480
so they're only made by bacteria you

328
00:12:36,180 --> 00:12:34,610
don't get eukaryotes making those so

329
00:12:38,500 --> 00:12:36,190
that's definitely not an algal marker

330
00:12:41,350 --> 00:12:38,510
why it's in the ice and not in the

331
00:12:43,060 --> 00:12:41,360
fluids I don't know but that was not all

332
00:12:45,550 --> 00:12:43,070
of the fluids and so what I haven't done

333
00:12:47,980 --> 00:12:45,560
is compared like that ice to its paired

334
00:12:50,200 --> 00:12:47,990
fluid to its bride to see you know if

335
00:12:51,670 --> 00:12:50,210
it's like one of those brine pools and

336
00:12:53,740 --> 00:12:51,680
Bass Lake is making some weird branch

337
00:12:57,070 --> 00:12:53,750
fatty acids or if it's something else

338
00:12:59,380 --> 00:12:57,080

so it's a it's a rich data set that's

339
00:13:01,480 --> 00:12:59,390
only gonna get richer as we get all of

340
00:13:03,190 --> 00:13:01,490
the samples unfortunately if for any

341
00:13:05,650 --> 00:13:03,200
GCMs people out there these samples are

342
00:13:07,960 --> 00:13:05,660
really hard on GC columns if they're

343
00:13:09,400 --> 00:13:07,970
just destroying the column so I'm trying

344
00:13:11,230 --> 00:13:09,410
to figure out what is in there that's

345
00:13:13,750 --> 00:13:11,240
doing that I think it's organic sulfur

346
00:13:17,650 --> 00:13:13,760
molecules in addition to maybe some

347
00:13:18,970 --> 00:13:17,660
other stuff so you know suggestions so

348
00:13:24,870 --> 00:13:18,980
it's a difficult data set now to

349
00:13:29,680 --> 00:13:27,850
they're really cool systems my question

350
00:13:31,530 --> 00:13:29,690
is kind of related you showed some

351
00:13:33,820 --> 00:13:31,540
decrease in concentration is there any

352
00:13:38,200 --> 00:13:33,830
extraction efficiency challenges with

353
00:13:40,870 --> 00:13:38,210
some of these salts um it's a good

354
00:13:44,020 --> 00:13:40,880
question and I don't know the answer

355
00:13:47,950 --> 00:13:44,030
the extraction buffers themselves are

356
00:13:50,440 --> 00:13:47,960
pretty salty and so I wouldn't predict

357
00:13:53,350 --> 00:13:50,450
so so the blight ire process we do via a

358
00:13:55,090 --> 00:13:53,360
pretty intense sonication in a in a

359
00:13:57,160 --> 00:13:55,100
single phase liquid that then separates

360
00:13:59,830 --> 00:13:57,170
into a two phase organic extraction and

361
00:14:02,170 --> 00:13:59,840
so I think I mean so these each got

362
00:14:03,850 --> 00:14:02,180
sonicated it's like five rounds

363
00:14:06,130 --> 00:14:03,860

sonicated for ten minutes which should

364
00:14:08,370 --> 00:14:06,140
be pretty disruptive to lipid membranes