AbGradCon 2018

1
00:00:00,260 --> 00:00:11,440
[Music]

2
00:00:17,120 --> 00:00:14,029
all right so my plan is to discuss

3
00:00:20,600 --> 00:00:17,130
briefly about the decomposition amino

4
00:00:23,210 --> 00:00:20,610
acids were especially for the ocean

5
00:00:25,940 --> 00:00:23,220
world of insiders in Europa and the

6
00:00:28,600 --> 00:00:25,950
whole idea is we heard from the previous

7
00:00:32,840 --> 00:00:28,610
talk we have amino acid generated from

8
00:00:36,290 --> 00:00:32,850
in the cell medium and you know process

9
00:00:38,630 --> 00:00:36,300
and preserve in a Mario so a set of

10
00:00:42,200 --> 00:00:38,640
material so the first step that we want

11
00:00:44,690 --> 00:00:42,210
you amino acids as well signatures it's

12
00:00:47,600 --> 00:00:44,700
determined as they really actually

13
00:00:50,900 --> 00:00:47,610

produce all the other without primordial

14
00:00:54,020 --> 00:00:50,910
synthesis not the whole idea of the talk

15
00:00:56,389 --> 00:00:54,030
today so gather all the people in this

16
00:01:00,010 --> 00:00:56,399
room now you're open and soldered so

17
00:01:03,410 --> 00:01:00,020
just want to mention very briefly Europa

18
00:01:05,569 --> 00:01:03,420
moon of Jupiter is a Cyril moon and

19
00:01:09,230 --> 00:01:05,579
somewhat the internal structure is much

20
00:01:11,660 --> 00:01:09,240
like Earth we're happy a metal core with

21
00:01:14,690 --> 00:01:11,670
roughly model and the more exciting

22
00:01:19,100 --> 00:01:14,700
things for astrobiology is come from the

23
00:01:21,050 --> 00:01:19,110
prison's of a Saltine subsurface ocean

24
00:01:24,380 --> 00:01:21,060
underneath the ice across and the

25
00:01:26,990 --> 00:01:24,390
evidence of the ocean came from two

26
00:01:30,050 --> 00:01:27,000
kinds observations one in the imaging

27
00:01:33,560 --> 00:01:30,060
data from Galileo spacecraft we saw a

28
00:01:35,780 --> 00:01:33,570
lot of kinds of questions in here which

29
00:01:39,410 --> 00:01:35,790
will help our science we have the hot

30
00:01:42,140 --> 00:01:39,420
water coming from the oceans came into

31
00:01:44,539 --> 00:01:42,150
the icy crust so you have some kind so

32
00:01:48,109 --> 00:01:44,549
there should be some kinds of activities

33
00:01:50,210 --> 00:01:48,119
in in the path history so they are owner

34
00:01:53,899 --> 00:01:50,220
now frozen but there should be liquid

35
00:01:58,429 --> 00:01:53,909
water on under the sub surface plus with

36
00:02:01,999 --> 00:01:58,439
the fact that we saw a very less

37
00:02:05,539 --> 00:02:02,009
abundant impact crater which is a very

38
00:02:08,240 --> 00:02:05,549

unusual for planetary body object with a

39
00:02:11,660 --> 00:02:08,250
very tenuous atmosphere so this suggests

40
00:02:14,390 --> 00:02:11,670
the subsurface liquid ocean where

41
00:02:17,420 --> 00:02:14,400
something's very recently haven't very

42
00:02:18,260 --> 00:02:17,430
recently the more convincing area in

43
00:02:20,900 --> 00:02:18,270
fact

44
00:02:23,950 --> 00:02:20,910
from magnetometer observations on

45
00:02:27,290 --> 00:02:23,960
Galileo so guy Leo had a magnetometer

46
00:02:31,100 --> 00:02:27,300
tracking v2p or magnetosphere and in

47
00:02:33,830 --> 00:02:31,110
Europa Israel in fact is he taking kinds

48
00:02:37,000 --> 00:02:33,840
of India magnetic field not Cummings

49
00:02:40,040 --> 00:02:37,010
from dynamic internal structure of

50
00:02:42,520 --> 00:02:40,050
Europa in fact that's where the Hindu

51
00:02:46,280 --> 00:02:42,530
magnetic field affected from Jupiter

52
00:02:49,040 --> 00:02:46,290
magnetosphere and so it's together there

53
00:02:53,180 --> 00:02:49,050
should be some Chi sub conductive layer

54
00:02:55,900 --> 00:02:53,190
underneath the underneath the in the

55
00:02:59,810 --> 00:02:55,910
internal structure of Europa and

56
00:03:03,280 --> 00:02:59,820
conductive modern water eyes more than

57
00:03:07,670 --> 00:03:03,290
liquid water so there's only salty

58
00:03:10,430 --> 00:03:07,680
liquid world when scientists tend to

59
00:03:13,760 --> 00:03:10,440
Cassini spacecraft we have a lot of

60
00:03:16,820 --> 00:03:13,770
steam we know the science from the plume

61
00:03:21,800 --> 00:03:16,830
is a global liquid ocean the Aryans

62
00:03:25,760 --> 00:03:21,810
coming from a lot of things from gravity

63
00:03:28,010 --> 00:03:25,770

data to confirm the existing gamma

64
00:03:32,060 --> 00:03:28,020
liquid ocean you did coming from

65
00:03:34,280 --> 00:03:32,070
vibration attitude I'm imagining for

66
00:03:37,400 --> 00:03:34,290
example on our earth moon orbiting

67
00:03:40,790 --> 00:03:37,410
around our planet in a synchronous orbit

68
00:03:43,190 --> 00:03:40,800
so terrifically we only see 50% of them

69
00:03:45,590 --> 00:03:43,200
of the moon we only we cannot see the

70
00:03:46,550 --> 00:03:45,600
far side of the moon mean did the

71
00:03:49,820 --> 00:03:46,560
maximum

72
00:03:50,270 --> 00:03:49,830
survey cover it and could see the middle

73
00:03:51,890 --> 00:03:50,280
of the earth

74
00:03:55,760 --> 00:03:51,900
you know what fifty-nine percent is

75
00:03:59,570 --> 00:03:55,770
because the vibration phenomena in which

76
00:04:03,380 --> 00:03:59,580
we have the orbital in Centrex the orbit

77
00:04:05,510 --> 00:04:03,390
of the moon is Namek eccentric first

78
00:04:09,230 --> 00:04:05,520
weight we have the entire talk

79
00:04:11,900 --> 00:04:09,240
interaction between the earth to to the

80
00:04:16,220 --> 00:04:11,910
moon to be causing some oscillations in

81
00:04:18,650 --> 00:04:16,230
in the viewing angles that the satellite

82
00:04:20,840 --> 00:04:18,660
looking at the planet and the

83
00:04:22,940 --> 00:04:20,850
elaboration amateurs matter for inside

84
00:04:25,550 --> 00:04:22,950
it is so large that it cannot be

85
00:04:27,560 --> 00:04:25,560
explained by a two-layer internal

86
00:04:29,119 --> 00:04:27,570
structure model which is ice unique

87
00:04:31,999 --> 00:04:29,129
cross and

88
00:04:34,820 --> 00:04:32,009

a rocky core so it should be some

89
00:04:37,459 --> 00:04:34,830
sandwich layer in between the cross and

90
00:04:39,889 --> 00:04:37,469
the core and to be having some material

91
00:04:43,009 --> 00:04:39,899
be stable there it's need to be liquid

92
00:04:46,100 --> 00:04:43,019
work and we also call our organics from

93
00:04:49,399 --> 00:04:46,110
the mass spectrometer and can see also a

94
00:04:51,320 --> 00:04:49,409
chemical energy we protected molecule

95
00:05:00,320 --> 00:04:51,330
hydrogen is coming from higher thermal

96
00:05:01,040 --> 00:05:00,330
activity so as I parted out from the

97
00:05:02,929 --> 00:05:01,050
first line

98
00:05:05,529 --> 00:05:02,939
so what contact the amino acid

99
00:05:18,600 --> 00:05:05,539
decomposition is the search for our

100
00:05:27,790 --> 00:05:24,340
though alright alright so we know that

101
00:05:29,890 --> 00:05:27,800
amino acid was from previous talk it can

102
00:05:32,710 --> 00:05:29,900
be synthesized and starting from

103
00:05:36,129 --> 00:05:32,720
interstellar medium and possibly a lot

104
00:05:40,749 --> 00:05:36,139
of other processes to do since I have no

105
00:05:44,020 --> 00:05:40,759
acid in decimal and is preserved in time

106
00:05:46,900 --> 00:05:44,030
audio amino acid in Peter in a lot of

107
00:05:50,680 --> 00:05:46,910
primitive material a meteorite Comet and

108
00:05:53,409 --> 00:05:50,690
asteroid so to using amino acids basic

109
00:05:56,080 --> 00:05:53,419
nature first step is we need to know is

110
00:05:58,650 --> 00:05:56,090
that really actively podium or there

111
00:06:01,990 --> 00:05:58,660
something generated from primordial

112
00:06:04,810 --> 00:06:02,000
processes and preserved in so system

113
00:06:07,300 --> 00:06:04,820

being local to and from chemistry point

114
00:06:10,600 --> 00:06:07,310
of view the spontaneous decomposition

115
00:06:14,290 --> 00:06:10,610
amino acids as known as among the

116
00:06:16,629 --> 00:06:14,300
slowest reaction this ever exists for

117
00:06:20,830 --> 00:06:16,639
example like glycine he applied about

118
00:06:23,320 --> 00:06:20,840
1.1 billion year for alanine is 10

119
00:06:27,279 --> 00:06:23,330
billion year room temperature neutral pH

120
00:06:29,890 --> 00:06:27,289
so by looking at the relative stability

121
00:06:33,520 --> 00:06:29,900
of the decomposition process where amino

122
00:06:36,749 --> 00:06:33,530
acids so we can track rising are

123
00:06:42,490 --> 00:06:36,759
typically form amino acids can be

124
00:06:44,320 --> 00:06:42,500
identified so it easier to however it

125
00:06:47,649 --> 00:06:44,330
easier to set and done interest because

126
00:06:50,020 --> 00:06:47,659
we already having is not dealing with

127
00:06:52,180 --> 00:06:50,030
thermodynamics during a kinetic and

128
00:06:55,300 --> 00:06:52,190
everyone working on kinetic no the

129
00:06:57,640 --> 00:06:55,310
problem is of the we do not have very

130
00:07:01,959 --> 00:06:57,650
difficult to get in kinetic data to

131
00:07:05,529 --> 00:07:01,969
tracking with Tom and many biologists

132
00:07:07,990 --> 00:07:05,539
here familiar probably much more better

133
00:07:10,510 --> 00:07:08,000
understand better than me about the

134
00:07:13,149 --> 00:07:10,520
decomposition of amino acids by bacteria

135
00:07:16,709 --> 00:07:13,159
or other enzyme Congress however it's

136
00:07:19,390 --> 00:07:16,719
not very applicable in this game and

137
00:07:21,249 --> 00:07:19,400
from other point of view getting it can

138
00:07:25,959 --> 00:07:21,259

you take data is difficult because we're

139
00:07:30,150 --> 00:07:25,969
actually super slow so to getting

140
00:07:33,840 --> 00:07:30,160
something doing experiment in a

141
00:07:35,850 --> 00:07:33,850
to getting the data in lab tom scale we

142
00:07:40,200 --> 00:07:35,860
need to heat it up basically heated up

143
00:07:43,020 --> 00:07:40,210
the solution so you can get thing the

144
00:07:45,390 --> 00:07:43,030
data in black Tom scale and also how to

145
00:07:48,210 --> 00:07:45,400
tracking all of that without interacting

146
00:07:52,050 --> 00:07:48,220
the system also analogies that make it

147
00:07:55,020 --> 00:07:52,060
difficult and so there are just only a

148
00:07:57,470 --> 00:07:55,030
few experiment done for apply with

149
00:08:00,960 --> 00:07:57,480
applying to a hydrothermal system

150
00:08:04,640 --> 00:08:00,970
however for how homo system water it is

151
00:08:08,670 --> 00:08:04,650
up and gives go beyond critical skate so

152
00:08:12,450 --> 00:08:08,680
many physical chemical changes probably

153
00:08:14,940 --> 00:08:12,460
changes for that alright so just want to

154
00:08:18,000 --> 00:08:14,950
put it down what was happening there

155
00:08:20,640 --> 00:08:18,010
very quickly so we have a lot of so the

156
00:08:24,090 --> 00:08:20,650
behavior of new Isis is very complicated

157
00:08:27,570 --> 00:08:24,100
so at least we have the laminations that

158
00:08:30,390 --> 00:08:27,580
sorry decarboxylation the living co2 web

159
00:08:33,330 --> 00:08:30,400
domination that living ammonium there

160
00:08:38,250 --> 00:08:33,340
may be other behavior like dehydration's

161
00:08:40,740 --> 00:08:38,260
or polymerization in here so here's our

162
00:08:43,920 --> 00:08:40,750
NASA so we collected on Caillou trying

163
00:08:47,640 --> 00:08:43,930

to use the press and apart we trying to

164
00:08:52,380 --> 00:08:47,650
do some a product with our simplify but

165
00:08:54,960 --> 00:08:52,390
I think that's reasonable enough to so

166
00:08:57,300 --> 00:08:54,970
we collected all kinds of kinetic data

167
00:09:00,090 --> 00:08:57,310
that we can have from polished

168
00:09:02,070 --> 00:09:00,100
literature's and we choose a few

169
00:09:05,040 --> 00:09:02,080
criteria but the most one is we choose

170
00:09:08,100 --> 00:09:05,050
only in the kinetic data that's taken

171
00:09:10,470 --> 00:09:08,110
five below creative point water it's

172
00:09:13,320 --> 00:09:10,480
because the water on inside of the

173
00:09:17,460 --> 00:09:13,330
Europa is very healthy to be heated up

174
00:09:19,260 --> 00:09:17,470
to go beyond critters state also because

175
00:09:20,250 --> 00:09:19,270
the amino acid concentration is

176
00:09:23,310 --> 00:09:20,260
presumably

177
00:09:27,690 --> 00:09:23,320
far below world concentration around so

178
00:09:29,810 --> 00:09:27,700
it could be treated simplify which is

179
00:09:32,070 --> 00:09:29,820
deductive instruction rate is a

180
00:09:34,380 --> 00:09:32,080
first-order reaction so we're

181
00:09:36,780 --> 00:09:34,390
considering two scenario with free zone

182
00:09:38,790 --> 00:09:36,790
and your assets in the ocean and some

183
00:09:40,710 --> 00:09:38,800
time and and the second thing that I

184
00:09:43,230 --> 00:09:40,720
corner this material amino acids

185
00:09:46,679 --> 00:09:43,240
basically is okay

186
00:09:49,220 --> 00:09:46,689
probably because here the seafloor so

187
00:09:52,379 --> 00:09:49,230
young no I didn't feel in more

188
00:09:54,210 --> 00:09:52,389

concentration zombie he's only allowed

189
00:09:59,489 --> 00:09:54,220
surprises why I can creature together

190
00:10:01,769 --> 00:09:59,499
with the yes one of my Peter today I

191
00:10:05,220 --> 00:10:01,779
just want to show you for sharing and

192
00:10:08,040 --> 00:10:05,230
glycine's with the r-square police near

193
00:10:12,720 --> 00:10:08,050
point 95 percent for the love of the red

194
00:10:15,299 --> 00:10:12,730
caution with inverse temperature and of

195
00:10:17,489 --> 00:10:15,309
course we want to do that because we

196
00:10:19,590 --> 00:10:17,499
know that the water in fact for inside

197
00:10:22,949 --> 00:10:19,600
the water when is cycling through the

198
00:10:25,230 --> 00:10:22,959
core is really heated up right to 323

199
00:10:28,590 --> 00:10:25,240
Kelvin 50 degrees Celsius

200
00:10:31,019 --> 00:10:28,600
however the mixing is not the

201
00:10:33,629 --> 00:10:31,029
temperature of the water ocean is not

202
00:10:37,319 --> 00:10:33,639
really well concerned it has some mixing

203
00:10:38,939 --> 00:10:37,329
that we do not really know so by the way

204
00:10:41,460 --> 00:10:38,949
you can solve a file you can Sony

205
00:10:43,290 --> 00:10:41,470
kinetic equation to fight the

206
00:10:47,369 --> 00:10:43,300
composition timescale the functional

207
00:10:52,049 --> 00:10:47,379
temperatures alright so here the one God

208
00:10:57,119 --> 00:10:52,059
with the in here totally got the result

209
00:10:59,879 --> 00:10:57,129
for 15 amino acids the vertical one here

210
00:11:02,220 --> 00:10:59,889
is the decomposition timescale India is

211
00:11:04,379 --> 00:11:02,230
not shaken here between here and one

212
00:11:07,169 --> 00:11:04,389
here we constraining that with the flu

213
00:11:11,220 --> 00:11:07,179

temperatures and the first book you see

214
00:11:15,499 --> 00:11:11,230
that the destruction tom scale depends

215
00:11:19,799 --> 00:11:15,509
were sensitive to ocean temperatures and

216
00:11:22,470 --> 00:11:19,809
with Richard who's talking about that

217
00:11:25,230 --> 00:11:22,480
when we have some while increasing the

218
00:11:27,299 --> 00:11:25,240
temperature so they've been some highs

219
00:11:30,150 --> 00:11:27,309
of weakening between the born in the

220
00:11:34,859 --> 00:11:30,160
amino acid coming back so what we got

221
00:11:39,119 --> 00:11:34,869
here is it's fancy

222
00:11:41,369 --> 00:11:39,129
okay so here we have I put in here some

223
00:11:43,470 --> 00:11:41,379
constraints this doctor in fact it's

224
00:11:46,019 --> 00:11:43,480
about ten million years that lives we

225
00:11:48,929 --> 00:11:46,029
can scale to the ocean on Assad that

226
00:11:51,629 --> 00:11:48,939
will be stable the upper question here

227
00:11:56,970 --> 00:11:51,639
is like an pina caught that in solar

228
00:11:59,370 --> 00:11:56,980
system can scale here is

229
00:12:03,120 --> 00:11:59,380
the minimum temperature that will exist

230
00:12:05,010 --> 00:12:03,130
in the the core of insiders we

231
00:12:07,590 --> 00:12:05,020
unfortunately do not really know the

232
00:12:10,380 --> 00:12:07,600
temperature of europa right now man was

233
00:12:13,830 --> 00:12:10,390
the point here is that if you look at a

234
00:12:16,470 --> 00:12:13,840
tree curve in here for example this red

235
00:12:20,370 --> 00:12:16,480
curve is for glycine's lucre before

236
00:12:25,080 --> 00:12:20,380
alanine valine is a black curve we're

237
00:12:28,050 --> 00:12:25,090
looking here there's even the 323 Kelvin

238
00:12:31,200 --> 00:12:28,060

that the water is liquid so the time

239
00:12:35,250 --> 00:12:31,210
scale if the commotion is about billing

240
00:12:37,650 --> 00:12:35,260
yeah which is very long on the other

241
00:12:41,310 --> 00:12:37,660
hand we have other thing that for

242
00:12:42,090 --> 00:12:41,320
example other species like nursing or a

243
00:12:45,360 --> 00:12:42,100
zoo

244
00:12:48,510 --> 00:12:45,370
isolation is here and we have met

245
00:12:50,760 --> 00:12:48,520
ammonia Trixie purple light here the

246
00:12:52,440 --> 00:12:50,770
decomposed relatively quick even at a

247
00:12:56,790 --> 00:12:52,450
very low temperature

248
00:12:58,890 --> 00:12:56,800
I say cooking here life 293 Kelvin and a

249
00:13:04,290 --> 00:12:58,900
part freakin here mean quickly geology

250
00:13:08,850 --> 00:13:04,300
timescale and we have other kinds of

251
00:13:12,930 --> 00:13:08,860
amino acids as well we have we have

252
00:13:15,930 --> 00:13:12,940
lysine we have adenine sorry

253
00:13:18,960 --> 00:13:15,940
we have lies in here with a zoom in here

254
00:13:23,130 --> 00:13:18,970
and history glutamic acids he come also

255
00:13:27,930 --> 00:13:23,140
very slow and it could probably because

256
00:13:32,070 --> 00:13:27,940
when we heated up glutamic acids we

257
00:13:36,090 --> 00:13:32,080
could transform to more stable form like

258
00:13:42,750 --> 00:13:36,100
Tyrell glutamate so that would decompose

259
00:13:44,940 --> 00:13:42,760
in let's say in year 200 Kelvin here and

260
00:13:50,040 --> 00:13:44,950
finally we checked out with some of the

261
00:13:52,830 --> 00:13:50,050
aromatic amino acids and rabbits you

262
00:13:56,630 --> 00:13:52,840
compose quite fast even at the low

263
00:13:59,580 --> 00:13:56,640

temperature it just well one really here

264
00:14:02,130 --> 00:13:59,590
so the second scenario then consider in

265
00:14:05,490 --> 00:14:02,140
this study so all of the three scenarios

266
00:14:07,950 --> 00:14:05,500
that the calculators before is about the

267
00:14:10,620 --> 00:14:07,960
Frida's own amino acid in the ocean but

268
00:14:13,769 --> 00:14:10,630
now and so by 3d zone

269
00:14:16,019 --> 00:14:13,779
there's be no other interactions with it

270
00:14:17,819 --> 00:14:16,029
just amino acid molecule with water

271
00:14:20,040 --> 00:14:17,829
surrounding there we no other

272
00:14:22,410 --> 00:14:20,050
interactions but we have some other

273
00:14:27,870 --> 00:14:22,420
model with the mixing amino acids in the

274
00:14:30,449 --> 00:14:27,880
oceans in which is basically somehow I'm

275
00:14:33,870 --> 00:14:30,459
allowed to what God in the seafloor we

276
00:14:39,870 --> 00:14:33,880
have more concentrated in the in the

277
00:14:44,160 --> 00:14:39,880
ocean so what we got here is the very

278
00:14:47,850 --> 00:14:44,170
quickly even is even more quicker than

279
00:14:50,490 --> 00:14:47,860
the previous one for all kinds of of

280
00:14:52,499 --> 00:14:50,500
amino acids all right so we go into the

281
00:14:55,079 --> 00:14:52,509
conclusion so conclusion here attack

282
00:14:57,840 --> 00:14:55,089
relatively short light harms and by

283
00:15:01,620 --> 00:14:57,850
short here is well less than 1 billion

284
00:15:04,079 --> 00:15:01,630
year of most amino acid except for

285
00:15:08,069 --> 00:15:04,089
higher species glycine alanine valine

286
00:15:10,410 --> 00:15:08,079
glutamic acids suggested you amino acids

287
00:15:13,079 --> 00:15:10,420
could be father protected on the ocean

288
00:15:16,800 --> 00:15:13,089

war so there are two in super-confident

289
00:15:20,309 --> 00:15:16,810
ongoing production rather than per mario

290
00:15:23,009 --> 00:15:20,319
synthesis of course i aware that there

291
00:15:26,670 --> 00:15:23,019
will be some of the limitation however

292
00:15:29,480 --> 00:15:26,680
the point here is to deriving the time

293
00:15:32,879 --> 00:15:29,490
scale rather than constraining exactly

294
00:15:35,429 --> 00:15:32,889
what we really do tom so there may be

295
00:15:37,559 --> 00:15:35,439
some variety in with different periods

296
00:15:41,689 --> 00:15:37,569
that we do not really have data at the

297
00:15:46,620 --> 00:15:41,699
constraint but confidently at the

298
00:15:48,420 --> 00:15:46,630
conclusion that in here so cuts the next

299
00:15:50,819 --> 00:15:48,430
step is trying to distinguish between

300
00:15:52,889 --> 00:15:50,829
the distribution amino acid generated

301
00:16:00,260 --> 00:15:52,899
from job chemical synthesis results

302
00:16:13,859 --> 00:16:03,079
[Applause]

303
00:16:15,029 --> 00:16:13,869
any questions for knock so I'm a little

304
00:16:18,659 --> 00:16:15,039
ignorant about this but

305
00:16:24,719 --> 00:16:18,669
so when you say Enceladus and Europa has

306
00:16:26,909 --> 00:16:24,729
have a icy crust and salty ocean do you

307
00:16:28,469 --> 00:16:26,919
do you mean that's water ice and also

308
00:16:30,779 --> 00:16:28,479
what kind of salts do we know any kinds

309
00:16:32,489 --> 00:16:30,789
of salts there and the follow-up

310
00:16:34,289 --> 00:16:32,499
question after that is did you consider

311
00:16:36,389 --> 00:16:34,299
those salts when you're thinking about

312
00:16:39,299 --> 00:16:36,399
the decomposition of the you acids

313
00:16:41,339 --> 00:16:39,309

well so yeah so there is a when I

314
00:16:44,159 --> 00:16:41,349
talking about the ocean here I mean that

315
00:16:47,669 --> 00:16:44,169
they be liquid water underneath the icy

316
00:16:51,299 --> 00:16:47,679
crust and is to a powering by Tyra

317
00:16:55,829 --> 00:16:51,309
heating as you know I do not consider

318
00:16:58,799 --> 00:16:55,839
the the effect of salt and in the it is

319
00:17:01,049 --> 00:16:58,809
cancellation so now the point that I

320
00:17:03,299 --> 00:17:01,059
don't think it would be affect the whole

321
00:17:04,889 --> 00:17:03,309
conclusion because the one that we want

322
00:17:07,499 --> 00:17:04,899
to constrain here is the time scale

323
00:17:09,899 --> 00:17:07,509
rather than exactly is in the

324
00:17:13,350 --> 00:17:09,909
composition town so it's true that will

325
00:17:16,679 --> 00:17:13,360
be some variety if we take with peer

326
00:17:18,659 --> 00:17:16,689
different periods and in a song I want

327
00:17:21,029 --> 00:17:18,669
to do that as well the poem that we do

328
00:17:25,739 --> 00:17:21,039
not have the data so that's why I mean

329
00:17:28,019 --> 00:17:25,749
subjet that and in October the the next

330
00:17:30,450 --> 00:17:28,029
meeting if you open you will forgive

331
00:17:35,279 --> 00:17:30,460
time Inquisition if anyone if you would

332
00:17:37,710 --> 00:17:35,289
go trying to see what its existing in

333
00:17:40,830 --> 00:17:37,720
the and what what is the knowledge gap

334
00:17:42,869 --> 00:17:40,840
between experimental in the morning so I

335
00:17:44,730 --> 00:17:42,879
would recommend with anyone interesting

336
00:17:48,389 --> 00:17:44,740
here to do some more experiment on that

337
00:17:50,100 --> 00:17:48,399
I was really talking kind of a follow-up

338
00:17:52,169 --> 00:17:50,110

question on that one of the things would

339
00:17:53,549 --> 00:17:52,179
be curious about for Europa is how you

340
00:17:55,590 --> 00:17:53,559
know acids or other bio signatures are

341
00:17:58,470 --> 00:17:55,600
processed to the I show and so not just

342
00:18:00,450 --> 00:17:58,480
surviving at ocean salinity is maybe 3%

343
00:18:02,460 --> 00:18:00,460
and 4% or whatever we might guess for

344
00:18:05,340 --> 00:18:02,470
you over but like Brian concentrations

345
00:18:07,350 --> 00:18:05,350
upwards of maybe 40 PSU or that kind of

346
00:18:08,460 --> 00:18:07,360
thing I have you or do you know of

347
00:18:11,190 --> 00:18:08,470
anyone who's worked on that or is that

348
00:18:13,789 --> 00:18:11,200
also plan for the future so you want a

349
00:18:16,279 --> 00:18:13,799
distribution that analyzes

350
00:18:18,049 --> 00:18:16,289
post oh yeah so if amino acids get

351
00:18:21,470 --> 00:18:18,059
incorporated into a shell from the ocean

352
00:18:24,229 --> 00:18:21,480
yeah preserved either a nice room Brian

353
00:18:26,779 --> 00:18:24,239
pockets yeah so that is my party working

354
00:18:28,909 --> 00:18:26,789
on that after that the poem winner opens

355
00:18:33,169 --> 00:18:28,919
us you know inside us we have were very

356
00:18:35,060 --> 00:18:33,179
good compositions by conceding Europa

357
00:18:36,859 --> 00:18:35,070
only thing we know from the chemical

358
00:18:39,859 --> 00:18:36,869
composition all of the thing we know

359
00:18:42,350 --> 00:18:39,869
about your potion about is whether there

360
00:18:45,200 --> 00:18:42,360
is sewn that and that it's everything

361
00:18:47,989 --> 00:18:45,210
every of the composition Discoverer

362
00:18:50,269 --> 00:18:47,999
apologist you know assumption for

363
00:18:52,909 --> 00:18:50,279

example taking the rocky core with the

364
00:18:57,169 --> 00:18:52,919
composition similar to CM contour I or

365
00:19:01,700 --> 00:18:57,179
CV wherever so the teen years that I'm

366
00:19:04,099 --> 00:19:01,710
trying to do by you know a pre but the

367
00:19:07,340 --> 00:19:04,109
fundamental understanding of well what

368
00:19:10,009 --> 00:19:07,350
what if we go there we follow a meiosis

369
00:19:12,919 --> 00:19:10,019
so we can excluding admit the

370
00:19:15,769 --> 00:19:12,929
possibility of primordial synthesis I

371
00:19:17,930 --> 00:19:15,779
would be very interested in to to see

372
00:19:21,970 --> 00:19:17,940
what will be the distribution of amino

373
00:19:25,820 --> 00:19:21,980
acids from chemical synthesis and

374
00:19:27,979 --> 00:19:25,830
biology of course the difficulty of that

375
00:19:31,340 --> 00:19:27,989
you don't really know the composition of

376
00:19:34,009 --> 00:19:31,350
Europe an ocean the second thing is

377
00:19:36,080 --> 00:19:34,019
active synthesis experiment for let's

378
00:19:38,989 --> 00:19:36,090
say JA chemical synthesis there are many

379
00:19:41,629 --> 00:19:38,999
people done that with you know fissile

380
00:19:43,909 --> 00:19:41,639
twelve synthesis or Strecker synthesis

381
00:19:46,879 --> 00:19:43,919
the problem is that we don't know to

382
00:19:49,940 --> 00:19:46,889
really calculate the distribution of

383
00:19:53,840 --> 00:19:49,950
that minute kinetic data and own of now

384
00:19:56,450 --> 00:19:53,850
data at least I saw only thermodynamic

385
00:19:58,580 --> 00:19:56,460
data so for thermodynamic we can

386
00:20:01,549 --> 00:19:58,590
calculate the free energy whatever in

387
00:20:05,539 --> 00:20:01,559
many condition is show that could be the

388
00:20:07,930 --> 00:20:05,549

free energy is negative so we have well

389
00:20:11,599 --> 00:20:07,940
so we can say that Wow it could be

390
00:20:15,680 --> 00:20:11,609
happening but we don't know really what

391
00:20:18,649 --> 00:20:15,690
will be the concentration okay