Marc Kaufman

Human life at ELSI:
The people behind the research

1
00:00:00,720 --> 00:00:11,030
[Music]

2
00:00:18,660 --> 00:00:15,390
hello everyone because I'm coming from a

3
00:00:21,749 --> 00:00:18,670
very different discipline and different

4
00:00:23,400 --> 00:00:21,759
area than the others who have spoken to

5
00:00:26,790 --> 00:00:23,410
you I just wanted to tell you a little

6
00:00:30,230 --> 00:00:26,800
bit about myself and why I'm here and

7
00:00:33,750 --> 00:00:30,240
why I'm speaking to you I have been a

8
00:00:37,740 --> 00:00:33,760
reporter a journalist for quite a few

9
00:00:41,969 --> 00:00:37,750
decades I've written some books I have a

10
00:00:46,049 --> 00:00:41,979
website for NASA and also I was asked to

11
00:00:48,210 --> 00:00:46,059
come here to Elsie to write what I think

12
00:00:51,149 --> 00:00:48,220
is a really fascinating story which is

13
00:00:55,079 --> 00:00:51,159

kind of the origins of a very unique

14
00:00:57,420 --> 00:00:55,089
institution so in that sense just as

15
00:01:00,570 --> 00:00:57,430
these wonderful scientists have been

16
00:01:02,820 --> 00:01:00,580
talking about origins I'm here to also

17
00:01:09,539 --> 00:01:02,830
talk about origins but of a very

18
00:01:12,360 --> 00:01:09,549
different kind so this is me some time

19
00:01:14,370 --> 00:01:12,370
ago in Afghanistan where I was a

20
00:01:17,900 --> 00:01:14,380
reporter for quite a while I was a

21
00:01:21,330 --> 00:01:17,910
foreign correspondent and did a lot of

22
00:01:25,290 --> 00:01:21,340
going around the world and collecting

23
00:01:27,960 --> 00:01:25,300
facts and bringing them back trying to

24
00:01:29,520 --> 00:01:27,970
understand trying to understand what

25
00:01:32,220 --> 00:01:29,530
people were telling me what their

26
00:01:35,930 --> 00:01:32,230
cultures were really saying sometimes it

27
00:01:39,300 --> 00:01:35,940
was just what I saw that was important

28
00:01:44,540 --> 00:01:39,310
and then I would write them as stories

29
00:01:48,090 --> 00:01:44,550
and send them back to the public and

30
00:01:50,399 --> 00:01:48,100
this was wonderful to do you know to

31
00:01:54,090 --> 00:01:50,409
have this kind of wild kind of

32
00:01:56,390 --> 00:01:54,100
experience but about 15 years ago I

33
00:01:59,490 --> 00:01:56,400
started writing about science

34
00:02:03,840 --> 00:01:59,500
particularly about space but also about

35
00:02:08,039 --> 00:02:03,850
science generally uh and fairly quickly

36
00:02:11,759 --> 00:02:08,049
I came to the conclusion that many of

37
00:02:14,180 --> 00:02:11,769
the scientists and journalists share a

38
00:02:19,380 --> 00:02:14,190

very similar way of looking at the world

39
00:02:21,610 --> 00:02:19,390
we go out we collect information we do

40
00:02:25,539 --> 00:02:21,620
experiments of a

41
00:02:28,360 --> 00:02:25,549
our job is to then try to make sense of

42
00:02:31,050 --> 00:02:28,370
that information that we've gotten to

43
00:02:34,059 --> 00:02:31,060
write it into papers or into articles

44
00:02:37,960 --> 00:02:34,069
and to then share it with the world

45
00:02:40,360 --> 00:02:37,970
so it's been both an enormous pleasure

46
00:02:44,500 --> 00:02:40,370
and an honor for me to be part of that

47
00:02:47,740 --> 00:02:44,510
process for scientists who have their

48
00:02:48,130 --> 00:02:47,750
story to tell and I then I'm part of

49
00:02:57,399 --> 00:02:48,140
that

50
00:03:03,729 --> 00:02:57,409
asked to come here to Elsie and I want

51
00:03:07,030 --> 00:03:03,739
to give you a sense of what a unique

52
00:03:09,699 --> 00:03:07,040
organization this is and what a unique

53
00:03:14,640 --> 00:03:09,709
place this is just as a little bit of

54
00:03:18,789 --> 00:03:14,650
history this was the the whole LC idea

55
00:03:21,879 --> 00:03:18,799
and and the campus came as a result of

56
00:03:24,099 --> 00:03:21,889
the world premiere International

57
00:03:29,020 --> 00:03:24,109
Research Center initiative by the

58
00:03:33,069 --> 00:03:29,030
Government of Japan it gave out a huge

59
00:03:37,140 --> 00:03:33,079
amount of money to now I think it's 11

60
00:03:41,680 --> 00:03:37,150
different Institute's with the goal of

61
00:03:44,800 --> 00:03:41,690
kind of jump-starting Japanese science

62
00:03:47,589 --> 00:03:44,810
this is the way was explained to me that

63
00:03:50,770 --> 00:03:47,599

there was perceived maybe 10 years ago

64
00:03:53,740 --> 00:03:50,780
15 years ago to be something of a crisis

65
00:03:56,670 --> 00:03:53,750
in Japanese science I don't know that

66
00:04:04,750 --> 00:03:56,680
this is true but this is the origin of

67
00:04:09,219 --> 00:04:04,760
the WPI and of this initiative LC was

68
00:04:15,219 --> 00:04:09,229
one of the later institutes it came on

69
00:04:18,159 --> 00:04:15,229
board only in in 2012 but it has had

70
00:04:23,230 --> 00:04:18,169
what I believe is just an utterly

71
00:04:26,050 --> 00:04:23,240
remarkable history and and rise if you

72
00:04:28,210 --> 00:04:26,060
had been here 2 years ago there would be

73
00:04:30,909 --> 00:04:28,220
no building here or there would be a

74
00:04:33,129 --> 00:04:30,919
construction site if you were here five

75
00:04:34,629 --> 00:04:33,139
years ago you could not find a

76
00:04:36,369 --> 00:04:34,639
researcher

77
00:04:38,950 --> 00:04:36,379
because they were stuck into kind of

78
00:04:44,679 --> 00:04:38,960
cubby holes in the back there were no

79
00:04:47,469 --> 00:04:44,689
labs now you have this is by no means

80
00:04:51,820 --> 00:04:47,479
all of the people of Elsie but you have

81
00:04:56,399 --> 00:04:51,830
a population here a very thriving

82
00:05:01,480 --> 00:04:56,409
population of scientists of technicians

83
00:05:03,989 --> 00:05:01,490
of incredibly talented administrative

84
00:05:08,230 --> 00:05:03,999
staff that keeps a very complicated

85
00:05:11,260 --> 00:05:08,240
system going and if I might also at this

86
00:05:14,980 --> 00:05:11,270
point give a brief shout out as we say

87
00:05:21,219 --> 00:05:14,990
in the u.s. to my photographer colleague

88
00:05:25,119 --> 00:05:21,229

Nerissa right there who has who has

89
00:05:28,360 --> 00:05:25,129
taken the pictures here and is terrific

90
00:05:30,339 --> 00:05:28,370
and as a further explanation of what

91
00:05:35,230 --> 00:05:30,349
we're doing we're going to be writing

92
00:05:38,519 --> 00:05:35,240
online columns for the and having

93
00:05:41,649 --> 00:05:38,529
photographs for the LC website but also

94
00:05:43,890 --> 00:05:41,659
just because we were gluttons for

95
00:05:47,920 --> 00:05:43,900
punishment we decided we would try to

96
00:05:50,170 --> 00:05:47,930
put together a long narrative into of

97
00:05:54,490 --> 00:05:50,180
the history and the people and the

98
00:05:56,679 --> 00:05:54,500
science of LC into a kind of a book mini

99
00:05:59,589 --> 00:05:56,689
book and to have it available for the

100
00:06:01,179 --> 00:05:59,599
symposium in January if any of you have

101
00:06:03,639 --> 00:06:01,189
been involved in book writing and

102
00:06:05,829 --> 00:06:03,649
publishing you know that is insane but

103
00:06:12,300 --> 00:06:05,839
that's what we're going to do in any

104
00:06:15,639 --> 00:06:12,310
case so this was at a in Aeon gathering

105
00:06:17,260 --> 00:06:15,649
virtually all of the LC related

106
00:06:19,149 --> 00:06:17,270
gathering start with some kind of

107
00:06:21,219 --> 00:06:19,159
photograph like this where they get

108
00:06:25,990 --> 00:06:21,229
everyone together to show that yes we

109
00:06:33,639 --> 00:06:26,000
exist and you'll see that there is a

110
00:06:36,369 --> 00:06:33,649
wide distribution of people the WPI one

111
00:06:39,159 --> 00:06:36,379
of its reasons for being was to bring

112
00:06:43,149 --> 00:06:39,169
international scientists to Japan

113
00:06:47,500 --> 00:06:43,159

that was the goal here at LC more than I

114
00:06:51,100 --> 00:06:47,510
think any Institute other than one

115
00:06:55,930 --> 00:06:51,110
they have succeeded well they have

116
00:07:02,490 --> 00:06:55,940
roughly 60 scientists about half of them

117
00:07:06,370 --> 00:07:02,500
are international the goal also is to be

118
00:07:08,740 --> 00:07:06,380
gender balanced they're not doing quite

119
00:07:10,960 --> 00:07:08,750
as well there but they're trying with

120
00:07:15,400 --> 00:07:10,970
the entire staff we have more than a

121
00:07:18,010 --> 00:07:15,410
hundred people but what makes LCA unique

122
00:07:22,240 --> 00:07:18,020
in addition to the beginnings of what

123
00:07:24,250 --> 00:07:22,250
I've told you is that every week there

124
00:07:29,110 --> 00:07:24,260
are people from around the world coming

125
00:07:32,230 --> 00:07:29,120
here for conferences for workshops to

126
00:07:35,200 --> 00:07:32,240
just collaborate with each other there

127
00:07:39,880 --> 00:07:35,210
there was money made available to do

128
00:07:42,360 --> 00:07:39,890
something right here in Okayama that is

129
00:07:48,340 --> 00:07:42,370
not done anywhere else in the world

130
00:07:53,830 --> 00:07:48,350
Kayla Rosie is the director Pete Hut is

131
00:07:56,350 --> 00:07:53,840
a counselor the two of them were among

132
00:08:00,130 --> 00:07:56,360
the handful of people who were

133
00:08:03,610 --> 00:08:00,140
responsible for the idea that was

134
00:08:11,070 --> 00:08:03,620
brought before the WPI that then became

135
00:08:17,820 --> 00:08:11,080
Elsi Kayla Rosie is a renowned scientist

136
00:08:22,440 --> 00:08:17,830
rural world renowned he has done really

137
00:08:26,290 --> 00:08:22,450
pioneering work on deep earth

138
00:08:30,310 --> 00:08:26,300

observations and he has and and

139
00:08:32,170 --> 00:08:30,320
simulations and he is using various

140
00:08:36,339 --> 00:08:32,180
technologies some of which he has

141
00:08:38,910 --> 00:08:36,349
developed has broken a lot of new ground

142
00:08:43,600 --> 00:08:38,920
in terms of understanding the core of

143
00:08:46,540 --> 00:08:43,610
our earth how the core evolves that's

144
00:08:48,760 --> 00:08:46,550
what he tells me he is his lifetime goal

145
00:08:50,650 --> 00:08:48,770
is to understand better what it's

146
00:08:54,190 --> 00:08:50,660
composed of and how it evolves but

147
00:08:58,630 --> 00:08:54,200
already he's done more work than most

148
00:09:04,389 --> 00:08:58,640
anyone and he was here at Tokyo Tech

149
00:09:08,380 --> 00:09:04,399
Pete is a extremely unusual person he is

150
00:09:11,380 --> 00:09:08,390
brilliant also he was the firt the

151
00:09:14,410 --> 00:09:11,390
youngest professor ever to be hired at

152
00:09:16,509 --> 00:09:14,420
the Institute for Advanced Studies at

153
00:09:20,500 --> 00:09:16,519
Princeton which is the place made famous

154
00:09:22,240 --> 00:09:20,510
by taking in Albert Einstein so we took

155
00:09:24,750 --> 00:09:22,250
an Albert Einstein and then it took in

156
00:09:34,230 --> 00:09:30,600
he is very unconventional thinking he

157
00:09:38,230 --> 00:09:34,240
his background is as an astrophysicist

158
00:09:40,930 --> 00:09:38,240
working with dense stellar systems I

159
00:09:45,990 --> 00:09:40,940
don't really know what that is but I'm

160
00:09:51,040 --> 00:09:46,000
sure it's very important and but after

161
00:09:53,310 --> 00:09:51,050
only maybe a decade or so at ILS he got

162
00:09:57,370 --> 00:09:53,320
interested in philosophy and

163
00:10:00,819 --> 00:09:57,380

paleontology in mathematics and he just

164
00:10:03,730 --> 00:10:00,829
has the kind of mind that you know

165
00:10:09,220 --> 00:10:03,740
cannot be hemmed in cannot be bordered

166
00:10:10,900 --> 00:10:09,230
and so he and he knows virtually

167
00:10:14,440 --> 00:10:10,910
everyone in the world I mean he has a

168
00:10:18,819 --> 00:10:14,450
connection to everyone and if he doesn't

169
00:10:22,030 --> 00:10:18,829
now he will soon and he was responsible

170
00:10:25,150 --> 00:10:22,040
for bringing an awful lot of people KLC

171
00:10:27,340 --> 00:10:25,160
kay was responsible for attracting a lot

172
00:10:30,010 --> 00:10:27,350
of people to Elsi because of his great

173
00:10:33,579 --> 00:10:30,020
scientific background his but you have

174
00:10:38,110 --> 00:10:33,589
two men there with terrific pedigrees

175
00:10:43,180 --> 00:10:38,120
and that's part of how and why this

176
00:10:52,990 --> 00:10:43,190
place has prospered it also is a place

177
00:10:57,910 --> 00:10:53,000
that again by WPI a priority is all

178
00:11:00,189 --> 00:10:57,920
about collaboration many scientists and

179
00:11:04,389 --> 00:11:00,199
I was told here that this this was

180
00:11:08,139 --> 00:11:04,399
particularly the case in Japan focus

181
00:11:10,600 --> 00:11:08,149
very very very well on their subject and

182
00:11:11,620 --> 00:11:10,610
they go very deeply into the subject and

183
00:11:16,420 --> 00:11:11,630
often come up

184
00:11:18,639 --> 00:11:16,430
with important discoveries but science

185
00:11:21,329 --> 00:11:18,649
tends to be going now in the direction

186
00:11:24,180 --> 00:11:21,339
of people collaborating together

187
00:11:29,410 --> 00:11:24,190
bringing together different disciplines

188
00:11:32,290 --> 00:11:29,420

so that you know a microbiologist might

189
00:11:35,230 --> 00:11:32,300
have things that they could add to what

190
00:11:38,110 --> 00:11:35,240
a geochemist or a even though physicist

191
00:11:40,780 --> 00:11:38,120
is saying and put it together and you

192
00:11:43,569 --> 00:11:40,790
have a lot more understanding than you

193
00:11:47,769 --> 00:11:43,579
might have with just one person doing

194
00:11:51,999 --> 00:11:47,779
that and one field so just about any

195
00:11:55,139 --> 00:11:52,009
time you come to LC during the work day

196
00:11:59,499 --> 00:11:55,149
there are people meeting like this

197
00:12:03,519 --> 00:11:59,509
poring over data it's kind of

198
00:12:05,230 --> 00:12:03,529
exhilarating to watch so many grown-ups

199
00:12:13,480 --> 00:12:05,240
being that excited about these things

200
00:12:17,889 --> 00:12:13,490
and there you go one of the things about

201
00:12:22,300 --> 00:12:17,899
LC also yes is that it's not the people

202
00:12:25,059 --> 00:12:22,310
here are not afraid to have fun this

203
00:12:29,530 --> 00:12:25,069
this is arena mama-jama off was one of

204
00:12:33,280 --> 00:12:29,540
the PI's here and she is doing really

205
00:12:34,629 --> 00:12:33,290
really cutting-edge work in in I don't

206
00:12:40,120 --> 00:12:34,639
know what it would be called systems

207
00:12:42,639 --> 00:12:40,130
biology chemistry she I think both Jim

208
00:12:45,879 --> 00:12:42,649
and Shawn were talking to some extent

209
00:12:53,350 --> 00:12:45,889
about different theories about how life

210
00:12:55,210 --> 00:12:53,360
began and she working with other people

211
00:12:56,650 --> 00:12:55,220
and then also you know with the

212
00:12:58,720 --> 00:12:56,660
experience that other people have had

213
00:13:01,600 --> 00:12:58,730

but she is really moved forward with the

214
00:13:05,949 --> 00:13:01,610
idea of messy chemistry this is the name

215
00:13:09,460 --> 00:13:05,959
messy chemistry they're famously was an

216
00:13:15,100 --> 00:13:09,470
experiment done in 1952 the miller-urey

217
00:13:20,079 --> 00:13:15,110
experiment it was the one of the first

218
00:13:22,449 --> 00:13:20,089
times that gases believed at that point

219
00:13:24,620 --> 00:13:22,459
to have been present on earth

220
00:13:28,120 --> 00:13:24,630
back in the early earth time

221
00:13:32,569 --> 00:13:28,130
along with some water were charged with

222
00:13:37,309 --> 00:13:32,579
electricity and lo and behold some hours

223
00:13:40,129 --> 00:13:37,319
later they found well what they found

224
00:13:42,439 --> 00:13:40,139
was a beaker full of gunk now it's

225
00:13:44,949 --> 00:13:42,449
called basically called tar but then

226
00:13:47,660 --> 00:13:44,959
they they worked with it and they found

227
00:13:49,840 --> 00:13:47,670
amino acids which are and I think

228
00:13:53,329 --> 00:13:49,850
nucleotides which are very important

229
00:13:55,490 --> 00:13:53,339
precursors to to life or to you know

230
00:13:58,519 --> 00:13:55,500
building blocks for life

231
00:14:01,370 --> 00:13:58,529
and the tar that was around the beaker

232
00:14:05,809 --> 00:14:01,380
was always considered to be like hmm a

233
00:14:08,210 --> 00:14:05,819
problem you know a lot of chemists are

234
00:14:10,069 --> 00:14:08,220
artificial or synthetic chemists will

235
00:14:11,629 --> 00:14:10,079
talk about you know how they did this

236
00:14:13,699 --> 00:14:11,639
experiment through that experiment and

237
00:14:14,749 --> 00:14:13,709
they got tar at the end and it was like

238
00:14:19,819 --> 00:14:14,759

oh that's terrible

239
00:14:21,290 --> 00:14:19,829
she says tar that's great it's it's a

240
00:14:25,059 --> 00:14:21,300
kind of a new way of looking at

241
00:14:28,790 --> 00:14:25,069
chemistry and it's very complicated and

242
00:14:32,900 --> 00:14:28,800
there is no as there is with any of

243
00:14:36,110 --> 00:14:32,910
these fields there's no sure sense that

244
00:14:38,389 --> 00:14:36,120
it will bear fruit but it seems to be it

245
00:14:41,569 --> 00:14:38,399
seems to be productive and it's one of

246
00:14:44,749 --> 00:14:41,579
the things that LC is now known for I

247
00:14:49,370 --> 00:14:44,759
was at a conference in in Arizona a

248
00:14:53,900 --> 00:14:49,380
large international conference on Origin

249
00:14:57,980 --> 00:14:53,910
on astrobiology and arena not wearing

250
00:15:01,069 --> 00:14:57,990
this shirt was one of the main speakers

251
00:15:04,519 --> 00:15:01,079
one of the one of the plenaries so this

252
00:15:07,100 --> 00:15:04,529
is just my way of saying that that LC in

253
00:15:07,850 --> 00:15:07,110
a very very short time when all things

254
00:15:09,889 --> 00:15:07,860
considered

255
00:15:11,660 --> 00:15:09,899
especially since other people have been

256
00:15:15,710 --> 00:15:11,670
talking about billions of years this is

257
00:15:17,660 --> 00:15:15,720
you know a couple years the origins here

258
00:15:21,379 --> 00:15:17,670
they're creating something that really

259
00:15:29,329 --> 00:15:21,389
has interesting roots and and fruit

260
00:15:31,280 --> 00:15:29,339
already we know is one of the I think he

261
00:15:35,750 --> 00:15:31,290
was here at the beginning of LC he's

262
00:15:37,820 --> 00:15:35,760
also a professor at Tokyo Tech he has

263
00:15:40,520 --> 00:15:37,830

collaborated with many men

264
00:15:46,280 --> 00:15:40,530
people here again collaboration is the

265
00:15:50,630 --> 00:15:46,290
name of the game and he is a now a Geo

266
00:15:52,820 --> 00:15:50,640
bio chemist I think he started off as a

267
00:15:54,940 --> 00:15:52,830
geologist but it gradually did more and

268
00:15:59,450 --> 00:15:54,950
more things and so it became a Geo

269
00:16:03,100 --> 00:15:59,460
biochemist and one of the important

270
00:16:07,580 --> 00:16:03,110
things that he did about 10 15 years ago

271
00:16:11,780 --> 00:16:07,590
he was down in the Pilbara section of

272
00:16:14,660 --> 00:16:11,790
Australia which is known for to have

273
00:16:20,330 --> 00:16:14,670
some of the most ancient rocks on earth

274
00:16:22,250 --> 00:16:20,340
and he and and the team that he was with

275
00:16:25,040 --> 00:16:22,260
you know we're chopping chopping and

276
00:16:30,790 --> 00:16:25,050
they took away you know tongue sword in

277
00:16:34,490 --> 00:16:30,800
case many samples of of rock and I

278
00:16:38,300 --> 00:16:34,500
because of how and where this rock was

279
00:16:41,000 --> 00:16:38,310
deposited we know thought that this

280
00:16:43,190 --> 00:16:41,010
could be a really interesting sample and

281
00:16:45,530 --> 00:16:43,200
so they did the what would have called

282
00:16:50,930 --> 00:16:45,540
the thin thin slices thin cuts of the

283
00:16:54,230 --> 00:16:50,940
rock and this as it turns out is a

284
00:16:58,640 --> 00:16:54,240
bubble of methane that was in Iraq that

285
00:17:03,890 --> 00:16:58,650
was 3.4 billion years old which meant

286
00:17:06,350 --> 00:17:03,900
that you know you had either methane in

287
00:17:08,540 --> 00:17:06,360
the atmosphere or perhaps some creature

288
00:17:11,420 --> 00:17:08,550

creating methane I mean because that's

289
00:17:16,150 --> 00:17:11,430
happened a great deal at that point but

290
00:17:19,610 --> 00:17:16,160
this was a discovery or an experiment a

291
00:17:27,260 --> 00:17:19,620
process that got a lot of attention got

292
00:17:28,910 --> 00:17:27,270
a major nature journal article and all

293
00:17:31,730 --> 00:17:28,920
right that was sitting there it turns

294
00:17:34,760 --> 00:17:31,740
out that that we know is also the

295
00:17:38,110 --> 00:17:34,770
director of a rock library you probably

296
00:17:41,270 --> 00:17:38,120
didn't know that there is a wonderful

297
00:17:44,300 --> 00:17:41,280
large rock library here on campus one of

298
00:17:47,620 --> 00:17:44,310
the biggest in the world and they have

299
00:17:50,700 --> 00:17:47,630
samples from most of the significant

300
00:17:55,320 --> 00:17:50,710
early early Earth sites

301
00:17:58,010 --> 00:17:55,330
and then because this is LT and Shana

302
00:18:04,220 --> 00:17:58,020
I'm sorry about this wide angle lair

303
00:18:11,720 --> 00:18:06,630
you troll and Shaun have been

304
00:18:15,210 --> 00:18:11,730
collaborating together using that sample

305
00:18:18,269 --> 00:18:15,220
Shaun wants to and he could no doubt

306
00:18:24,330 --> 00:18:18,279
explain it better but he's he's using it

307
00:18:27,740 --> 00:18:24,340
to examine sulfur sulfur isotopes going

308
00:18:31,380 --> 00:18:27,750
way way back and trying to find a a

309
00:18:34,139 --> 00:18:31,390
process by which you can you can date

310
00:18:37,889 --> 00:18:34,149
and you can and you could watch the

311
00:18:41,310 --> 00:18:37,899
evolution of potentially microscopic

312
00:18:46,430 --> 00:18:41,320
life in Rock by looking at the sulfur

313
00:18:58,200 --> 00:18:54,360

okay I succeeded but in any case it'll

314
00:19:03,210 --> 00:18:58,210
be right by the time I write it but it

315
00:19:06,840 --> 00:19:03,220
is it it is that collaboration is an

316
00:19:10,220 --> 00:19:06,850
example of what LC is all about is to

317
00:19:15,600 --> 00:19:10,230
take knowledge from one set of

318
00:19:22,139 --> 00:19:19,860
this is hot magma hot magma when when

319
00:19:24,539 --> 00:19:22,149
when I was told that another initiative

320
00:19:26,639 --> 00:19:24,549
here is the magma ocean I thought that

321
00:19:29,669 --> 00:19:26,649
is so cool I mean I was not aware that

322
00:19:33,320 --> 00:19:29,679
there had been a magma ocean but that

323
00:19:39,810 --> 00:19:33,330
was my lack of knowledge but at the very

324
00:19:43,279 --> 00:19:39,820
earliest times of Earth's history hot

325
00:19:48,980 --> 00:19:43,289
molten rock covered much of the globe

326
00:19:54,029 --> 00:19:48,990
and and and perhaps went way deep and

327
00:19:56,430 --> 00:19:54,039
how how the dynamics of that and the the

328
00:19:58,799 --> 00:19:56,440
heat and the composition of that are

329
00:20:01,620 --> 00:19:58,809
subject of a great deal of study

330
00:20:03,959 --> 00:20:01,630
particularly here at LC magma ocean is

331
00:20:08,399 --> 00:20:03,969
also another priority here

332
00:20:11,519 --> 00:20:08,409
and working with K and John Harland and

333
00:20:15,329 --> 00:20:11,529
others they have they've been making a

334
00:20:17,759 --> 00:20:15,339
lot of progress about what the magma

335
00:20:20,399 --> 00:20:17,769
ocean on earth might have been like and

336
00:20:25,409 --> 00:20:20,409
then also what the implications of that

337
00:20:27,029 --> 00:20:25,419
could be also working on this is Keiko

338
00:20:29,479 --> 00:20:27,039

Hammond Oh whoo I think you had the

339
00:20:33,869 --> 00:20:29,489
pleasure of hearing from this morning

340
00:20:36,689 --> 00:20:33,879
she also had a paper in nature a couple

341
00:20:41,329 --> 00:20:36,699
years ago maybe where she was talking

342
00:20:45,209 --> 00:20:41,339
about the magma ocean and extrapolating

343
00:20:48,389 --> 00:20:45,219
from the knowledge that we have of how

344
00:20:52,589 --> 00:20:48,399
the magma ocean on Venus might have made

345
00:20:55,469 --> 00:20:52,599
that planet into the you know the hot

346
00:20:57,209 --> 00:20:55,479
cauldron that it is and she's saying

347
00:20:59,579 --> 00:20:57,219
that it's possible that the magma ocean

348
00:21:02,159 --> 00:20:59,589
there instead of lasting millions of

349
00:21:05,579 --> 00:21:02,169
years could have lasted 3.5 billion

350
00:21:09,299 --> 00:21:05,589
years and again thus making it what it

351
00:21:11,909 --> 00:21:09,309
is the several years ago there was a

352
00:21:15,779 --> 00:21:11,919
perception here that they needed more

353
00:21:19,949 --> 00:21:15,789
scientists to be to be here

354
00:21:24,809 --> 00:21:19,959
to kind of get juices going Pete Hutt

355
00:21:27,329 --> 00:21:24,819
was instrumental in getting a grant from

356
00:21:29,369 --> 00:21:27,339
the Templeton Foundation several of the

357
00:21:32,629 --> 00:21:29,379
people who spoke today are part of the

358
00:21:36,779 --> 00:21:32,639
EON program LCA origins network program

359
00:21:40,049 --> 00:21:36,789
it brings people and I think it started

360
00:21:43,289 --> 00:21:40,059
as 10 now it's maybe up to 13 scientists

361
00:21:44,909 --> 00:21:43,299
from around the world they kind of have

362
00:21:47,249 --> 00:21:44,919
these schizophrenic lives where they

363
00:21:49,439 --> 00:21:47,259

spend six months here and 6 months back

364
00:21:52,319 --> 00:21:49,449
from you know back at where they are

365
00:21:55,469 --> 00:21:52,329
from and it has been just an enormous

366
00:21:57,809 --> 00:21:55,479
success in terms of spreading the word

367
00:22:02,339 --> 00:21:57,819
about LC but also bringing in a great

368
00:22:04,409 --> 00:22:02,349
deal of collaboration and I will leave

369
00:22:07,379 --> 00:22:04,419
this to Nikolas to talk about how

370
00:22:10,799 --> 00:22:07,389
there's a lot of computational work

371
00:22:15,499 --> 00:22:10,809
that's going on here like the messy

372
00:22:17,520 --> 00:22:15,509
chemistry I was referring to that has a

373
00:22:20,550 --> 00:22:17,530
computational side to it that is

374
00:22:22,950 --> 00:22:20,560
really interesting order of life I was

375
00:22:25,820 --> 00:22:22,960
just looking online and saw that there

376
00:22:28,290 --> 00:22:25,830
were a million plus hits for just this

377
00:22:32,190 --> 00:22:28,300
the origin of life hasn't necessarily

378
00:22:36,210 --> 00:22:32,200
been like a hot subject in the past but

379
00:22:38,630 --> 00:22:36,220
I think it's time is coming I hope and

380
00:22:40,950 --> 00:22:38,640
[Applause]

381
00:22:44,160 --> 00:22:40,960
Elizabeth was talking about exoplanets

382
00:22:47,310 --> 00:22:44,170
you should also just know that part of

383
00:22:49,140 --> 00:22:47,320
the Elsi mission of understanding the

384
00:22:51,390 --> 00:22:49,150
origin of the earth and the origin of

385
00:22:54,300 --> 00:22:51,400
life is also trying to understand

386
00:22:58,580 --> 00:22:54,310
aspects of exoplanet origins and

387
00:23:04,550 --> 00:22:58,590
potential life so it's quite broad and

388
00:23:08,400 --> 00:23:04,560

I'll end on this um the Hayabusa mission

389
00:23:11,970 --> 00:23:08,410
was really a remarkable experience and

390
00:23:14,840 --> 00:23:11,980
success and I don't exactly know how to

391
00:23:18,450 --> 00:23:14,850
describe this or how to explain this but

392
00:23:21,930 --> 00:23:18,460
mning that is little known in the United

393
00:23:25,200 --> 00:23:21,940
States both the incredible ingenuity

394
00:23:26,730 --> 00:23:25,210
that the that the engineers used and

395
00:23:29,310 --> 00:23:26,740
then also the fact that they actually

396
00:23:31,560 --> 00:23:29,320
brought back dust grains and that

397
00:23:35,040 --> 00:23:31,570
there's a second Hayabusa that's going

398
00:23:38,010 --> 00:23:35,050
to a different asteroid and this brings

399
00:23:42,600 --> 00:23:38,020
me to kind of my final thought about

400
00:23:46,080 --> 00:23:42,610
Elsi and for the students among you this

401
00:23:49,640 --> 00:23:46,090
is totally unfair but the world of

402
00:23:53,760 --> 00:23:49,650
science is largely done in English

403
00:23:56,640 --> 00:23:53,770
totally unfair why is Hayabusa not known

404
00:23:59,220 --> 00:23:56,650
much in the United States and elsewhere

405
00:24:02,490 --> 00:23:59,230
but most of the coverage was in Japanese

406
00:24:05,520 --> 00:24:02,500
I apologize for that but that's the way

407
00:24:08,700 --> 00:24:05,530
it is and one of the things that LC

408
00:24:12,690 --> 00:24:08,710
mandates is that everything be done in

409
00:24:15,240 --> 00:24:12,700
English and that's almost the case so

410
00:24:16,800 --> 00:24:15,250
for the for any of you who are students

411
00:24:20,070 --> 00:24:16,810
and are interested in going into these

412
00:24:22,230 --> 00:24:20,080
kinds of fields study as well as your

413
00:24:23,920 --> 00:24:22,240

chemistry study your English your spoken

414
00:24:28,920 --> 00:24:23,930
English thank you

415
00:24:28,930 --> 00:25:00,390
[Music]