Literature validation on Mars, Northern Aspect

Name	
Calcite	Two different studies, Blanco et al., 2006 and Stalport et al., 2006, showed that calcite could potentially serve as a viable way to protect potentially biotic calcite samples on Mars
Hedenbergite (manganoan)	Hamilton et al., 1998 showed doing mineralogy analysis using TES that pyroxenes, such as hedenbergite, be found on Mars
Hectorite	Ehlmann et al., 2009 showed that hectorite is prevalent on the Nili Fossae portion of Mars and Losa-Adams et al., 2014 showed that hectorite is prevalent on the Noachian terrains portion of Mars
Ilmenite	Navarrete et al., 2013 discovered that this mineral could potentially serve as a 'food' source for iron-oxidizing and iron-scavenging bacteria.
Kyanite	Much like vanadinite, no groups have confirmed presence on Mars; due to Mars' lead and sedimentary rock makeup, seems likely that this mineral is on Mars
Montmorillonite	In 2014, Opportunity, using CRISM spectral signature data, discovered the presence of this mineral in Murray Ridge, among other places on Mars
Quartz	Bandfield et al., 2004 discovered quartz using THEMIS imagery in northern Syrtis Major
Spodumene	Part of the pyroxene family, which is a very common mineral family on Mars; shown by Shkolyar and Farmer, 2012 to be a Mars-relevant mineral because of this

1
00:00:10,850 --> 00:00:08,930
I'm assuming you guys know what Mars is

2
00:00:13,520 --> 00:00:10,860
because otherwise y'all want to be here

3
00:00:15,680 --> 00:00:13,530
so that awkward introduction is now out

4
00:00:17,359 --> 00:00:15,690
of the question however linpus minds not

5
00:00:19,730 --> 00:00:17,369
all y'all may not know what that is so

6
00:00:21,470 --> 00:00:19,740
conveniently I have slides for those who

7
00:00:24,320 --> 00:00:21,480
who are from Arizona State University I

8
00:00:25,609 --> 00:00:24,330
am so sorry but your institution and

9
00:00:28,070 --> 00:00:25,619
your entire state is being covered by

10
00:00:31,070 --> 00:00:28,080
olympus mons you might want to call

11
00:00:33,410 --> 00:00:31,080
somebody about that but anyways it is

12
00:00:35,840 --> 00:00:33,420
the largest known volcano in our entire

13
00:00:38,060 --> 00:00:35,850

solar system to compare the largest

14
00:00:41,060 --> 00:00:38,070
solar the largest volcano on earth is

15
00:00:43,160 --> 00:00:41,070
Mon Aloha it is like Olympus Mons a

16
00:00:46,279 --> 00:00:43,170
shield volcano and it is 10 kilometers

17
00:00:49,220 --> 00:00:46,289
or 6.3 miles high and 120 kilometers or

18
00:00:51,560 --> 00:00:49,230
75 miles across a little small in

19
00:00:53,119 --> 00:00:51,570
comparison to this thing the volume of

20
00:00:56,000 --> 00:00:53,129
Olympus Mons is about a hundred times

21
00:00:58,670 --> 00:00:56,010
larger than that of mont aloha in fact

22
00:01:02,959 --> 00:00:58,680
the entire Hawaiian island chain could

23
00:01:06,950 --> 00:01:02,969
fit inside this ginormous shield volcano

24
00:01:08,929 --> 00:01:06,960
and figures 1 and 2 show a very

25
00:01:11,830 --> 00:01:08,939
inopportune moment that NASA had they

26
00:01:14,420 --> 00:01:11,840
could have called it 2001 L Mars Odyssey

27
00:01:17,690 --> 00:01:14,430
and they did it I mean it was right

28
00:01:19,580 --> 00:01:17,700
there NASA anyways um so this was the

29
00:01:23,359 --> 00:01:19,590
spacecraft that was launched that carry

30
00:01:25,280 --> 00:01:23,369
Themis this it contains five visible way

31
00:01:27,140 --> 00:01:25,290
five visible bands and nine infrared

32
00:01:29,149 --> 00:01:27,150
bands I focus on the infrared bands

33
00:01:33,910 --> 00:01:29,159
because it's infinitely better for

34
00:01:38,380 --> 00:01:33,920
mineral analysis alright so my mythology

35
00:01:41,120 --> 00:01:38,390
I obtained for northern aspect and

36
00:01:43,100 --> 00:01:41,130
southern aspects slope images from

37
00:01:46,010 --> 00:01:43,110
Arizona State University's Themis images

38
00:01:47,810 --> 00:01:46,020

status data website after converting

39
00:01:50,030 --> 00:01:47,820
them to an NV NV for those you who do

40
00:01:54,679 --> 00:01:50,040
not know remote sensing it's a remote

41
00:01:57,679 --> 00:01:54,689
sensing software program that pretty

42
00:02:00,039 --> 00:01:57,689
much reads all these related all obvious

43
00:02:03,319 --> 00:02:00,049
all the remote sensing related imagery

44
00:02:04,399 --> 00:02:03,329
after bringing it into NV there was a

45
00:02:06,200 --> 00:02:04,409
couple of things that I did before I

46
00:02:08,150 --> 00:02:06,210
even did any analysis first and foremost

47
00:02:10,100 --> 00:02:08,160
I examined it for noise using a

48
00:02:13,340 --> 00:02:10,110
technique called mnf or minimum minimum

49
00:02:14,750 --> 00:02:13,350
noise fraction transformation

50
00:02:19,490 --> 00:02:14,760
intially what that does is I loaded the

51
00:02:23,720 --> 00:02:19,500
nine bands individually using this tool

52
00:02:25,520 --> 00:02:23,730
and identified if there are any noise in

53
00:02:29,330 --> 00:02:25,530
the data that could potentially be posed

54
00:02:30,920 --> 00:02:29,340
problematic it passed and then I moved

55
00:02:34,610 --> 00:02:30,930
on to the atmospheric correction which

56
00:02:36,050 --> 00:02:34,620
corrects for the dust that Mars and

57
00:02:38,360 --> 00:02:36,060
particularly on top of Olympus Mons

58
00:02:40,640 --> 00:02:38,370
would experience and then after doing

59
00:02:43,430 --> 00:02:40,650
that I'd ran another M&F to make sure

60
00:02:46,160 --> 00:02:43,440
that any if there was any potentially

61
00:02:48,980 --> 00:02:46,170
problematic noise in those images that

62
00:02:52,190 --> 00:02:48,990
they were eradicated so my data would be

63
00:02:54,380 --> 00:02:52,200

hopefully as accurate as possible also

64
00:02:57,830 --> 00:02:54,390
from ASU I obtained a spectral library

65
00:03:00,800 --> 00:02:57,840
which contains 170 minerals after and

66
00:03:04,580 --> 00:03:00,810
then I sampled that toothy mice's

67
00:03:08,900 --> 00:03:04,590
infrared bands of varying wavelengths in

68
00:03:10,780 --> 00:03:08,910
micrometers so the space spectral angle

69
00:03:17,090 --> 00:03:10,790
mapper it's a physically-based

70
00:03:21,050 --> 00:03:17,100
supervised classification that matches

71
00:03:22,340 --> 00:03:21,060
pixels to a spectrum so I'm in this

72
00:03:26,480 --> 00:03:22,350
instance it was a mineral library that I

73
00:03:29,000 --> 00:03:26,490
brought in Jay Mars is the Java mission

74
00:03:31,610 --> 00:03:29,010
java mission planning and now an

75
00:03:34,040 --> 00:03:31,620
analysis remote sensing which is a su SG

76
00:03:36,760 --> 00:03:34,050
is tool if you are if you know anything

77
00:03:40,940 --> 00:03:36,770
about arcgis it's very similar to arcgis

78
00:03:43,490 --> 00:03:40,950
in terms of like the format and how it

79
00:03:44,900 --> 00:03:43,500
looks their servers a ground check for

80
00:03:46,280 --> 00:03:44,910
mineral analysis by the tests and

81
00:03:50,990 --> 00:03:46,290
tessa's the thermal emission

82
00:03:54,640 --> 00:03:51,000
spectrometer alright so this shows the

83
00:03:57,830 --> 00:03:54,650
four images that i used for olympus mons

84
00:03:59,960 --> 00:03:57,840
the rest of the information side of the

85
00:04:02,000 --> 00:03:59,970
eye is irrelevant issues an basic image

86
00:04:04,310 --> 00:04:02,010
identifier the eye is the more important

87
00:04:06,260 --> 00:04:04,320
one it shows that they're infrared and I

88
00:04:08,600 --> 00:04:06,270

try to get images that were either on

89
00:04:12,380 --> 00:04:08,610
top over as close to as possible around

90
00:04:15,230 --> 00:04:12,390
the same time all during day and that

91
00:04:19,640 --> 00:04:15,240
were clearly enough and without you know

92
00:04:21,080 --> 00:04:19,650
much of any built-in noise due to the

93
00:04:23,810 --> 00:04:21,090
way that the images were collected in

94
00:04:25,080 --> 00:04:23,820
case Themis head bad hair day that day

95
00:04:27,810 --> 00:04:25,090
or something like that

96
00:04:29,820 --> 00:04:27,820
alright so the results over the next

97
00:04:31,560 --> 00:04:29,830
couple of slides I'll be showing they're

98
00:04:37,590 --> 00:04:31,570
pretty much identical but they feature a

99
00:04:41,450 --> 00:04:37,600
table and then this image right here on

100
00:04:45,719 --> 00:04:41,460
all of them is the infrared energy

101
00:04:47,490 --> 00:04:45,729
imagery after doing the to mnf and as

102
00:04:48,900 --> 00:04:47,500
well as M aspheric correction and also

103
00:04:51,270 --> 00:04:48,910
doing a technique called D striping

104
00:04:53,129 --> 00:04:51,280
which as the name implies remove stripes

105
00:04:57,120 --> 00:04:53,139
in the data which could potentially hold

106
00:05:00,090 --> 00:04:57,130
that data for purposes of the way these

107
00:05:04,020 --> 00:05:00,100
are oriented everything is facing this

108
00:05:06,210 --> 00:05:04,030
way so this is north this is the second

109
00:05:08,670 --> 00:05:06,220
Sam or spectral anger map or

110
00:05:11,430 --> 00:05:08,680
classification and then all of these

111
00:05:13,020 --> 00:05:11,440
colors correspond to the ones that the

112
00:05:15,840 --> 00:05:13,030
that were selected for being the most

113
00:05:22,020 --> 00:05:15,850

prevalent using the cursor located tool

114
00:05:26,000 --> 00:05:22,030
in NB so this is for the first image

115
00:05:30,150 --> 00:05:26,010
that was north-facing slope and then its

116
00:05:31,170 --> 00:05:30,160
counterpart the south-facing slope and

117
00:05:32,790 --> 00:05:31,180
the thing that's really interesting to

118
00:05:35,550 --> 00:05:32,800
note about this is like how a lot of

119
00:05:37,740 --> 00:05:35,560
these geological features just light up

120
00:05:41,790 --> 00:05:37,750
like crazy on the during the spectral

121
00:05:44,190 --> 00:05:41,800
anger mapper tools to like particularly

122
00:05:48,930 --> 00:05:44,200
this part right here amongst these

123
00:05:52,680 --> 00:05:48,940
colors and then another north and aspect

124
00:05:53,760 --> 00:05:52,690
one again same thing like it's really

125
00:05:56,279 --> 00:05:53,770
enjoying the note the geological

126
00:05:57,570 --> 00:05:56,289
features that like this this part of the

127
00:06:00,990 --> 00:05:57,580
completest doesn't show up at all in the

128
00:06:08,279 --> 00:06:01,000
Sam but the rest of it is pretty

129
00:06:10,440 --> 00:06:08,289
noteworthy and then this one was an

130
00:06:13,230 --> 00:06:10,450
image that was potentially problematic

131
00:06:15,810 --> 00:06:13,240
but I included it if only for this part

132
00:06:19,409 --> 00:06:15,820
right here I really I found it really

133
00:06:22,860 --> 00:06:19,419
interesting that I'm in the magenta

134
00:06:24,029 --> 00:06:22,870
mineral and the blue mineral we're like

135
00:06:28,589 --> 00:06:24,039
kind of running on top of each other

136
00:06:33,570 --> 00:06:28,599
during this entire time alright so the

137
00:06:34,980 --> 00:06:33,580
next two tables shows the the literature

138
00:06:37,050 --> 00:06:34,990

validation on Mars both the northern

139
00:06:38,379 --> 00:06:37,060
aspect at the northern aspect in the

140
00:06:40,670 --> 00:06:38,389
southern ass

141
00:06:42,800 --> 00:06:40,680
there's a couple of ones that are very

142
00:06:47,300 --> 00:06:42,810
noteworthy to mention first and foremost

143
00:06:50,420 --> 00:06:47,310
is eliminate it is the most it was found

144
00:06:52,309 --> 00:06:50,430
to be the most prevalent mineral on the

145
00:06:56,119 --> 00:06:52,319
northern aspect which is interesting to

146
00:06:58,369 --> 00:06:56,129
note because of what this research group

147
00:07:00,290 --> 00:06:58,379
found that this mineral potentially

148
00:07:02,390 --> 00:07:00,300
service of food source for iron oxidized

149
00:07:04,939 --> 00:07:02,400
and iron scavenging bacteria which is

150
00:07:08,930 --> 00:07:04,949
cool because Mars is I was like covered

151
00:07:10,309 --> 00:07:08,940
in iron now mind you of course I'm not

152
00:07:11,869 --> 00:07:10,319
trying to make assumptions but this

153
00:07:13,909 --> 00:07:11,879
study was obviously done on earth and

154
00:07:15,409 --> 00:07:13,919
not in Mars and even though but was done

155
00:07:18,879 --> 00:07:15,419
in Mars like environments with it being

156
00:07:20,930 --> 00:07:18,889
in a mostly oxygen-deprived environment

157
00:07:22,670 --> 00:07:20,940
it's still and she is still very

158
00:07:24,740 --> 00:07:22,680
interesting to note the other two

159
00:07:29,300 --> 00:07:24,750
minerals I want to highlight on this

160
00:07:32,390 --> 00:07:29,310
particular slide is calcite and courts

161
00:07:35,170 --> 00:07:32,400
so calcite the two research studies that

162
00:07:37,249 --> 00:07:35,180
I mentioned on here one of them found

163
00:07:38,629 --> 00:07:37,259

that the rapid increase of the

164
00:07:40,969 --> 00:07:38,639
crystalline structure develop under

165
00:07:43,010 --> 00:07:40,979
biotic conditions makes these calcite

166
00:07:44,629 --> 00:07:43,020
minerals less resistant to thermal

167
00:07:47,360 --> 00:07:44,639
treatments compared with the samples of

168
00:07:49,249 --> 00:07:47,370
abiotic origin therefore the infrared

169
00:07:51,499 --> 00:07:49,259
spectroscopy isabella technique to

170
00:07:53,480 --> 00:07:51,509
discern the origin of the samples and a

171
00:07:56,149 --> 00:07:53,490
powerful tool for analyzing insight to

172
00:07:58,749 --> 00:07:56,159
and sample return Mars mission specimens

173
00:08:01,820 --> 00:07:58,759
and that was from Blanco the latter one

174
00:08:03,860 --> 00:08:01,830
their research their results of their

175
00:08:05,570 --> 00:08:03,870
research show that it is encouraging for

176
00:08:07,760 --> 00:08:05,580
a possible preservation of mineral

177
00:08:09,800 --> 00:08:07,770
biotic calcite structures on Mars for

178
00:08:12,649 --> 00:08:09,810
billions of years furthermore they

179
00:08:14,269 --> 00:08:12,659
suggest that the future Mars Landers be

180
00:08:15,769 --> 00:08:14,279
equipped with instruments to both heat

181
00:08:20,240 --> 00:08:15,779
and away minerals to determine whether

182
00:08:21,559 --> 00:08:20,250
they have been supported by life Oh in

183
00:08:25,850 --> 00:08:21,569
case you not familiar with what cruising

184
00:08:28,189 --> 00:08:25,860
chrism is it's like Themis but I real I

185
00:08:29,149 --> 00:08:28,199
know it is it was out of scope I didn't

186
00:08:30,649 --> 00:08:29,159
want included because I didn't want to

187
00:08:32,060 --> 00:08:30,659
clear way too much data so for the

188
00:08:36,500 --> 00:08:32,070

purposes of the study cruising was out

189
00:08:38,659 --> 00:08:36,510
of scope for my study but the acronym is

190
00:08:40,850 --> 00:08:38,669
compact REE consonants and it's famous

191
00:08:42,230 --> 00:08:40,860
spectrometer for mars and the reason why

192
00:08:44,930 --> 00:08:42,240
opportunity used it is because

193
00:08:47,720 --> 00:08:44,940
opportunity had an unfortunate

194
00:08:50,660 --> 00:08:47,730
circumstance where opportunity wasn't

195
00:08:51,620 --> 00:08:50,670
able to like curiosity able to actually

196
00:08:53,720 --> 00:08:51,630
like

197
00:08:56,810 --> 00:08:53,730
use his own spectrometer so it had a

198
00:09:00,560 --> 00:08:56,820
broad it screws them data had a assisted

199
00:09:03,220 --> 00:09:00,570
a little bit so finally with courts FEMA

200
00:09:07,570 --> 00:09:03,230
scientists so those who actually created

201
00:09:10,810 --> 00:09:07,580
and helped run this instrument

202
00:09:14,330 --> 00:09:10,820
discovered courts and realize that

203
00:09:16,460 --> 00:09:14,340
courts on Mars isn't the same then it

204
00:09:18,350 --> 00:09:16,470
likely come about the same origin as

205
00:09:19,700 --> 00:09:18,360
courts on earth due to the fact that

206
00:09:21,980 --> 00:09:19,710
there's really not that many plate

207
00:09:25,670 --> 00:09:21,990
tectonics or if any plate tectonics on

208
00:09:27,440 --> 00:09:25,680
Mars as far as we know so they proposed

209
00:09:29,870 --> 00:09:27,450
that it may have formed when thick

210
00:09:31,910 --> 00:09:29,880
sequences of us sadak rocks where meant

211
00:09:33,310 --> 00:09:31,920
metamorphosize by moderate heat and

212
00:09:36,980 --> 00:09:33,320
pressure and then partially melted

213
00:09:39,620 --> 00:09:36,990

that's interesting because this was

214
00:09:44,690 --> 00:09:39,630
discovered i was i noticed this mineral

215
00:09:46,880 --> 00:09:44,700
on a volcano so that might help with the

216
00:09:49,520 --> 00:09:46,890
validation attempt with that furthermore

217
00:09:50,960 --> 00:09:49,530
the scientists mentioned that the

218
00:09:52,970 --> 00:09:50,970
granite like rocks are rare in the

219
00:09:55,430 --> 00:09:52,980
Martian surface and say that this

220
00:10:00,230 --> 00:09:55,440
process that formed them has not been

221
00:10:03,230 --> 00:10:00,240
widespread all right and then for the

222
00:10:07,010 --> 00:10:03,240
southern aspect the most prevalent

223
00:10:09,830 --> 00:10:07,020
minerals that were discovered in on this

224
00:10:13,820 --> 00:10:09,840
particular portion our holo sight mellow

225
00:10:16,160 --> 00:10:13,830
night and been in the night what's

226
00:10:18,950 --> 00:10:16,170
interesting to note about bana tonight

227
00:10:23,450 --> 00:10:18,960
is that as I mentioned as it mentions on

228
00:10:26,480 --> 00:10:23,460
and a slide there yes there aren't there

229
00:10:29,030 --> 00:10:26,490
hasn't been any documented research to

230
00:10:31,910 --> 00:10:29,040
show that it has or has not ever been

231
00:10:34,460 --> 00:10:31,920
confirmed on Mars but because bana

232
00:10:36,590 --> 00:10:34,470
tonight is the min is the result of

233
00:10:38,870 --> 00:10:36,600
oxidation of lead and espanha

234
00:10:40,760 --> 00:10:38,880
sedimentary rocks and given Mars is made

235
00:10:43,280 --> 00:10:40,770
up of lead and also of sedimentary rocks

236
00:10:47,150 --> 00:10:43,290
it seems likely that this mineral is on

237
00:10:53,270 --> 00:10:47,160
Mars another interesting thing to note

238
00:10:55,610 --> 00:10:53,280

about this mineral is that a simple

239
00:10:58,190 --> 00:10:55,620
superoxide is at work on Mars in this

240
00:10:59,810 --> 00:10:58,200
particular scenario a combination of UV

241
00:11:01,910 --> 00:10:59,820
and super oxide would essentially

242
00:11:03,560 --> 00:11:01,920
sterilize the Martian surface stripping

243
00:11:04,740 --> 00:11:03,570
in of all of its organic precursors to

244
00:11:06,690 --> 00:11:04,750
life

245
00:11:08,790 --> 00:11:06,700
they are quoted to say the oxygen

246
00:11:10,470 --> 00:11:08,800
radicals can explain the reactive nature

247
00:11:12,840 --> 00:11:10,480
of the soil and the apparent absence of

248
00:11:19,050 --> 00:11:12,850
the organic material at the Martian

249
00:11:21,420 --> 00:11:19,060
surface alright so conclusions it should

250
00:11:25,350 --> 00:11:21,430
be noted that this study was the pilot

251
00:11:28,200 --> 00:11:25,360
study while there were other research

252
00:11:31,080 --> 00:11:28,210
groups that looked at other places on

253
00:11:33,270 --> 00:11:31,090
Mars as was mentioned in previous slides

254
00:11:37,230 --> 00:11:33,280
it wasn't they weren't actually they

255
00:11:39,390 --> 00:11:37,240
never focused on Olympus Mons so I used

256
00:11:42,150 --> 00:11:39,400
techniques the techniques I mentioned in

257
00:11:44,610 --> 00:11:42,160
my previous slides were done based upon

258
00:11:47,010 --> 00:11:44,620
what previous researchers have done what

259
00:11:48,690 --> 00:11:47,020
my own intuition told me and because it

260
00:11:51,270 --> 00:11:48,700
was a pilot study I figured it was

261
00:11:52,770 --> 00:11:51,280
interesting to just kind of like go to

262
00:11:55,140 --> 00:11:52,780
go down a rabbit hole but not go down

263
00:11:59,100 --> 00:11:55,150

all the way so that's first and foremost

264
00:12:01,500 --> 00:11:59,110
with the conclusions secondly I found

265
00:12:03,900 --> 00:12:01,510
some interesting results with respect to

266
00:12:04,980 --> 00:12:03,910
eliminate and vanna denied and the other

267
00:12:06,210 --> 00:12:04,990
ones that i mentioned that were in most

268
00:12:08,010 --> 00:12:06,220
probably been on the northern a southern

269
00:12:10,530 --> 00:12:08,020
aspect of olympus mons that they're

270
00:12:12,540 --> 00:12:10,540
clearly very different which might

271
00:12:14,300 --> 00:12:12,550
eventually show that maybe they're

272
00:12:18,180 --> 00:12:14,310
different in terms of how they formed

273
00:12:20,220 --> 00:12:18,190
furthermore the infrared bands of Themis

274
00:12:22,829 --> 00:12:20,230
are their spatial resolution or 100

275
00:12:25,190 --> 00:12:22,839
meters so because of that their pixels

276
00:12:27,960 --> 00:12:25,200
obviously contains likely a lot more

277
00:12:30,660 --> 00:12:27,970
minerals than my razors actually showed

278
00:12:32,270 --> 00:12:30,670
however even though I you know selected

279
00:12:36,300 --> 00:12:32,280
the ones that were the most Parliament

280
00:12:42,270 --> 00:12:36,310
it should be noted that without very

281
00:12:43,860 --> 00:12:42,280
intense facial resolution it's not it's

282
00:12:45,090 --> 00:12:43,870
likely a little difficult to like

283
00:13:03,139 --> 00:12:45,100
actually legitimately ground truth

284
00:13:06,990 --> 00:13:05,550
so you pulled out a few specific

285
00:13:09,360 --> 00:13:07,000
minerals that you discussed and kind of

286
00:13:11,400 --> 00:13:09,370
what those can mean um but looking at

287
00:13:14,400 --> 00:13:11,410
this mineral assemblage as a whole can I

288
00:13:16,199 --> 00:13:14,410

like what you saw all together you know

289
00:13:18,240 --> 00:13:16,209
kind of integrating everything all these

290
00:13:20,879 --> 00:13:18,250
different minerals the fact that they're

291
00:13:22,620 --> 00:13:20,889
you know all on olympus mons what do you

292
00:13:24,870 --> 00:13:22,630
think that means for the geologic

293
00:13:27,269 --> 00:13:24,880
history of olympus mons honestly I think

294
00:13:29,639 --> 00:13:27,279
um you know it's definitely very very

295
00:13:32,430 --> 00:13:29,649
rich a lot of them that I found were

296
00:13:33,660 --> 00:13:32,440
like paroxetine based which has been

297
00:13:35,939 --> 00:13:33,670
documented to show that there's quite a

298
00:13:39,509 --> 00:13:35,949
lot of them that are related to that

299
00:13:41,550 --> 00:13:39,519
major group of minerals but I mean

300
00:13:44,309 --> 00:13:41,560
there's because this is just the first

301
00:13:46,410 --> 00:13:44,319
you know study that was done I'm hoping

302
00:13:47,970 --> 00:13:46,420
in the future I'll be able to do a

303
00:13:49,499 --> 00:13:47,980
different iteration of this and maybe do

304
00:13:52,980 --> 00:13:49,509
with different techniques to see if AI

305
00:13:55,319 --> 00:13:52,990
can replicate this and be to look to

306
00:14:01,530 --> 00:13:55,329
sample other minerals just to see where

307
00:14:03,629 --> 00:14:01,540
they're at very interesting talk I found

308
00:14:05,970 --> 00:14:03,639
it quite surprising the abundance of

309
00:14:08,370 --> 00:14:05,980
phyllo silicates and carbonates they

310
00:14:12,120 --> 00:14:08,380
found the slopes those are minerals that

311
00:14:15,090 --> 00:14:12,130
typically are formed in the presence of

312
00:14:16,379 --> 00:14:15,100
water so I'm just curious what you

313
00:14:18,929 --> 00:14:16,389

thought about finding those on the

314
00:14:20,340 --> 00:14:18,939
slopes of the biggest volcano in the in

315
00:14:23,790 --> 00:14:20,350
the solar system yeah I was the same way

316
00:14:25,259 --> 00:14:23,800
I was like calcite really what um so

317
00:14:26,699 --> 00:14:25,269
that's why I wanted to make sure that

318
00:14:28,050 --> 00:14:26,709
like that's part of the reason why I

319
00:14:29,340 --> 00:14:28,060
wanted to validate everything so that's

320
00:14:31,740 --> 00:14:29,350
why I when I found those two studies

321
00:14:33,749 --> 00:14:31,750
like I guess in my mind it definitely

322
00:14:36,300 --> 00:14:33,759
seems that it could potentially I mean

323
00:14:39,509 --> 00:14:36,310
it's again a very big stretch that the

324
00:14:42,269 --> 00:14:39,519
biotic calcite samples if they do indeed

325
00:14:44,670 --> 00:14:42,279
exist on olympus mons obviously it's

326
00:14:47,040 --> 00:14:44,680
impossible to like literally go there

327
00:14:49,590 --> 00:14:47,050
because curiosity can make it up there

328
00:14:51,629 --> 00:14:49,600
we can't make it up there if we when we

329
00:14:58,530 --> 00:14:51,639
do get to Mars but it definitely merits

330
00:15:02,880 --> 00:15:00,630
I also really liked your calcite results

331
00:15:05,340 --> 00:15:02,890
a little spawn so I was wondering do you

332
00:15:08,610 --> 00:15:05,350
find them associated industries from a

333
00:15:13,560 --> 00:15:08,620
variation of calcite with iron and their

334
00:15:14,910 --> 00:15:13,570
matrix um well with respect to like you

335
00:15:19,730 --> 00:15:14,920
know that I find a like on top of it or

336
00:15:22,560 --> 00:15:19,740
maybe iron oh well I mean there's a I

337
00:15:24,750 --> 00:15:22,570
the way this mineral announce the way

338
00:15:26,940 --> 00:15:24,760

this mineral library works is it doesn't

339
00:15:30,000 --> 00:15:26,950
show like anything like in it it just

340
00:15:31,500 --> 00:15:30,010
shows like it's it ranks it by purity so

341
00:15:32,550 --> 00:15:31,510
it's very likely that if some of them

342
00:15:34,680 --> 00:15:32,560
are in Pierre they could have been like

343
00:15:37,740 --> 00:15:34,690
cross contaminated with another sample

344
00:15:39,540 --> 00:15:37,750
but unfortunately the mineral library

345
00:15:41,580 --> 00:15:39,550
that I did doesn't look into to see if

346
00:15:44,390 --> 00:15:41,590
it's like calcite in the presence of X

347
00:15:47,850 --> 00:15:44,400
or Y or anything like that unfortunately