



On Phone
Question From Media



1
00:00:05,740 --> 00:00:08,920
>>> GOOD MORNING AND WELCOME TO
NASA HEADQUARTERS IN WASHINGTON.

2
00:00:08,920 --> 00:00:20,900
MY NAME IS DWAYNE BROWN.

3
00:00:20,900 --> 00:00:29,800
THEY'LL PROVIDE THE THOUGHTS AND
THEORIES OF THE POSSIBILITIES OF

4
00:00:29,800 --> 00:00:34,730
WHAT THIS COULD MEAN FOR LIFE
BEYOND EARTH.

5
00:00:34,730 --> 00:00:42,040
WE'LL HAVE BRIEFINGS FROM
PARTICIPANTS AND OPEN UP OUR

6
00:00:42,040 --> 00:00:45,750
PHONE LINES AND SOCIAL MEDIA.

7
00:00:45,750 --> 00:00:58,830
ANY UPDATES ARE AVAILABLE ONLINE
AT WWW.NASA/MARS ALSO NASA.GOV

8
00:00:58,830 --> 00:01:05,159
JOURNEY TO MARS AND FOLLOW THE
CONVERSATION AND THE

9
00:01:05,159 --> 00:01:09,380
CONVERSATION IS PHENOMENAL ALL
OVER THE WORLD OF WHAT IS

10
00:01:09,380 --> 00:01:11,979
HAPPENING AND WHAT WILL BE
TALKED ABOUT TODAY.

11
00:01:11,979 --> 00:01:14,740

SOCIAL MEDIA, YOUTUBE, TWITTER,
FACEBOOK.

12

00:01:14,740 --> 00:01:18,600

AND SEND IN YOUR QUESTIONS
TO †#ASKNASA.

13

00:01:18,600 --> 00:01:22,270

WE HAVE A LOT TO COVER.

14

00:01:22,270 --> 00:01:25,640

LET ME INTRODUCE YOU TO TODAY'S
PARTICIPANTS.

15

00:01:25,640 --> 00:01:29,510

FIRST UP JOHN GRUNSFELD.

16

00:01:29,510 --> 00:01:34,960

FIVE TIME ASTRONAUT.

17

00:01:34,960 --> 00:01:47,070

>> JIM GREEN, DIRECTOR OF
PLANETARY SCIENCE, NASA

18

00:01:47,070 --> 00:01:51,170

HEADQUATERS.

19

00:01:51,170 --> 00:01:55,609

MICHAEL MEYER, LEAD SCIENTIST
FOR THE MARS EXPLORATION

20

00:01:55,609 --> 00:01:57,310

PROGRAM.

21

00:01:57,310 --> 00:01:58,310

NASA HEADQUATERS.

22

00:01:58,310 --> 00:02:03,350

AND LADIES AND GENTLEMEN,

JOINING US VIA PHONE FROM

23

00:02:03,350 --> 00:02:08,060
FRANCE, INDIVIDUALS ATTENDING
THE EUROPEAN PLANETARY SCIENCE

24

00:02:08,060 --> 00:02:16,360
CONFERENCE, ALFRED MCEWEN
FOR

25

00:02:16,360 --> 00:02:24,150
THE UNIVERSITY
OF ARIZONA TUCSAN

26

00:02:24,150 --> 00:02:31,030
AND LUJENDRA†OJHA AND JOINING US
IS MARY BETH WILHELM.

27

00:02:31,030 --> 00:02:35,080
HOLD ON TO YOUR SEATS AND YOUR
HATS AND I'LL TURN IT OVER TO

28

00:02:35,080 --> 00:02:38,490
JOHN.

29

00:02:38,490 --> 00:02:39,530
>> THANK YOU FOR COMING.

30

00:02:39,530 --> 00:02:42,280
THIS IS A VERY EXCITING
DISCUSSION WE'RE GOING TO HAVE

31

00:02:42,280 --> 00:02:43,670
TODAY.

32

00:02:43,670 --> 00:02:49,810
SCIENCE AT NASA IS ALL ABOUT
INNOVATING, EXPLORING, DISCOVERY

33

00:02:49,810 --> 00:02:53,890
AND INSPIRING AND WE HAVE SOME
VERY INNOVATIVE INSTRUMENTS

34
00:02:53,890 --> 00:02:57,570
ORBITING MARS ON THE SURFACE OF
MARS.

35
00:02:57,570 --> 00:02:59,400
STATE OF THE ART TECHNOLOGY.

36
00:02:59,400 --> 00:03:03,070
WE'RE STARTING TO PUT TOGETHER A
MUCH MORE INTERESTING PICTURE OF

37
00:03:03,070 --> 00:03:04,210
WHAT MARS IS LIKE.

38
00:03:04,210 --> 00:03:08,620
I DREW UP DURING THE ERA WHEN
VIKINGS HAD LANDED ON MARS AND

39
00:03:08,620 --> 00:03:13,540
REVEALED A DESERT-LIKE PLANET
APPARENTLY DEAD AND NOT AS

40
00:03:13,540 --> 00:03:16,190
INTERESTING AS WE SEE IT REALLY
IS.

41
00:03:16,190 --> 00:03:19,340
OUR INSTRUMENTS TODAY ARE
SHOWING US A MUCH MORE DYNAMIC

42
00:03:19,340 --> 00:03:22,730
AND COMPLEX PLANET AND ONE THAT
IS EXCITING FOR A NUMBER OF

43
00:03:22,730 --> 00:03:26,290
REASONS WHICH I'LL DESCRIBE AND

WHEN WE EXPLORE WE MAKE

44

00:03:26,290 --> 00:03:29,680

DISCOVERIES AND THAT'S REALLY
THE HUMAN ELEMENT.

45

00:03:29,680 --> 00:03:31,930

DISCOVERY IS WHY WE DO SCIENCE.

46

00:03:31,930 --> 00:03:34,040

WE'RE TRYING TO ANSWER
FUNDAMENTAL QUESTIONS ABOUT OUR

47

00:03:34,040 --> 00:03:38,430

UNIVERSITY, ABOUT OUR HOME
PLANET, ABOUT OUR SOLAR SYSTEM,

48

00:03:38,430 --> 00:03:44,760

QUESTIONS LIKE WHERE DID WE COME
FROM, WHERE ARE WE GOING?

49

00:03:44,760 --> 00:03:54,190

AND ARE WE ALONE.

50

00:03:54,190 --> 00:03:56,470

IN THIS CASE AND ONE OF THE
REASONS I'M WEARING MY ASTRONAUT

51

00:03:56,470 --> 00:03:59,190

JACKET IS BECAUSE WE ARE GOING
TO MARS.

52

00:03:59,190 --> 00:04:05,330

OUR JOURNEY TO MARS IS A SCIENCE
LED EXPEDITION NOW BUT SOON

53

00:04:05,330 --> 00:04:08,500

WE'LL BE SENDING HUMANS TO THE
RED PLANET TO EXPLORE AND

54
00:04:08,500 --> 00:04:12,900
SCIENCE WILL LEAD THE WAY AND
TODAY'S ANNOUNCEMENT OF A REALLY

55
00:04:12,900 --> 00:04:17,220
FASCINATING RESULT ABOUT CURRENT
WATER ON MARS IS ONE OF THE

56
00:04:17,220 --> 00:04:21,090
REASONS WHY I FEEL IT'S EVEN
MORE IMPERATIVE THAT WE SEND

57
00:04:21,090 --> 00:04:24,650
ASTROBIOLOGISTS AND PLANETARY
SCIENTISTS TO MARS TO EXPLORE

58
00:04:24,650 --> 00:04:27,859
THE QUESTION OF IS THERE LIFE ON
MARS.

59
00:04:27,859 --> 00:04:33,539
>> ONE OF THE THINGS THAT
EXCITES ME ABOUT COMING TO WORK

60
00:04:33,539 --> 00:04:35,310
EVERY DAY.

61
00:04:35,310 --> 00:04:38,719
THE WAY THAT WE DO THAT IS TO
USE OUR ANALYTICAL INSTRUMENTS.

62
00:04:38,719 --> 00:04:41,229
THESE ARE SOMEWITH A COMPLEX
INSTRUMENTS.

63
00:04:41,229 --> 00:04:47,020
IT'S BECAUSE WE'RE TRYING TO
OBSERVE THAT THIS IS SO

64

00:04:47,020 --> 00:04:50,819
DIFFICULT BUT THE MORE WE
OBSERVE MARS THE MORE

65
00:04:50,819 --> 00:04:53,630
INFORMATION WE'RE GETTING THAT
IT REALLY IS A FASCINATING

66
00:04:53,630 --> 00:04:54,909
PLANET.

67
00:04:54,909 --> 00:04:58,999
FROM THE CURIOSITY ROVER WE NOW
KNOW THAT MARS ONCE WAS A PLANET

68
00:04:58,999 --> 00:05:00,729
VERY MUCH LIKE EARTH.

69
00:05:00,729 --> 00:05:04,650
WITH WARM SALTY SEAS, FRESH
WATER LAKES, PROBABLY SNOW

70
00:05:04,650 --> 00:05:08,210
CAPPED PEAKS AND CLOUDS AND A
WATER CYCLE JUST LIKE WE'RE

71
00:05:08,210 --> 00:05:11,020
STUDYING HERE ON EARTH.

72
00:05:11,020 --> 00:05:16,699
BUT SOMETHING HAS HAPPENED TO
MARS THAT LAST IT'S WATER.

73
00:05:16,699 --> 00:05:21,310
WE STILL HAVE AN ATMOSPHERE ON
THE SURFACE FOR THE MOST PART.

74
00:05:21,310 --> 00:05:26,940
WE STILL HAVE THIS QUESTION, WAS
LIFE ON MARS ONCE AND WE STILL

75

00:05:26,940 --> 00:05:33,919
HAVE CLUES ABOUT THAT.

76

00:05:33,919 --> 00:05:37,169
IF LIFE STARTED ON MARS
3.5†BILLION YEARS AGO, DID ANY

77

00:05:37,169 --> 00:05:38,169
SURVIVE?

78

00:05:38,169 --> 00:05:39,919
IS THERE ANY LIFE ON MARS TODAY?

79

00:05:39,919 --> 00:05:44,060
THAT'S A FASCINATING QUESTION.

80

00:05:44,060 --> 00:05:47,749
TECHNOLOGICALLY WE CAN ANSWER
AND WE CAN ANSWER IT BY SENDING

81

00:05:47,749 --> 00:05:51,979
ROVERS AND BY SENDING PEEL AND I
LOOK FORWARD ON THAT DAY OF OUR

82

00:05:51,979 --> 00:05:53,289
JOURNEY TO MARS.

83

00:05:53,289 --> 00:05:57,909
THE DISCOVERY WE'RE GOING TO
TALK ABOUT TODAY REALLY IS MOST

84

00:05:57,909 --> 00:06:01,779
EXCITING BECAUSE IT SUGGESTS
THAT IT WOULD BE POSSIBLE FOR

85

00:06:01,779 --> 00:06:05,059
THERE TO BE LIFE TODAY ON MARS
AND WITH THAT I'M GOING TO TURN

86

00:06:05,059 --> 00:06:09,379

IT OVER TO JIM GREEN TO DESCRIBE
A LITTLE MORE DETAIL AND

87

00:06:09,379 --> 00:06:10,379

BACKGROUND.

88

00:06:10,379 --> 00:06:11,400

>> THANK YOU VERY MUCH, JOHN.

89

00:06:11,400 --> 00:06:14,699

WE'RE MAKING ENORMOUS PROGRESS
WITH OUR CURRENT ORBITERS AND

90

00:06:14,699 --> 00:06:20,719

ROVERS AS JOHN MENTIONED AND
THIS IS REALLY TO LOOK AT MARS

91

00:06:20,719 --> 00:06:24,550

BECAUSE IT IS THE PLANET MOST
LIKE THE EARTH.

92

00:06:24,550 --> 00:06:30,460

IT'S THE DESTINATION FOR HUMAN
EXPLORATION AND BEYOND.

93

00:06:30,460 --> 00:06:35,090

IF WE GO BACK 10 BILLION YEARS
AND TAKE A LOOK AT MARS IT WAS A

94

00:06:35,090 --> 00:06:37,090

VERY DIFFERENT PLANET.

95

00:06:37,090 --> 00:06:42,650

IT HAD AN EXTENSIVE ATMOSPHERE
AND WHAT WE BELIEVE WAS A HUGE

96

00:06:42,650 --> 00:06:46,819

OCEAN, PERHAPS AS LARGE AS
2-THIRDS OF THE NORTHERN

97

00:06:46,819 --> 00:06:51,569
HEMISPHERE AND THAT OCEAN MAY
HAVE BEEN AS MUCH AS A MILE

98

00:06:51,569 --> 00:06:52,770
DEEP.

99

00:06:52,770 --> 00:06:57,710
MARS HAD EXTENSIVE WATER
RESOURCES.

100

00:06:57,710 --> 00:06:59,620
BUT SOMETHING HAPPENED.

101

00:06:59,620 --> 00:07:04,969
MARS SUFFERED A MAJOR CLIMATE
CHANGE AND LOST IT'S SURFACE

102

00:07:04,969 --> 00:07:12,849
WATER.

103

00:07:12,849 --> 00:07:16,939
OUR ROVERS ARE FINDING THERE'S A
LOT MORE HUMIDITY IN THE AIR

104

00:07:16,939 --> 00:07:19,400
THAN WE EVER IMAGINED.

105

00:07:19,400 --> 00:07:24,749
THE SOILS ARE MOIST AND HYDRATED
FULL OF WATER.

106

00:07:24,749 --> 00:07:28,050
THESE DISCOVERIES ARE VERY
IMPORTANT BUT THEY WERE ONLY

107

00:07:28,050 --> 00:07:31,729
PART OF THE HYDROLOGICAL CYCLE
ON MARS THAT WE'RE JUST NOW

108
00:07:31,729 --> 00:07:34,889
BEGINNING TO UNDERSTAND.

109
00:07:34,889 --> 00:07:38,979
WHAT WE'RE GOING TO ANNOUNCE
TODAY IS THAT MARS IS NOT THE

110
00:07:38,979 --> 00:07:43,550
DRY PLANET WE THOUGHT OF IN THE
PAST.

111
00:07:43,550 --> 00:07:47,620
TODAY WE'RE GOING TO ANNOUNCE
THAT UNDER CERTAIN CIRCUMSTANCES

112
00:07:47,620 --> 00:07:52,580
LIQUID WATER HAS BEEN FOUND ON
MARS AND TO GIVE MORE OF A

113
00:07:52,580 --> 00:07:56,659
BACKGROUND ON THOSE RESULTS, LET
ME TURN IT OVER TO MIKE MEYER.

114
00:07:56,659 --> 00:07:57,659
MICHAEL.

115
00:07:57,659 --> 00:07:58,729
>> THANK YOU, JIM.

116
00:07:58,729 --> 00:08:04,189
FOR THE FIRST TIME WE HAVE
ORBITAL EVIDENCE OF THE AGENT

117
00:08:04,189 --> 00:08:09,499
THAT HAS ENABLED WATER TO FLOW
ON THE SURFACE OF TODAY'S MARS.

118

00:08:09,499 --> 00:08:15,189

FOR YEARS WE WE HAD ORBITAL
SPACECRAFT, IMAGING, VALLEYS,

119

00:08:15,189 --> 00:08:19,969

CREEKS, GULLIES, ALL OF THEM
LOOKED LIKE WATER HAD SOMETHING

120

00:08:19,969 --> 00:08:23,569

TO DO WITH FORMING THEM BUT WE
DIDN'T HAVE PROOF.

121

00:08:23,569 --> 00:08:30,190

IT WASN'T UNTIL ABOUT FOUR YEARS
AGATHA WE FOUND THE ACTIVE

122

00:08:30,190 --> 00:08:35,370

PROCESS ON MARS TODAY THAT
SHOWED THAT WATER WAS THE LIKELY

123

00:08:35,370 --> 00:08:37,360

CULPRIT.

124

00:08:37,360 --> 00:08:42,240

THESE ARE CALLED RETURNING, RSL
THROUGH THE REST OF THE PRESS

125

00:08:42,240 --> 00:08:46,810

CONFERENCE TO SAVE EVERYBODY THE
TROUBLE OF SAYING IT.

126

00:08:46,810 --> 00:08:50,990

THESE ARE DARK STREAKS THAT FORM
IN LATE SPRING AND GROW THROUGH

127

00:08:50,990 --> 00:08:55,420

THE SUMMER AND THEN DISAPPEAR BY
FALL.

128

00:08:55,420 --> 00:08:59,660

HOWEVER, FOR FOUR YEARS THE
SCIENTIFIC COMMUNITY HAS BEEN

129

00:08:59,660 --> 00:09:06,690

UNABLE TO EXPLAIN THE WAXING AND
WANING OF THESE ON THE SURFACE.

130

00:09:06,690 --> 00:09:12,450

THEY HELPED US DETERMINE A
BROADER DISTRIBUTION OF RSL THAN

131

00:09:12,450 --> 00:09:13,470

WE EXPECTED.

132

00:09:13,470 --> 00:09:19,019

WE'RE ALSO FINDING THAT THEY ARE
EXPANDED LATITUDES.

133

00:09:19,019 --> 00:09:23,040

THESE OBSERVATIONS NARROWED THE
CONSTRAINTS FOR HOW RSL MIGHT

134

00:09:23,040 --> 00:09:29,759

FORM BUT THERE HAVE BEEN NO
EVIDENCE FOR WATER.

135

00:09:29,759 --> 00:09:34,790

UNTIL NOW IT'S THROUGH THE
MULTIPLE SPACECRAFT AND

136

00:09:34,790 --> 00:09:39,269

OBSERVATIONS THAT WE HAVE BEEN
ABLE TO MAKE THIS DISCOVERY.

137

00:09:39,269 --> 00:09:46,689

I'LL TURN IT OVER TO DWYANE THAT
WILL PASS IT ON.

138

00:09:46,689 --> 00:09:54,190
>> LET'S PASS IT ON AND LET'S
SEE WHAT THIS EXCITEMENT IS ALL

139
00:09:54,190 --> 00:10:04,139
ABOUT YOU'LL HEAR FIRST FROM
ALFRED MCEWEN AND THEN

140
00:10:04,139 --> 00:10:07,749
LUJENDRA†OJHA.

141
00:10:07,749 --> 00:10:13,740
>> I'M GOING TO PROVIDE SOME
BACKGROUND ON THE RSL AND HAVE

142
00:10:13,740 --> 00:10:22,250
TO EXPLAIN WHY WE HAVE SUCH A
HORRIBLE ACRONYM.

143
00:10:22,250 --> 00:10:32,010
WE CAN ARGUE ABOUT HOW IT'S
FORMED AND WE'RE STUCK WITH RSL.

144
00:10:32,010 --> 00:10:41,389
SO I'M GOING TO GIVE A LITTLE
BACKGROUND TO DESCRIBE HIS NEW

145
00:10:41,389 --> 00:10:42,519
RESULTS.

146
00:10:42,519 --> 00:10:48,450
SO THIS TITLE SLIDE IS THE
TITLE OF THE PAPER THAT HAS

147
00:10:48,450 --> 00:10:56,370
BEEN RELEASED TODAY AND THIS IS
A VIEW AS IF WE'RE ON THE

148
00:10:56,370 --> 00:10:58,400
GROURND.

149

00:10:58,400 --> 00:11:02,259

THE ARROWS ARE POINTING TO THE TIPS OF THESE RSL.

150

00:11:02,259 --> 00:11:08,069

THEY ACTUALLY BEGIN WAY UP IN THE TOPS OF THIS HILL HERE AND

151

00:11:08,069 --> 00:11:14,620

AS THEY FLOW DOWN OVER THE BEDROCK AND THAT'S WHEN THEY

152

00:11:14,620 --> 00:11:17,569

STAND OUT MORE DISTINCTLY SO THESE ARE FEATURES WE'RE TALKING

153

00:11:17,569 --> 00:11:26,620

ABOUT AND IF I CAN GO TO THE NEXT GRAPH THIS WILL SHOW YOU

154

00:11:26,620 --> 00:11:33,320

THE BLACK AND WHITE IMAGES.

155

00:11:33,320 --> 00:11:45,279

IT'S ALL ALONG THE NORTH AND WEST FACING ACRE.

156

00:11:45,279 --> 00:11:50,040

ON THE RIGHT IS AN ANIMATED GIF AND SHOWS THE SEQUENCE WHERE

157

00:11:50,040 --> 00:11:53,700

THEY START TO FORL IN THE EARLY SUMMER.

158

00:11:53,700 --> 00:11:55,270

THEY GROW.

159

00:11:55,270 --> 00:12:00,389
EITHER GRADUALLY, VERY GRADUALLY
OR INCREMENTALLY AND THEN THEY

160
00:12:00,389 --> 00:12:07,940
STOP GROWING AND THEY FADE AND
THEN THEY DISAPPEAR, THE

161
00:12:07,940 --> 00:12:11,510
FOLLOWING SUMMER NEW ONES GROW.

162
00:12:11,510 --> 00:12:18,180
THAT'S THE SEQUENCE OF EVENTS WE
HAVE BEEN OBSERVING OVER THE

163
00:12:18,180 --> 00:12:25,360
LAST FOUR YEARS OR SO AND THESE
FEATURES ARE VERY SENSITIVE TO

164
00:12:25,360 --> 00:12:26,360
THE TEMPERATURE.

165
00:12:26,360 --> 00:12:27,529
THEY FORM AT DIFFERENT TILES.

166
00:12:27,529 --> 00:12:30,660
AT DIFFERENT LATITUDES ON MARS.

167
00:12:30,660 --> 00:12:35,009
ALL RELATED TO THE SEASONAL
VARIATIONS AT THOSE LOCATIONS.

168
00:12:35,009 --> 00:12:39,160
SO THEY'RE VERY TEMPERATURE
DEPENDENT AND THE DARKENING AND

169
00:12:39,160 --> 00:12:42,190
THE TEMPERATURE DEPENDENCE CAN
BE EXPLAINED IF THESE ARE SEEPS

170

00:12:42,190 --> 00:12:47,610

OF WATER THAT SEEP THROUGH THE
SHALLOW SURFACE LAYER AND DARKEN

171

00:12:47,610 --> 00:12:51,779

THE VERY SURFACE LAYER BUT WE
HAD NO DIRECT DETECTION OF

172

00:12:51,779 --> 00:12:52,779

WATER.

173

00:12:52,779 --> 00:12:56,750

THAT WAS JUST OUR BEST GUESS OF
WHAT THESE WERE.

174

00:12:56,750 --> 00:13:02,310

YOU GO TO THE NEXT SLIDE THIS IS
A GLOBAL MAP OF MARS AND IT

175

00:13:02,310 --> 00:13:04,990

SHOWS TOTALLY CONFIRMED RSL.

176

00:13:04,990 --> 00:13:08,209

THIS NEEDS TO BE UPDATED.

177

00:13:08,209 --> 00:13:10,460

IT'S THE SAME GENERAL PATTERN.

178

00:13:10,460 --> 00:13:12,230

THERE'S THREE REGIONS.

179

00:13:12,230 --> 00:13:15,490

ONE IS THE SOUTHERN MID
LATITUDES.

180

00:13:15,490 --> 00:13:24,310

AND THERE ARE A FEW OTHER SPOTS
AND IN THE NORTHERN HEMISPHERE

181

00:13:24,310 --> 00:13:28,290

WE'VE SEEN QUITE A FEW OF THESE.

182

00:13:28,290 --> 00:13:42,350

HE'S GOING TO TALK ABOUT HIS
ANOTHER IS THE CRATER I SHOWED

183

00:13:42,350 --> 00:13:47,670

YOU THE ANIMATED GIF FOR AND
THEN WE SEE THEM IN THE CENTRAL

184

00:13:47,670 --> 00:13:55,640

PEAKS AND JOHN MENTIONED THE
VIKING RESULTS.

185

00:13:55,640 --> 00:14:02,620

WELL, NORMAN HOROWITZ WAS ON THE
EXPERIMENT OF THE VIKING LANDERS

186

00:14:02,620 --> 00:14:07,100

DH WAS SEARCHING FOR LIFE ON
MARS.

187

00:14:07,100 --> 00:14:12,800

IT HAD A NEGATIVE RESULT
ALTHOUGH THERE MAY BE REASONS

188

00:14:12,800 --> 00:14:20,769

FOR THAT AND THEN THE LAST SLIDE
I'M GOING TO SHOW YOU, THIS JUST

189

00:14:20,769 --> 00:14:25,519

SHOWS MARS AND IT'S ORBIT AROUND
THE SUN, THIS IS TO EXPLAIN

190

00:14:25,519 --> 00:14:28,370

ABOUT WHY WE SEE THESE AT
DIFFERENT TIMES AND DIFFERENT

191

00:14:28,370 --> 00:14:36,690
PLACES AND IN SEASONS LIKE EARTH
WHEN THE POLES ARE POINTING

192
00:14:36,690 --> 00:14:44,540
TOWARD THE SUN IT'S SUMMER AND
WINTER WHEN IT'S POINTING AWAY.

193
00:14:44,540 --> 00:14:50,930
MARS HAS A NON-CENTRIC ORBIT.

194
00:14:50,930 --> 00:14:56,089
WE HAVE SHORT AND HOT SOUTHERN
SUMMERS AND COOLER LONGER

195
00:14:56,089 --> 00:15:02,060
NORTHERN SUMMERS SO WE SEE THE
RSL IN SOUTHERN SUMMERS AND

196
00:15:02,060 --> 00:15:05,649
SOUTHERN HEMISPHERE, WE SEE THEM
IN NORTHERN SPRING AND THE

197
00:15:05,649 --> 00:15:09,779
NORTHERN HEMISPHERE AND IN THE
EQUATOR WE SEE THEM YEAR AROUND.

198
00:15:09,779 --> 00:15:16,250
THE SLOPE IS ACTIVE IN THE
SEASON WHEN THAT SLOPE IS

199
00:15:16,250 --> 00:15:21,130
GETTING THE MOST SUN.

200
00:15:21,130 --> 00:15:25,209
WITH THAT I'LL TURN IT OVER TO
EXPLAIN THE NEW RESULTS.

201
00:15:25,209 --> 00:15:27,149
>> GOOD MORNING.

202

00:15:27,149 --> 00:15:33,830

IT'S TRULY AN HONOR TO BE
ADDRESSING THIS CROWD ABOUT OUR

203

00:15:33,830 --> 00:15:34,830

RESULT AND DISCOVERY.

204

00:15:34,830 --> 00:15:39,139

WE HAVE BEEN INVESTIGATING THESE
NARROW STREETS ON MARS EVER

205

00:15:39,139 --> 00:15:45,720

SINCE THEIR DISCOVERY: AND WE
KNOW FROM PRIOR INVESTIGATIONS

206

00:15:45,720 --> 00:15:53,040

THAT IT'S IDEAL FOR LIQUID WATER
TO EXIST ON THE SURFACE.

207

00:15:53,040 --> 00:15:58,449

HOWEVER, THE KEY EVIDENCE WAS
MISSING AND THAT WAS THE

208

00:15:58,449 --> 00:15:59,480

CHEMICAL IDENTITY.

209

00:15:59,480 --> 00:16:04,129

AN EXCELLENT WAY TO VALIDATE THE
HYPOTHESIS THAT LIQUID WATER

210

00:16:04,129 --> 00:16:11,769

PLAYS A KEY ROLE IN THE
MECHANISM OF THESE IS WHAT I'LL

211

00:16:11,769 --> 00:16:14,380

BE TALKING ABOUT IN THIS SLIDE.

212

00:16:14,380 --> 00:16:20,790

SO IF YOU SEE THE SLIDE THERE'S
SHOOTING RAYS DOWN.

213

00:16:20,790 --> 00:16:27,351

THAT'S BASICALLY AN EXCELLENT
EXAMPLE TO SEE THE THEORY IS WE

214

00:16:27,351 --> 00:16:29,600

CAN RECOGNIZE VARIOUS COLORS.

215

00:16:29,600 --> 00:16:35,879

THE REASON THEY LOOK GREEN TO
OUR HUMAN EYES IS THE

216

00:16:35,879 --> 00:16:49,040

CHLOROPHYLL ABSORBS ALL THE
OTHERS AND THE GREEN LIGHT.

217

00:16:49,040 --> 00:16:53,759

WE CAN VIEW THE SURFACE OF MARS
IN DIFFERENT COLOR WHICH IS WHAT

218

00:16:53,759 --> 00:16:56,839

YOU SEE IN THIS ILLUSTRATION.

219

00:16:56,839 --> 00:17:02,350

AND SEE HOW LIGHT IS ABSORBED BY
MINERALS ON THE SURFACE.

220

00:17:02,350 --> 00:17:09,560

WE HAVE AN EXCELLENT ONE ON
BOARD WHICH IS WHAT YOU SEE AND

221

00:17:09,560 --> 00:17:11,760

IT CAN OBSERVE THE SURFACE OF
MARS.

222

00:17:11,760 --> 00:17:17,600

WHAT WE DID IS WE WENT THROUGH
THESE PLACES WHERE WE SEE THESE

223

00:17:17,600 --> 00:17:22,549

AND OBSERVED THE INTERACTION
BETWEEN LIGHT AND THE SURFACE

224

00:17:22,549 --> 00:17:25,730

MATERIAL TO SEE IF THERE WAS ANY
EVIDENCE TO SUPPORT OUR

225

00:17:25,730 --> 00:17:26,730

HYPOTHESIS.

226

00:17:26,730 --> 00:17:36,350

SO IF YOU GO TO THE NEXT SLIDE,
YOU'RE SEEING ANIMATED DARK

227

00:17:36,350 --> 00:17:40,320

NARROW SEEPS FLOWING OUT OF
THEM.

228

00:17:40,320 --> 00:17:42,940

THIS CAN CONTAIN HUNDREDS.

229

00:17:42,940 --> 00:17:47,669

THIS IS THE SAME PEAK THAT
ALFRED WAS EARLIER TALKING

230

00:17:47,669 --> 00:17:48,669

ABOUT.

231

00:17:48,669 --> 00:17:51,520

WE LOOKED AT THE SURFACE USING
THE INSTRUMENT I DESCRIBED

232

00:17:51,520 --> 00:17:54,390

BEFORE TO SEE IF THERE WAS ANY
EVIDENCE FOR THE LIQUID WATER

233

00:17:54,390 --> 00:17:55,410

HYPOTHESIS.

234

00:17:55,410 --> 00:17:59,450
SO IF YOU GO TO THE NEXT SLIDE,
I CAN SHOW YOU SOME OF THE

235

00:17:59,450 --> 00:18:01,940
RESULTS.

236

00:18:01,940 --> 00:18:07,580
HERE YOU CAN SEE TWO BLACK LINES
WHICH ARE OUR OBSERVATION FROM

237

00:18:07,580 --> 00:18:11,429
THE EXACT PLACE WHERE WE SAW THE
NARROW STREETS IN THE PREVIOUS

238

00:18:11,429 --> 00:18:12,429
ONE.

239

00:18:12,429 --> 00:18:17,210
THESE SQUIGGLY LINES YOU CAN
OBSERVE DIPS IN THEM.

240

00:18:17,210 --> 00:18:25,460
IF YOU READ THE AXIS YOU CAN SEE
THEY'RE FROM 1.9 MICRONS WHICH

241

00:18:25,460 --> 00:18:29,809
MEANS LIGHT IS BEING ABSORBED BY
WHATEVER IS PRESENT ON THE

242

00:18:29,809 --> 00:18:30,809
SURFACE.

243

00:18:30,809 --> 00:18:40,100
YOU SEE THE SAME THING ABOUT
2.14 MICRONS AND THERE'S A FEW

244

00:18:40,100 --> 00:18:43,930
OTHER SMALLER ABSORPTION
FEATURES HERE.

245
00:18:43,930 --> 00:18:48,820
WE CAN GO TO OUR LABORATORY AND
FIND OUT WHICH ONES CAN ABSORB

246
00:18:48,820 --> 00:18:58,740
LIGHT AT THE WAVELENGTH AND I
LABELED IT LABORATORY

247
00:18:58,740 --> 00:19:00,160
OBSERVATION.

248
00:19:00,160 --> 00:19:10,789
IT'S WELL MAPPED BY SALT AND
CHLORINE AND THEY'RE HYDRATED.

249
00:19:10,789 --> 00:19:17,740
THE FACT THAT THEY'RE HYDRATED
MEANS THERE'S PRESENCE OF WATER

250
00:19:17,740 --> 00:19:19,779
IN THEIR CRYSTAL STRUCTURE.

251
00:19:19,779 --> 00:19:25,140
IT OBSERVES THE SURFACE OF MARS
EVERY DAY AT 3:00†P.M.

252
00:19:25,140 --> 00:19:28,740
WHICH IS
THE DRIEST TIME OF THE DAY SO

253
00:19:28,740 --> 00:19:31,990
MOST OF THE LIQUID WATER WOULD
HAVE BEEN COMPLETELY EVAPORATED

254
00:19:31,990 --> 00:19:36,770
HOWEVER, THE MOLECULAR WATER

TRAPPED INSIDE THE SALT

255

00:19:36,770 --> 00:19:41,000

STRUCTURE WOULD BE MORE STABLE
AND THAT'S WHAT WE OBSERVE HERE.

256

00:19:41,000 --> 00:19:45,510

THIS MEANS THAT THE SOURCE OF
HYDRATION OR SOURCE OF MOLECULAR

257

00:19:45,510 --> 00:19:52,700

WATER IS EITHER DUE TO THE
FEATURES OF RSL OR OTHER

258

00:19:52,700 --> 00:19:59,710

PROCESSES THAT CREATED
THESE

259

00:19:59,710 --> 00:20:00,710

STREAKS.

260

00:20:00,710 --> 00:20:07,399

REGARDLESS IT MEANS THEY'RE
FORMED INTO CONTEMPORARY†LIQUID

261

00:20:07,399 --> 00:20:08,399

WATER.

262

00:20:08,399 --> 00:20:16,490

IF WE GO TO THE NEXT SLIDE, YOU
CAN SEE ARROWS POINTING TO SOME

263

00:20:16,490 --> 00:20:19,820

DATED STREETS FLOWING OUT OF THE
CRATER WALL.

264

00:20:19,820 --> 00:20:25,190

THIS IS FROM LOCATION IN THE
SOUTHERN HEMISPHERE OF MARS.

265

00:20:25,190 --> 00:20:28,350

WE HAVE MULTIPLE OBSERVATIONS
FROM DIFFERENT TIMES.

266

00:20:28,350 --> 00:20:33,779

HOWEVER WE SEE THE HYDRATED SALT
ONLY WHEN THE STREETS ARE

267

00:20:33,779 --> 00:20:34,779

BIGGEST.

268

00:20:34,779 --> 00:20:38,809

OTHER TIMES WE DON'T SEE
HYDRATION.

269

00:20:38,809 --> 00:20:47,510

IT'S THE SOURCE OF MOLECULAR
WATER IS EITHER DUE TO THE

270

00:20:47,510 --> 00:20:52,640

PRESENCE OF RSL OR SOME OTHER
PROCESSES THAT CREATED RSL.

271

00:20:52,640 --> 00:20:58,010

REGARDLESS, AGAIN, THE PRESENCE
OF HYDRATED SALT MEANS THAT

272

00:20:58,010 --> 00:20:59,140

THESE FEATURES ARE DUE TO
CONTEMPORARY†LIQUID WATER.

273

00:20:59,140 --> 00:21:07,250

IF WE GO TO THE NEXT SLIDE, THE
PRESENCE ALSO HAS SOME OTHER BIG

274

00:21:07,250 --> 00:21:10,720

IMPLICATION FOR WATER ON MARS.

275

00:21:10,720 --> 00:21:14,740

YOU CAN SEE THE PURE WATER
STABILITY HERE ON EARTH.

276

00:21:14,740 --> 00:21:19,039
IF YOU TAKE LIQUID WATER ON
EARTH IT WILL REMAIN IN THE

277

00:21:19,039 --> 00:21:22,840
LIQUID FORM UNTIL YOU HIT 0
DEGREES CELCIUS.

278

00:21:22,840 --> 00:21:26,260
AT 100 DEGREES IT WILL MELT.

279

00:21:26,260 --> 00:21:37,090
ON

280

00:21:37,090 --> 00:21:45,070
MARS IT'S THE SAME IT WILL
THIN BUT IT WILL START BOILING

281

00:21:45,070 --> 00:21:48,720
AS SOON AS IT REACHES CLOSE TO
10 DEGREES CELSIUS.

282

00:21:48,720 --> 00:21:55,929
THEREFORE PURE LIQUID WATER IS
UNSTABLE ON MARS.

283

00:21:55,929 --> 00:22:00,399
NEXT CONSIDER A WATER MIXED.

284

00:22:00,399 --> 00:22:04,720
IF THAT HAPPENS THEN THE
STABILITY OF A SALTY LIQUID

285

00:22:04,720 --> 00:22:06,710
WATER ON THE SURFACE OF MARS
VASTLY INCREASES.

286

00:22:06,710 --> 00:22:12,840

AS YOU CAN SEE IN THE GRAPHIC,
IT WILL REMAIN IN A LIQUID FORM

287

00:22:12,840 --> 00:22:16,640

UNTIL WE HIT NEGATIVE 70 DEGREES
CELSIUS AND WILL NOT START

288

00:22:16,640 --> 00:22:21,240

BOILING UNTIL IT'S 24 DEGREES
CELSIUS.

289

00:22:21,240 --> 00:22:32,690

THEREFORE THE PRESENCE INCREASES
ON MARS.

290

00:22:32,690 --> 00:22:36,989

I'M GOING TO TURN IT TO MARY
BETH.

291

00:22:36,989 --> 00:22:40,240

>> THANK YOU, GENTLEMEN AND WE
WILL NOW HEAR FROM MARY BETH

292

00:22:40,240 --> 00:22:41,240

WILHELM.

293

00:22:41,240 --> 00:22:45,539

WE WILL GO TO THE WEST COAST.

294

00:22:45,539 --> 00:22:47,160

MARY BETH.

295

00:22:47,160 --> 00:22:48,780

>> THANKS DEWAYNE.

296

00:22:48,780 --> 00:22:52,760

HE DISCUSSED THE FIRST MAJOR
IMPLICATION OF OUR EARTH WHICH

297

00:22:52,760 --> 00:22:56,179

IS INCREASED STABILITY OF WATER
ON MARS.

298

00:22:56,179 --> 00:23:03,970

NOW I'LL DISCUSS THE BROADER
SIGNIFICANCE OF OUR FINDINGS.

299

00:23:03,970 --> 00:23:07,321

SO THEY HAVE A SPECIAL
CAPABILITY PER TAKE TO THE

300

00:23:07,321 --> 00:23:10,200

ABSORPTION OF ATMOSPHERIC WATER.

301

00:23:10,200 --> 00:23:16,880

BASICALLY, IF THE HUMIDITY GETS
HIGH ENOUGH THE SALTS WILL

302

00:23:16,880 --> 00:23:21,120

ABSORB THE ATMOSPHERIC WATER
UNTIL IT FORMS A LIQUID

303

00:23:21,120 --> 00:23:28,680

SOLUTION.

304

00:23:28,680 --> 00:23:31,510

SO THIS SORT OF PHYSICAL PROCESS
CAN EXPLAIN THE FUTURES THAT WE

305

00:23:31,510 --> 00:23:33,120

OBSERVED HERE.

306

00:23:33,120 --> 00:23:38,059

THE DARKER PACKAGES MAY BE
FORMED.

307

00:23:38,059 --> 00:23:42,320

IT IS ALSO POSSIBLE THAT THE
FORMATION OF RSL IS DUE TO OTHER

308

00:23:42,320 --> 00:23:45,970

TYPES OF PROCESSES WHICH WE
WON'T GO TO HERE.

309

00:23:45,970 --> 00:23:52,390

FOR CHLORINES HAVE AN ABILITY
TO DISSOLVE IN WATER.

310

00:23:52,390 --> 00:23:55,510

SO OUR OBSERVATIONS COULD ALSO
BE EXPLAINED BY OTHER LIQUID

311

00:23:55,510 --> 00:23:59,230

WATER SOURCE DISSOLVING FOR
THOSE NATURALLY PRESENT IN THE

312

00:23:59,230 --> 00:24:02,279

SOIL AND LATER DEPOSITING THEM
AS A SOLID IN HIGHER

313

00:24:02,279 --> 00:24:05,399

CONCENTRATION.

314

00:24:05,399 --> 00:24:11,940

SO HERE YOU SEE A MAP.

315

00:24:11,940 --> 00:24:17,130

THEY INDICATE PLACES ON THE
SURFACE WHERE THEY HAVE

316

00:24:17,130 --> 00:24:20,320

PREVIOUSLY BEEN DETECTED BY
ROVERS OR LANDERS.

317

00:24:20,320 --> 00:24:29,940

IT IS SUSPECTED TO BE PRESENT AT
BOTH OF THE VIKING LANDINGS AND

318

00:24:29,940 --> 00:24:37,220

WAS SEEN IN THE LATE 2000S.

319

00:24:37,220 --> 00:24:41,830

OUR DETECTION AT RSL SITES SHOWN
HERE IN BLUE ARE THE FIRST TO BE

320

00:24:41,830 --> 00:24:45,190

MADE USING DATA ACQUIRED BY AN
ORBITER.

321

00:24:45,190 --> 00:24:48,120

WE INCREASED THE NUMBER OF KNOWN
LOCATIONS OF THIS IMPORTANT

322

00:24:48,120 --> 00:24:52,409

RESOURCE ON THE SURFACE SHOWING
THAT THEY'RE PERHAPS MORE WIDELY

323

00:24:52,409 --> 00:24:56,770

DISTRIBUTED THAN PREVIOUSLY
THOUGHT.

324

00:24:56,770 --> 00:25:01,200

SO TO SUMMARIZE, OUR FINDINGS
STRONGLY SUGGEST THAT THESE ARE

325

00:25:01,200 --> 00:25:04,370

FORMED BY LIQUID WATER ON
PRESENT DAY MARS.

326

00:25:04,370 --> 00:25:08,880

THE DETECTION OF HYDRATED PER
CHLROATES INDICATES IT'S BRINEY

327

00:25:08,880 --> 00:25:10,940

AND NOT PURE.

328

00:25:10,940 --> 00:25:19,830
SO
WATER AS I'M SURE MANY OF YOU

329
00:25:19,830 --> 00:25:22,399
HEARD US SAY ON MULTIPLE
OCCASIONS IS AN ESSENTIAL

330
00:25:22,399 --> 00:25:24,539
INGREDIENT FOR LIFE.

331
00:25:24,539 --> 00:25:27,460
OUR RESULTS MAY POINT TO MORE
HABITABLE CONDITIONS ON THE NEAR

332
00:25:27,460 --> 00:25:30,510
SURFACE OF MARS THAN PREVIOUSLY
THOUGHT.

333
00:25:30,510 --> 00:25:35,230
HERE POTENTIAL HABITABILITY IS
UNCLEAR.

334
00:25:35,230 --> 00:25:39,090
TO ASSESS HABITABILITY WE'D NEED
TO DETERMINE HOW COLD AND HOW

335
00:25:39,090 --> 00:25:44,970
CONCENTRATE THE BRINE IS BUT THE
DETECTION WARRANTS FURTHER

336
00:25:44,970 --> 00:25:52,250
CHARACTERIZATION AND EXPLORATION
OF THESE UNIQUE REGIONS ON MARS.

337
00:25:52,250 --> 00:26:03,320
WATER MAYBE IMPORTANT FOR
EXPLORERS OF MARS.

338
00:26:03,320 --> 00:26:06,799

LOOKING FORWARD IS IMPERATIVE
FOR US TO FURTHER UNDERSTAND THE

339

00:26:06,799 --> 00:26:09,260

SOURCE OF THIS WATER FOR THESE
FEATURES.

340

00:26:09,260 --> 00:26:12,250

AND WITH THAT I'LL TURN IT BACK
OVER TO YOU DWAYNE AT NASA

341

00:26:12,250 --> 00:26:13,250

HEADQUARTERS.

342

00:26:13,250 --> 00:26:14,590

>> THANK YOU.

343

00:26:14,590 --> 00:26:19,350

NOW WE'LL TRANSITION TO OUR
QUESTION AND ANSWER.

344

00:26:19,350 --> 00:26:22,350

WE HAVE A LOT OF MEDIA NOT ONLY
HERE IN WASHINGTON BUT ON THE

345

00:26:22,350 --> 00:26:24,669

PHONE LINES AND WE WANT TO GET
TO SOCIAL MEDIA.

346

00:26:24,669 --> 00:26:27,179

SO I'M GOING TO ASK YOU WAIT FOR
THE MIC.

347

00:26:27,179 --> 00:26:29,190

PLEASE LIMIT YOUR QUESTION TO
ONE.

348

00:26:29,190 --> 00:26:31,910

WE'LL TRY TO GET TO AS MANY
QUESTIONS.

349

00:26:31,910 --> 00:26:34,610

OUR PARTICIPANTS WILL BE HERE
FOLLOWING THE PRESS CONFERENCE.

350

00:26:34,610 --> 00:26:37,350

WE HAVE A GENTLEMAN HERE.

351

00:26:37,350 --> 00:26:42,270

IF WE CAN GET A MIC HERE, YOUR
NAME.

352

00:26:42,270 --> 00:26:44,789

>> I'D LIKE TO TRY TO PIN YOU
DOWN GIVEN ALL THIS NEW

353

00:26:44,789 --> 00:26:48,140

EVIDENCE, HOW LIKELY DO YOU
THINK IT IS, A 1 TO 10 POINT

354

00:26:48,140 --> 00:26:51,440

SCALE OR WHATEVER YOU CHOOSE
THAT TODAY THERE IS SOME FORM OF

355

00:26:51,440 --> 00:26:52,720

LIFE ON MARS?

356

00:26:52,720 --> 00:26:53,720

>> OKAY.

357

00:26:53,720 --> 00:26:59,929

I GUESS EVERYONE IS LOOKING AT
ME SO I'LL GIVE YOU MY FEELING.

358

00:26:59,929 --> 00:27:04,780

WHEN YOU LOOK AT EARTH, WATER IS
AN ESSENTIAL INGREDIENT IN JUST

359

00:27:04,780 --> 00:27:08,049

ABOUT-- EVERYWHERE WE GO
WHETHER IT'S LIQUID WATER,

360

00:27:08,049 --> 00:27:16,200

WHETHER IT'S DEEP IN THE EARTH
OR IN REGIONS WE FIND.

361

00:27:16,200 --> 00:27:19,890

WE HAVEN'T BEEN ABLE TO ANSWER
THE QUESTION IS LIFE BEYOND

362

00:27:19,890 --> 00:27:23,990

EARTH BUT IT'S CRITICAL OF THAT.

363

00:27:23,990 --> 00:27:28,690

WE NOW HAVE GREAT OPPORTUNITIES
TO BE IN THE RIGHT LOCATIONS ON

364

00:27:28,690 --> 00:27:35,520

MARS TO INVESTIGATE THAT AND I
THINK THE ACTUAL WATER ON THE

365

00:27:35,520 --> 00:27:41,149

SURFACE ALLOWS US WITH SURFACE
MOBILITY IN OUR ASSETS NOW AND

366

00:27:41,149 --> 00:27:45,050

IN THE FUTURE TO BE ABLE TO
INVESTIGATE THAT AND LOOK FOR

367

00:27:45,050 --> 00:27:47,389

LIFE AND MAKE THAT POSITIVE
IDENTIFICATION.

368

00:27:47,389 --> 00:27:49,519

>> GO AHEAD, JOHN.

369

00:27:49,519 --> 00:27:50,940

I'M SORRY.

370

00:27:50,940 --> 00:27:53,900

>> I JUST THINK THE REALLY
EXCITING THING ABOUT THIS IS

371

00:27:53,900 --> 00:28:02,200

THAT OUR VIEW OF MARS OF THIS
ANCIENT MARS HAS BEEN REALLY

372

00:28:02,200 --> 00:28:08,389

ABOUT SEEKING CHEMICAL FOSSILS
OF POSSIBLE PAST LIFE ON MARS.

373

00:28:08,389 --> 00:28:13,200

THE EXISTENCE OF LIQUID WATER
EVEN IF IT'S SUPER SALTY WATER

374

00:28:13,200 --> 00:28:18,060

GIVES THE POSSIBILITY THAT IF
THERE'S LIFE ON MARS THAT WE

375

00:28:18,060 --> 00:28:22,309

HAVE A WAY TO DESCRIBE HOW IT
WOULD SURVIVE AND WE'RE NOW AT A

376

00:28:22,309 --> 00:28:29,960

POINT TECHNOLOGICALLY THAT WE
HAVE THE CAPABILITY TO GO THERE

377

00:28:29,960 --> 00:28:33,040

AND ASK THIS QUESTION OF IS
THERE LIFE ON MARS AND ANSWER

378

00:28:33,040 --> 00:28:34,040

IT.

379

00:28:34,040 --> 00:28:36,720

THIS IS TO ME THE MOST EXCITING
THING IS NOW THAT QUESTION IS

380

00:28:36,720 --> 00:28:40,620
NOT AN ABSTRACT SCIENTIFIC
QUESTION.

381
00:28:40,620 --> 00:28:47,990
IT'S A CONCRETE ONE THAT WE CAN
ANSWER.

382
00:28:47,990 --> 00:28:53,110
>> WE HAVE ONLY ONE EXAMPLE OF
LIFE.

383
00:28:53,110 --> 00:28:54,110
AND THAT'S US.

384
00:28:54,110 --> 00:28:55,110
THIS IS IT.

385
00:28:55,110 --> 00:28:56,260
ON PLANET EARTH.

386
00:28:56,260 --> 00:28:58,649
WE DON'T KNOW HOW IT STARTED.

387
00:28:58,649 --> 00:29:02,110
SO ONE OF THE THINGS THAT WE
FOUND AT MARS IS WE KNOW THAT

388
00:29:02,110 --> 00:29:05,519
MARS COULD HAVE SUPPORTED LIFE
AT LEAST WHAT WE KNOW ABOUT

389
00:29:05,519 --> 00:29:06,519
LIFE.

390
00:29:06,519 --> 00:29:09,690
BUT WE DON'T KNOW HOW LIFE
STARTED HERE SO WE DON'T KNOW IF

391

00:29:09,690 --> 00:29:12,539
IT IS POSSIBLE FOR LIFE TO HAVE
STARTED ON MARS.

392
00:29:12,539 --> 00:29:17,440
SO THAT'S A HUGE QUESTION AND
ONLY THROUGH THAT EXPLORATION

393
00:29:17,440 --> 00:29:27,929
ARE
WE GOING TO NARROW IT DOWN

394
00:29:27,929 --> 00:29:34,490
AND GET A DIRECT ANSWER WE CAN
BEGIN A BETTER SEARCH AND BE

395
00:29:34,490 --> 00:29:35,940
MORE METHODOICAL.

396
00:29:35,940 --> 00:29:39,919
WE CAN LOOK AND SEE IF WE CAN
DETERMINE IF THERE IS SOME SORT

397
00:29:39,919 --> 00:29:43,960
OF NETWORK THAT MAY BE SUPPLYING
THESE.

398
00:29:43,960 --> 00:29:44,960
WE DON'T KNOW THAT.

399
00:29:44,960 --> 00:29:49,600
THERE'S OTHER THEORIES AND OTHER
IDEAS BUT THAT IS THE NEXT STEP.

400
00:29:49,600 --> 00:29:53,870
HOW MUCH WATER THAT WHEN IT LEFT
THE PLANET WENT INTO THE SOIL?

401
00:29:53,870 --> 00:29:59,510
AND WENT UNDER GROUND AND IS

THERE EXPLORATION FOR US.

402

00:29:59,510 --> 00:30:06,419

AND IF THERE ARE RESOURCES WE
CAN PROBE WE MIGHT BE ABLE TO

403

00:30:06,419 --> 00:30:09,590

ANSWER THAT QUESTION PRETTY
QUICKLY.

404

00:30:09,590 --> 00:30:11,210

>> SO THAT QUESTION PROBABLY
KNOCKED OFF HALF OF THE

405

00:30:11,210 --> 00:30:12,650

QUESTIONS WE'RE GOING TO GET
TODAY.

406

00:30:12,650 --> 00:30:16,779

LET ME SEE IF OUR SCIENTISTS IN
FRANCE OR MARY BETH IF YOU ALL

407

00:30:16,779 --> 00:30:18,330

WANT TO CHIME IN WITH THAT
QUESTION.

408

00:30:18,330 --> 00:30:20,409

WE'LL START WITH FRANCE.

409

00:30:20,409 --> 00:30:21,409

ALFRED.

410

00:30:21,409 --> 00:30:27,250

>> I WILL JUST SAY I THINK THE
POSSIBILITY OF LIFE IS CERTAINLY

411

00:30:27,250 --> 00:30:34,039

HIGH AND THERE'S LIFE SOMEWHERE
IN MARS AND MARS HAS RECEIVED

412

00:30:34,039 --> 00:30:35,409

METEORITES FROM EARTH.

413

00:30:35,409 --> 00:30:39,970

IT'S BEEN CONTAMINATED FROM
EARTH AND IT'S VERY LIKELY, I

414

00:30:39,970 --> 00:30:45,970

THINK, THAT THERE'S LIFE
SOMEWHERE IN THE CRUST OF MARS

415

00:30:45,970 --> 00:30:49,440

MICROBES BUT WHERE IS IT?

416

00:30:49,440 --> 00:30:51,690

HOW ACCESSIBLE IS IT?

417

00:30:51,690 --> 00:30:53,889

MAYBE THERE'S SOMETHING THAT WE
CAN FIND CLOSE TO THE SURFACE

418

00:30:53,889 --> 00:30:57,630

AND THAT'S WHAT IS EXCITING BUT
TO ME THE CHANCES OF THERE BEING

419

00:30:57,630 --> 00:31:04,820

LIFE IN THE SUB SURFACE OF MARS
HAS ALWAYS BEEN VERY HIGH.

420

00:31:04,820 --> 00:31:12,299

>> JUST A REMINDER, SEND IN YOUR
QUESTIONS AT #ASK NASA AND WE'LL

421

00:31:12,299 --> 00:31:14,750

CONTINUE HERE AT HEADQUARTERS
BEFORE WE GO TO THE PHONE LINES

422

00:31:14,750 --> 00:31:23,289

AND WE HAVE THIS LADY HERE.

423

00:31:23,289 --> 00:31:24,799

>> WE PUBLISH IN ENGLISH AND
FRENCH.

424

00:31:24,799 --> 00:31:28,261

HOW ARE TODAY'S ANNOUNCEMENTS
EFFECT YOUR TIME LINE OR TIME

425

00:31:28,261 --> 00:31:31,550

FRAME FROM GOING AND THE
POSSIBILITY OF COMING BACK AND

426

00:31:31,550 --> 00:31:37,630

IS ANY BUDGET ALLOCATED FINDING
ANY SIGN OF CULTURE RESOURCES ON

427

00:31:37,630 --> 00:31:38,630

NASA?

428

00:31:38,630 --> 00:31:41,320

YOU'RE LOOKING AT THE WATER BUT
WHAT ABOUT POTENTIAL HABITATS OR

429

00:31:41,320 --> 00:31:45,919

ANYTHING LIKE THAT AS WELL.

430

00:31:45,919 --> 00:31:49,720

>> WE DO HAVE A BUDGET FOR
FUTURE SCIENTIFIC EXPLORATION

431

00:31:49,720 --> 00:31:54,830

AND A NUMBER OF EXCITING
MISSIONS THAT ARE QUEUED UP.

432

00:31:54,830 --> 00:31:59,539

NASA LEAD AND EUROPEAN SPACE
AGENCY LEAD WITH THE PARTNERSHIP

433

00:31:59,539 --> 00:32:00,570
WITH RUSSIA.

434
00:32:00,570 --> 00:32:04,990
SO WE HAVE THE INSIGHT LANDER
WHICH IS GOING TO LAUNCH NEXT

435
00:32:04,990 --> 00:32:13,870
YEAR AND WE'RE GOING TO PUT IN A
SEISMOMETER.

436
00:32:13,870 --> 00:32:30,740
AND IN 2018 THEY HAVE A LANDER
GOING DOWN AND IN PARTNERSHIP

437
00:32:30,740 --> 00:32:34,919
WITH NASA WE HAVE AN ORGANIC
MOLECULAR ANALYZER AND THEY HAVE

438
00:32:34,919 --> 00:32:38,830
A DRILL TO DRILL UNDER THE
SURFACE AND BRING UP MATERIALS

439
00:32:38,830 --> 00:32:45,149
AND SEE IF THERE'S ORGANIC
MATTER MEANING RELATED TO

440
00:32:45,149 --> 00:32:48,490
COMPOUNDS BUT SPECIFICALLY ONES
THAT MIGHT HAVE BEEN CREATED BY

441
00:32:48,490 --> 00:32:49,490
LIFE.

442
00:32:49,490 --> 00:32:50,490
SO THAT'S VERY PIETED.

443
00:32:50,490 --> 00:32:55,610
THEN IN 2020 IS OUR NEXT BIG
NASA ROVER THAT WILL ACTUALLY

444

00:32:55,610 --> 00:32:58,580

COLLECT SAMPLES SO THAT
EVENTUALLY WE CAN BRING THEM

445

00:32:58,580 --> 00:33:05,179

BACK TO EARTH AND SEE IF WE SEE
ANY SIGNS OF ANCIENT CONDITIONS

446

00:33:05,179 --> 00:33:07,929

THAT WOULD TELL US THERE'S LIFE
ON MARS.

447

00:33:07,929 --> 00:33:08,929

THAT'S JUST THE BEGINNING.

448

00:33:08,929 --> 00:33:10,790

THAT'S IN THE NEXT FIVE YEARS.

449

00:33:10,790 --> 00:33:13,980

BEYOND THAT, WE HAVE PLANS AS
PART OF OUR JOURNEY TO MARS THAT

450

00:33:13,980 --> 00:33:16,279

INCLUDE DEVELOPING THE SPACE
LAUNCH SYSTEM.

451

00:33:16,279 --> 00:33:19,659

A BIG ROCKET THAT WILL IN THE
FUTURE BE ABLE TO GET PAYLOADS

452

00:33:19,659 --> 00:33:22,679

TO MARS IN PERHAPS A ROUND TRIP
MISSION.

453

00:33:22,679 --> 00:33:24,779

WE'RE STILL SKETCHING OUT WHAT
THAT LOOKS LIKE IT FELT FUTURE

454

00:33:24,779 --> 00:33:28,230
IS ALWAYS MORE FUZZY THAN THE
CURRENT BUT THESE EXCITING

455
00:33:28,230 --> 00:33:33,210
RESULTS ONLY ENCOURAGE US FOR
THE FUTURE OF MARS EXPLORATION.

456
00:33:33,210 --> 00:33:37,040
>> WE SHOULDN'T DISCOUNT WHAT WE
HAVE AS ASSETS THAT ARE THERE.

457
00:33:37,040 --> 00:33:39,100
THEY WERE RELATIVELY HEALTHY.

458
00:33:39,100 --> 00:33:44,150
IT'S DOING A FABULOUS JOB AND
HAS HIGH RESOLUTION IMAGES AND

459
00:33:44,150 --> 00:33:48,790
AS WE TALKED ABOUT WHAT IT'S
BEEN DOING, YOU KNOW, WHEN YOU

460
00:33:48,790 --> 00:33:51,659
LOOK AT EVEN THOUGH IT'S BEEN
THERE NEARLY NINE YEARS IT'S

461
00:33:51,659 --> 00:33:56,700
ONLY REALLY MAPPED ABOUT 3 OR 4%
IN HIGH RESOLUTION OF MARS.

462
00:33:56,700 --> 00:34:03,669
THERE'S SO MUCH MORE WE NEED TO
DO ALL OVER THE PLACE.

463
00:34:03,669 --> 00:34:08,870
IT WILL ENABLE US TO NARROW DOWN
ON BETTER PLACES OR MORE

464
00:34:08,870 --> 00:34:14,679

ACCESSIBLE PLACES WHERE WE CAN
GET ACCESS TO REALLY THOROUGHLY

465

00:34:14,679 --> 00:34:15,679

EXAMINE.

466

00:34:15,679 --> 00:34:17,879

CURIOSITY IS IN A NICE LOCATION.

467

00:34:17,879 --> 00:34:19,020

IT'S IN MT.

468

00:34:19,020 --> 00:34:20,540

SHARP AND DOING
GREAT.

469

00:34:20,540 --> 00:34:24,840

THERE'S POTENTIALLY DARK
STREAKS.

470

00:34:24,840 --> 00:34:26,440

WE DON'T KNOW MUCH ABOUT THOSE.

471

00:34:26,440 --> 00:34:30,179

WE DON'T KNOW.

472

00:34:30,179 --> 00:34:34,899

THERE'S A POSSIBILITY THAT MORE
OBSERVATIONS WILL ELIMINATE

473

00:34:34,899 --> 00:34:39,310

THOSE OR GIVE US MORE DATA THAT
COULD TELL US THAT THEY ALSO

474

00:34:39,310 --> 00:34:42,310

COULD BE RSLs THAT WE MIGHT BE
ABLE TO VISIT.

475

00:34:42,310 --> 00:34:44,849

SO THERE'S REALLY EXCITING
THINGS JUST COMING UP EVEN WITH

476

00:34:44,849 --> 00:34:46,040

OUR CURRENT ASSETS.

477

00:34:46,040 --> 00:34:48,619

>> ONE MORE QUESTION AND THEN WE
GO TO THE PHONE LINES.

478

00:34:48,619 --> 00:34:53,000

>> DAVID CURLY FROM ABC NEWS.

479

00:34:53,000 --> 00:34:56,340

THIS REALLY IS A BREAK THROUGH
FOR HUMAN TRAVEL TO MARS.

480

00:34:56,340 --> 00:34:59,890

YOU CAN NOW PURIFY THE WATER,
CREATE OXYGEN.

481

00:34:59,890 --> 00:35:01,990

THIS MAKES IT MUCH EASIER,
DOESN'T IT?

482

00:35:01,990 --> 00:35:04,990

>> I THINK ALL OF THE SCIENTIFIC
DISCOVERIES WE'RE MAKING ON THE

483

00:35:04,990 --> 00:35:17,050

SURFACE OF MARS, ARE GIVING US A
VIEW THAT MARS HAS RESOURCES.

484

00:35:17,050 --> 00:35:21,490

WHAT'S WATER?

485

00:35:21,490 --> 00:35:22,940

HYDROGEN AND OXYGEN.

486

00:35:22,940 --> 00:35:27,190
THAT'S WHAT WE MAKE ROCKET FUEL
OUT OF.

487
00:35:27,190 --> 00:35:39,150
THE SPACE SHUTTLE ARE ALUMINUM
CHLORATE AND THE WATER REALLY IS

488
00:35:39,150 --> 00:35:42,810
CRUCIAL BECAUSE WE NEED WATER TO
DRINK, OXYGEN TO BREATHE.

489
00:35:42,810 --> 00:35:47,490
WE HAVE CARBON DIOXIDE SO
THERE'S PLENTY OF RESOURCES ON

490
00:35:47,490 --> 00:35:48,490
MARS.

491
00:35:48,490 --> 00:35:52,440
EVEN NITROGEN IN THE ATMOSPHERE
WHICH WE DON'T THINK ABOUT.

492
00:35:52,440 --> 00:35:54,349
BUT IT'S CRUCIAL FOR EARTH.

493
00:35:54,349 --> 00:35:58,690
BOTH IF LIFE EXISTS ON MARS BUT
ALSO ONCE WE GET THERE, WE'RE

494
00:35:58,690 --> 00:36:00,819
GOING TO NEED NITROGEN FOR A
VARIETY OF PURPOSES.

495
00:36:00,819 --> 00:36:04,580
SO I THINK THAT MARS IS LOOKING
MORE AND MORE THAT IT'S A

496
00:36:04,580 --> 00:36:08,410
POTENTIAL HABITAT FOR LIFE ON

MARS THAT COULD BE, AS YOU

497

00:36:08,410 --> 00:36:13,470

HEARD, YOU KNOW, FROM TRANSFER
FROM EARTH ONE WAY OR THE OTHER,

498

00:36:13,470 --> 00:36:14,850

SOME PEOPLE SAY WE'RE MARTIANS.

499

00:36:14,850 --> 00:36:16,680

COULD GO EITHER WAY.

500

00:36:16,680 --> 00:36:19,253

BUT THE EXCITING THING IS I
THINK WE WILL SEND HULS IN THE

501

00:36:19,253 --> 00:36:25,359

†-- HUMANS IN THE NEAR FUTURE TO
MARS AND ALSO TO BE ABLE TO LIVE

502

00:36:25,359 --> 00:36:26,359

ON THE SURFACE.

503

00:36:26,359 --> 00:36:29,170

THE RESOURCES ARE THERE.

504

00:36:29,170 --> 00:36:32,430

>> IT'S IMPORTANT TO REALIZE
THAT NASA'S APPROACH TO

505

00:36:32,430 --> 00:36:35,430

EXPLORATION IS NOT STAR TREK.

506

00:36:35,430 --> 00:36:38,750

IT'S NOT GO WHERE NO MAN HAS
GONE BEFORE AS THEY SAY.

507

00:36:38,750 --> 00:36:42,550

IT'S A METHODOICAL APPROACH FOR

WHICH WE LEARN EVERYTHING ABOUT

508

00:36:42,550 --> 00:36:45,431

THE ENVIRONMENT THAT WE'RE GOING
TO SUBJECT HUMANS TO THAT WE

509

00:36:45,431 --> 00:36:49,210

POSSIBLY CAN AND THAT'S WHY OUR
RIGOROUS SCIENTIFIC PROGRAM IS

510

00:36:49,210 --> 00:36:53,380

REALLY THE PIONEERS THAT ARE
MAKING STEADY DISCOVERIES AND

511

00:36:53,380 --> 00:36:57,180

IAN GATTIS PATE CONTINUING TO DO
THAT FOR MANY, MANY YEARS BEFORE

512

00:36:57,180 --> 00:37:02,930

HUMANS EVEN GET INTO THE VOIR
DIRE†-- VACINITY OF MARS.

513

00:37:02,930 --> 00:37:09,470

THAT DOES HELP US UNDERSTAND THE
PARAMETERS AND LEVERAGE AND

514

00:37:09,470 --> 00:37:14,450

UTILIZE THOSE THAT ARE AVAILABLE
AND MAKE THOSE TRIPS MORE

515

00:37:14,450 --> 00:37:15,960

FEASIBLE THAN EVER BEFORE.

516

00:37:15,960 --> 00:37:17,190

>> I'LL BE VERY SPECIFIC.

517

00:37:17,190 --> 00:37:22,740

ON OUR MARS 2020 LANDER WE HAVE
AN EXPERIMENT THAT'S NOT A

518

00:37:22,740 --> 00:37:24,860

CLASSICAL SCIENCE EXPERIMENT.

519

00:37:24,860 --> 00:37:28,960

IN FACT, IT'S A RESOURCE
UTILIZATION EXPERIMENT.

520

00:37:28,960 --> 00:37:30,020

YOU MAY HEAR THAT.

521

00:37:30,020 --> 00:37:35,359

WE LOVE OUR ACRONYMS BUT IT'S A
SMALL APPARATUS THAT'S GOING TO

522

00:37:35,359 --> 00:37:37,760

TAKE IN MARTIAN ATMOSPHERE.

523

00:37:37,760 --> 00:37:41,680

MOSTLY CARBON DIOXIDE AND
EXTRACT THE OXYGEN.

524

00:37:41,680 --> 00:37:43,520

THAT'S WHAT IS FUNCTIONAL.

525

00:37:43,520 --> 00:37:45,570

WE CAN DO THAT ON EARTH BUT
WE'RE GOING TO DEMONSTRATE IT ON

526

00:37:45,570 --> 00:37:46,570

MARS.

527

00:37:46,570 --> 00:37:51,400

THAT'S PART OF OUR COMBINATION
OF HUMAN SPACE FLIGHT, SPACE

528

00:37:51,400 --> 00:37:54,380

TECHNOLOGY, AND SCIENCE ALL IN
ONE.

529

00:37:54,380 --> 00:37:59,210

>> IN ADDITION TO THAT ON 2020
IS A†-- UNDERNEATH THE ROVER IS

530

00:37:59,210 --> 00:38:00,210

A RADAR.

531

00:38:00,210 --> 00:38:01,210

ACTUALLY IT'S FROM NORWAY.

532

00:38:01,210 --> 00:38:05,500

THEY'RE BUILDING THAT NORWEGIAN
SPACE AGENCY AND THIS IS A RADAR

533

00:38:05,500 --> 00:38:10,010

THAT WILL SEND RADIO WAVES
THROUGH THE GROUND, RETURN

534

00:38:10,010 --> 00:38:13,640

REFLECTIONS WILL TELL US WHAT
THAT IS LIKE AND, YOU KNOW,

535

00:38:13,640 --> 00:38:18,380

MIGHT BE ABLE TO UNCOVER THOSE
CLOSE TO THE SURFACE.

536

00:38:18,380 --> 00:38:21,369

IT COULD TELL US HOW IMPORTANT
EXPERIMENTS LIKE THAT ARE FOR

537

00:38:21,369 --> 00:38:24,460

HUMANS TO BE ABLE TO TAKE AND GO
TO MARS.

538

00:38:24,460 --> 00:38:29,940

AND WE'RE GOING TO OPERATE THAT
ALL TIMES DURING THE DAY.

539

00:38:29,940 --> 00:38:33,130

THERE'S HUGE TEMPERATURE AND
PRESSURE SWINGS ON MARS SO WHAT

540

00:38:33,130 --> 00:38:34,130

IS IT LIKE?

541

00:38:34,130 --> 00:38:36,440

WHAT'S THE EFFICIENCY OF
EXTRACTING THE OXYGEN UNDER

542

00:38:36,440 --> 00:38:37,700

VARIOUS EXTREMES.

543

00:38:37,700 --> 00:38:40,730

NOT ONLY DURING THE DAY BUT ALL
THROUGHOUT A SEASON.

544

00:38:40,730 --> 00:38:43,630

SO THESE ARE HUGE STEPS FOR US
TO BE ABLE TO PLAN THE RIGHT

545

00:38:43,630 --> 00:38:46,960

RESOURCES TO SUPPORT HUMANS IN
THE FUTURE.

546

00:38:46,960 --> 00:38:53,790

>> LET'S GO TO THE PHONE LINES
NOW AND WE'RE GOING TO START OUT

547

00:38:53,790 --> 00:38:57,829

WITH NEW YORK TIMES.

548

00:38:57,829 --> 00:39:03,770

>> YOU ARE ALL SAYING HOW
EXCITING THIS IS AND I WAS

549

00:39:03,770 --> 00:39:08,240

WONDERING WHEN YOU MIGHT GET
THERE AND NONE OF THE CURRENT

550

00:39:08,240 --> 00:39:10,480

SPACECRAFT ARE BEING PLANNED.

551

00:39:10,480 --> 00:39:11,480

DR.

552

00:39:11,480 --> 00:39:17,820

GREEN SAID CURIOSITY MIGHT
GO THROUGH THE DARK STREAKS.

553

00:39:17,820 --> 00:39:21,280

UNDER WHAT PARAMETERS COULD THAT
HAPPEN?

554

00:39:21,280 --> 00:39:26,951

>> YOU BROUGHT UP A REALLY
IMPORTANT POINT AND THE QUESTION

555

00:39:26,951 --> 00:39:30,210

OF IS THERE LIFE ON MARS, WE
KNOW THERE'S LIFE ON MARS

556

00:39:30,210 --> 00:39:32,280

ALREADY BECAUSE WE SENT IT
THERE.

557

00:39:32,280 --> 00:39:35,520

WE TRY AND CLEAN OUR SPACECRAFT
AS BEST AS WE CAN AND THE

558

00:39:35,520 --> 00:39:38,510

VIKINGS CERTAINLY WERE
STERILIZED THE BEST OF ANY OF

559

00:39:38,510 --> 00:39:42,380

OUR SPACECRAFT BECAUSE WE JUST
DIDN'T KNOW BUT THE SURFACE OF

560

00:39:42,380 --> 00:39:49,750

MARS IS REALLY A HARSH PLACE.

561

00:39:49,750 --> 00:39:55,760

IF YOU WANT TO KILL MICROBES ON
EARTH YOU TAKE UV LIGHT AND KILL

562

00:39:55,760 --> 00:39:58,200

THE MICROBES.

563

00:39:58,200 --> 00:40:02,400

WE KNOW THAT BACTERIA ARE SO
TENACIOUS THAT IT'S IMPOSSIBLE

564

00:40:02,400 --> 00:40:03,770

TO KILL THEM ALL.

565

00:40:03,770 --> 00:40:08,310

SO WE DO THE BEST JOB WE CAN AND
WE SEND OUR SPACECRAFT INTO

566

00:40:08,310 --> 00:40:18,850

AREAS THAT WE THINK ARE
SENSITIVE AND HOW CAN WE TAKE A

567

00:40:18,850 --> 00:40:21,280

SPACECRAFT LIKE CURIOSITY THAT
MAY NOT HAVE BEEN CLEANED AS

568

00:40:21,280 --> 00:40:25,550

WELL AS VIKING TO AN AREA THAT
MIGHT HAVE THAT LIFE.

569

00:40:25,550 --> 00:40:28,110

BUT THIS IS THE SCIENTIFIC
PROCESS.

570

00:40:28,110 --> 00:40:32,510

THIS IS WHY WE'RE CRAWLING
BEFORE WE WALK.

571

00:40:32,510 --> 00:40:36,210

THAT WE'RE BEING VERY CAREFUL
THAT WE DON'T SEND A SPACECRAFT

572

00:40:36,210 --> 00:40:39,630

TO MARS WITH THE INTENTION OF
DETECTING MARTIAN LIFE AND FIND

573

00:40:39,630 --> 00:40:45,160

OUT THAT WE JUST FIND THE EARTH
LIFE THAT WE TOOK WITH US.

574

00:40:45,160 --> 00:40:49,530

THAT'S TOUGH TO DO WHEN YOU GO
DOWN AND LIST HOW DO YOU AVOID

575

00:40:49,530 --> 00:40:50,530

DOING THAT?

576

00:40:50,530 --> 00:40:51,530

IT'S VERY HARD.

577

00:40:51,530 --> 00:40:54,581

AND THIS IS THE GENERAL FIELD
THAT YOU MAY HEARD US TALK

578

00:40:54,581 --> 00:40:56,260

ABOUT, PLANETARY PROTECTION.

579

00:40:56,260 --> 00:41:00,420

IT'S NOT ONLY PROTECTING THE
EARTH FROM BRINGING SOME ALIEN

580

00:41:00,420 --> 00:41:07,380

LIFEFORM† TO EARTH BUT IT'S
PROTECTING WHERE WE GO TO MAKE

581

00:41:07,380 --> 00:41:10,990

SURE THAT WE DON'T CONTAMINATE

OTHER PLANETS BEFORE WE FIND OUT

582

00:41:10,990 --> 00:41:13,349

IF WE'RE ALONE IN THE UNIVERSE.

583

00:41:13,349 --> 00:41:16,960

>> WE DON'T KNOW IF CURIOSITY
WILL HAVE AN OPPORTUNITY TO GO

584

00:41:16,960 --> 00:41:22,730

TO ONE OF THESE AREAS AND
FIND†-- MAKE MEASUREMENTS.

585

00:41:22,730 --> 00:41:26,329

WE HAVE LINEAR STREAKS ON MT.

586

00:41:26,329 --> 00:41:28,160

SHARP THAT WE DON'T KNOW ENOUGH
ABOUT.

587

00:41:28,160 --> 00:41:35,059

THEY MAY OR MAY NOT BE RSLs AND
THEN WE HAVE TO MAKE DECISIONS

588

00:41:35,059 --> 00:41:38,619

ON IS CURIOSITY GOOD ENOUGH TO
BE ABLE TO GO OVER TO THAT AREA

589

00:41:38,619 --> 00:41:43,730

AND MAKE APPROPRIATE MEASURES AS
JOHN SAID WITHOUT IT MEASURING

590

00:41:47,829 --> 00:41:44,730

US.

591

00:41:47,829 --> 00:41:53,510

BUT EVEN THEN IT HAS A LIMITED
CAPABILITY TO MAKE ANY SORT OF

592

00:41:53,510 --> 00:41:58,010
DETECTION IN THIS AREA.

593
00:41:58,010 --> 00:42:02,810
>> NEXT UP, TIM, US NEWS AND
WORLD REPORT.

594
00:42:02,810 --> 00:42:04,610
>> YES, THANK YOU.

595
00:42:04,610 --> 00:42:05,810
CONGRATULATIONS EVERYONE.

596
00:42:05,810 --> 00:42:06,820
GREAT RESEARCH ON MARS.

597
00:42:06,820 --> 00:42:10,770
VERY EXCITING TO HEAR THAT THE
SURFACE OF MARS CAN AT SOME

598
00:42:10,770 --> 00:42:12,130
POINT SUPPORT WATER.

599
00:42:12,130 --> 00:42:15,450
IT SOUNDS A BIT LIKE GAME OF
THRONES WHERE THERE'S EXTREME

600
00:42:15,450 --> 00:42:19,650
SEASONS WHERE IT'S REALLY COLD
AND REALLY WARM.

601
00:42:19,650 --> 00:42:24,440
DO YOU THINK THAT HUMANS COULD
GROW CROPS ON MARS?

602
00:42:24,440 --> 00:42:29,099
THAT THE SOIL WOULD BE ALIVE
ENOUGH TO SUPPORT SO KIND OF

603

00:42:29,099 --> 00:42:30,099

EARTH CROPS?

604

00:42:30,099 --> 00:42:33,859

>> WELL, I THINK THE REAL
CHALLENGE AND IF YOU THINK ABOUT

605

00:42:33,859 --> 00:42:38,050

THE PROGRESSION OF ALTITUDE ON
EARTH, WHEN YOU'RE CLIMBING

606

00:42:38,050 --> 00:42:44,880

MOUNT EVEREST, YOU HAVE
WONDERFUL PLANT LIFE BUT AS YOU

607

00:42:44,880 --> 00:42:50,050

GO HIGHER THAT PLAN LIFE
DISAPPEARS UNTIL YOU SEE ONLY

608

00:42:50,050 --> 00:42:55,310

THIS UNIQUE FUNGUS AND ALGAE AND
HIGHER ALL THE PLANT LIFE

609

00:42:55,310 --> 00:42:56,310

DISAPPEARS.

610

00:42:56,310 --> 00:43:00,670

THAT'S BECAUSE THE ATMOSPHERE
GETS SO THIN THAT ANY LIFE WOULD

611

00:43:00,670 --> 00:43:01,670

BE DESICCATED.

612

00:43:01,670 --> 00:43:02,810

WOULD LOSE IT'S MOISTURE.

613

00:43:02,810 --> 00:43:07,520

WELL, MARS IS ABOUT THE ALTITUDE
OF AN EVEREST THAT'S THREE TIMES

614
00:43:07,520 --> 00:43:08,520
HIGHER.

615
00:43:08,520 --> 00:43:10,040
HIGHER THAN ANY AIRPLANES CAN
FLY.

616
00:43:10,040 --> 00:43:12,980
SO YOU'D HAVE A CHALLENGE
GROWING PLANTS ON THE SURFACE OF

617
00:43:12,980 --> 00:43:17,859
MARS EVEN WITH SOME EXTREME
GENETIC ENGINEERING BUT

618
00:43:17,859 --> 00:43:21,829
CERTAINLY YOU COULD BUILD
INFLATABLE OR SMALL GREEN HOUSES

619
00:43:21,829 --> 00:43:26,109
WITH HIGHER PRESSURE AND IF
THERE'S A LOT OF WATER YOU COULD

620
00:43:26,109 --> 00:43:28,770
USE THAT WATER TO GROW PLANTS
INSIDE OF THE GREEN HOUSE.

621
00:43:28,770 --> 00:43:31,200
BECAUSE AFTER ALL THERE'S PLENTY
OF CARBON DIOXIDE.

622
00:43:31,200 --> 00:43:36,200
SO THAT MIGHT BE ANOTHER
MECHANISM THAT WE HAVE FUTURE

623
00:43:36,200 --> 00:43:41,099
EXPLORERS WITH THE PLANTS THEY
EAT AS PART OF THE SYSTEM.

624

00:43:41,099 --> 00:43:46,350
>> AND NOW WE KNOW THERE'S A
SIGNIFICANT AMOUNT OF WATER IN

625
00:43:46,350 --> 00:43:50,859
THE HUMIDITY AND WATER RESOURCES
TO BE ABLE TO BRING TO BEAR.

626
00:43:50,859 --> 00:43:54,049
>> NEXT UP, REUTERS, IRENE.

627
00:43:54,049 --> 00:43:57,690
>> THANKS VERY MUCH DWYANE.

628
00:43:57,690 --> 00:44:01,450
I ALSO HAD A QUESTION ABOUT
PLANETARY PROTECTION ISSUES.

629
00:44:01,450 --> 00:44:11,130
I UNDERSTAND MARS 2020 DOESN'T
HAVE THE BUDGET TO GO TO AN AREA

630
00:44:11,130 --> 00:44:15,410
OF SPECIAL INTEREST AND
WONDERING IN LIGHT OF THIS

631
00:44:15,410 --> 00:44:21,170
DISCOVERY MIGHT THAT BE REVISITS
AND COULD THE LANDING TEAM

632
00:44:21,170 --> 00:44:33,480
CONSIDER SIGHTS CLOSE TO RSL
LOCATIONS?

633
00:44:33,480 --> 00:44:39,670
>> WELL, THE CURRENT SIGHTS
BEING CONSIDERED FOR MARS 2020

634
00:44:39,670 --> 00:44:43,380
ARE BEING CLASSIFIED RELATIVE TO

PLANETARY PROTECTION AND OUR

635

00:44:43,380 --> 00:44:48,920

PLANS, INDEED, ARE TO MAKE SURE
THAT MARS 2020 DOES, INDEED,

636

00:44:48,920 --> 00:44:52,790

RECOGNIZE WHAT CLASSIFICATION
AND THEN STERILIZE APPROPRIATELY

637

00:44:52,790 --> 00:45:00,930

AND RETURNING SAMPLES IS ONE OF
THE HIGHEST LEVELS NO MATTER

638

00:45:00,930 --> 00:45:01,960

WHAT.

639

00:45:01,960 --> 00:45:09,599

SO WE HAVE PLANS TO BE ABLE TO
STERILIZE MARS 2020 AND WE HAVE

640

00:45:09,599 --> 00:45:12,839

THE BUDGET IN THE PLAN TO BE
ABLE TO DO THAT SO IT'S

641

00:45:12,839 --> 00:45:17,140

INCORRECT TO SAY WE WON'T
CONSIDER PLAN TOIR EXPLORATION.

642

00:45:17,140 --> 00:45:22,799

WE HAVE AND WE HAVE TO PLAN HOW
TO HANDLE THAT.

643

00:45:22,799 --> 00:45:44,960

>> THE OTHER PART OF THE
QUESTION IS THESE RSLs ARE IN

644

00:45:44,960 --> 00:45:49,130

CHALLENGING LOCATIONS IT WOULD
BE TRIVIAL TO GO UP AND

645

00:45:49,130 --> 00:45:51,550

INVESTIGATE BUT IT'S VERY HARD
FOR A ROVER.

646

00:45:51,550 --> 00:45:53,109

SO WE'RE A LITTLE WAYS OFF.

647

00:45:53,109 --> 00:45:56,920

I THINK THAT THE INVESTIGATION
OF THESE WITH PROPER PLANETARY

648

00:45:56,920 --> 00:46:01,609

PROTECTION LAYS IN THE DOMAIN OF
FUTURE ROBOTIC SPACECRAFTS THAT

649

00:46:01,609 --> 00:46:04,680

ARE DESIGNED SPECIFICALLY TO GO
THERE AND THEY'RE DESIGNED IN A

650

00:46:04,680 --> 00:46:08,040

WAY THAT THEY CAN BE STERILIZED
AND THE EXCITING THING ABOUT

651

00:46:08,040 --> 00:46:10,641

THIS ANNOUNCEMENT IS THE
CONFIRMATION OF WHAT WE

652

00:46:10,641 --> 00:46:22,369

SUSPECTED THAT THIS IS DUE TO
SOME KIND OF WATER FUTURE

653

00:46:22,369 --> 00:46:23,500

AND
HOPEFULLY THAT WE COULD GO IN

654

00:46:23,500 --> 00:46:29,089

AND INVESTIGATE THESE AREAS AND
PERHAPS EVEN RETURN SAMPLES FROM

655

00:46:29,089 --> 00:46:30,530

THESE AREAS SOME DAY.

656

00:46:30,530 --> 00:46:34,069

>> IRENE, WE'RE GOING TO GET
YOUR PLANETARY PROTECTION

657

00:46:34,069 --> 00:46:35,530

QUESTION AT ANOTHER TIME.

658

00:46:35,530 --> 00:46:37,480

WE'LL HAVE TO DO A LOT OF FOLLOW
UPS.

659

00:46:37,480 --> 00:46:41,309

I BELIEVE THAT FOLKS IN FRANCE
WANT TO RESPOND TO THE QUESTION

660

00:46:41,309 --> 00:46:43,090

AND PLEASE IDENTIFY YOURSELF.

661

00:46:43,090 --> 00:46:49,349

>> I WAS GOING TO SAY EXACTLY
WHAT HE SAID.

662

00:46:49,349 --> 00:46:53,170

THAT'S THE RSL THAT WE KNOW
ABOUT.

663

00:46:53,170 --> 00:46:58,819

THERE MAY BE WATER FROM FLAT
AREAS THAT WE DON'T KNOW ABOUT.

664

00:46:58,819 --> 00:47:03,990

THE PROBLEM IS WE OBSERVE AT
3:00†P.M.

665

00:47:03,990 --> 00:47:06,609

THE DRIEST TIME OF THE

DAY.

666

00:47:06,609 --> 00:47:12,300
SO MAYBE WE COULD FIND THIS IN
OTHER LOCATIONS THAT ARE

667

00:47:12,300 --> 00:47:13,300
ACCESSIBLE.

668

00:47:13,300 --> 00:47:17,640
BUT RIGHT NOW THESE ARE ONLY
KNOWN TO EXIST ON STEEP ROCKY

669

00:47:17,640 --> 00:47:18,640
SLOPES.

670

00:47:18,640 --> 00:47:21,090
PLACES WE COULDN'T LAND
DIRECTLY.

671

00:47:21,090 --> 00:47:27,960
WE COULD LAND CLOSE TO THEM AND
OBSERVE THEM FROM A DISTANCE AND

672

00:47:27,960 --> 00:47:30,730
THAT WOULD BE VALUABLE,
ESPECIALLY TO WATCH THESE THINGS

673

00:47:30,730 --> 00:47:34,299
THROUGHOUT THE DAY WHICH WE
CAN'T DO FROM ORBIT.

674

00:47:34,299 --> 00:47:41,549
>> I WOULD ALSO SAY IF I WAS A
MICROBE ON MARS I WOULD NOT LIVE

675

00:47:41,549 --> 00:47:44,079
NEAR ONE OF THE RSLs.

676

00:47:44,079 --> 00:47:48,339
I WOULD WANT TO LIVE FURTHER
NORTH OR SOUTH, HIGHER LATITUDES

677
00:47:48,339 --> 00:47:51,210
UNDER THE SURFACE, QUITE FAR
UNDER THE SURFACE AND WHERE

678
00:47:51,210 --> 00:47:55,540
THERE'S MORE OF A FRESH WATER
GLACIER.

679
00:47:55,540 --> 00:47:58,819
WE HAVE SOME SCIENTIFIC EVIDENCE
THAT THEY DO.

680
00:47:58,819 --> 00:48:04,329
WHEN WE CAN FIND SUB SURFACE ICE
THAT'S A FEW METERS OR DEEPER

681
00:48:04,329 --> 00:48:07,190
BELOW THE SURFACE AND THAT'S
FRESH WATER.

682
00:48:07,190 --> 00:48:14,480
THAT'S GOING TO BE A VERY
EXCITING AREA OF EXPLORATION IN

683
00:48:14,480 --> 00:48:15,480
THE FUTURE.

684
00:48:15,480 --> 00:48:16,640
>> ALL RIGHT.

685
00:48:16,640 --> 00:48:21,680
WE ARE RUNNING SHORT ON TIME BUT
WE'LL TAKE ONE MORE CALL FROM

686
00:48:21,680 --> 00:48:25,039
THE PHONES, SOCIAL MEDIA AND

THEN COME BACK HERE.

687

00:48:25,039 --> 00:48:26,930

>> CAN YOU HEAR ME?

688

00:48:26,930 --> 00:48:27,930

>> YES.

689

00:48:27,930 --> 00:48:29,289

>> CAN YOU HEAR ME?

690

00:48:29,289 --> 00:48:30,289

>> YES, AGAIN.

691

00:48:30,289 --> 00:48:33,299

>> YOU WANT TO LOOK FOR LIFE ON
MARS BUT YOU DON'T KNOW WHAT

692

00:48:33,299 --> 00:48:35,770

MARS LIFE LOOKS LIKE AND SIBS
YOU DON'T KNOW WHAT IT LOOKS

693

00:48:35,770 --> 00:48:37,520

LIKE YOU DON'T KNOW HOW TO LOOK
FOR IT.

694

00:48:37,520 --> 00:48:41,640

THAT SAID, THIS DISCOVERY IS A
SERIES OF PAPERS THAT HAVE COME

695

00:48:41,640 --> 00:48:47,240

TO THE CONCLUSION ABOUT THE
WATER AND A ARE THERE ANALOGS ON

696

00:48:47,240 --> 00:48:51,010

EARTH THAT YOU ARE SPECIFICALLY
LOOKING AT THAT MIRROR ASPECTS

697

00:48:51,010 --> 00:48:54,420

OF WHAT YOU FOUND ON MARS AND B
AS YOU PREPARE TO SEND PEOPLE

698

00:48:54,420 --> 00:48:57,680

THERE AND MAYBE MORE ROBOTS HAVE
YOU EVER GIVEN THOUGHT TO

699

00:48:57,680 --> 00:49:01,180

BUILDING A LARGE REFRIGERATOR
AND TRYING TO SIMULATE THE

700

00:49:01,180 --> 00:49:04,640

GEOLOGY BY DUMPING STUFF IN
THERE AND SEEING HOW IT REACTS

701

00:49:04,640 --> 00:49:08,950

AND THEN INOCULATING IT WITH
KNOWN LIFE FORMS?

702

00:49:08,950 --> 00:49:13,230

>> SO NUMBER ONE WE ARE ACTUALLY
LOOKING FOR LIFE ON MARS.

703

00:49:13,230 --> 00:49:17,920

WE'RE TAKING A VERY MEASURED
APPROACH TO IT BECAUSE IN MANY

704

00:49:17,920 --> 00:49:21,000

WAYS WE DON'T KNOW WHAT EXACTLY
TO LOOK FOR SO WE'RE LOOKING FOR

705

00:49:21,000 --> 00:49:25,180

THINGS THAT FRAME IT AND GIVE US
A CONTEXT TO MAKE US UNDERSTAND

706

00:49:25,180 --> 00:49:28,980

WHETHER OR NOT LIFE WAS EVEN
POSSIBLE AND THEN WHAT MAY BE

707

00:49:28,980 --> 00:49:31,440

SORT OF A BIO CHEMICAL
DISCONTINUTIY.

708

00:49:31,440 --> 00:49:41,160

SO IT'S THE FACT THAT WE'RE
GOING TO CASH SAMPLES IN 2020.

709

00:49:41,160 --> 00:49:44,809

THIS HAS BEEN A LONG STANDING
SCIENTIFIC PENDING FROM THE

710

00:49:44,809 --> 00:49:49,520

NATIONAL RESEARCH COUNCIL AND
THE ONLY WAY TO TELL WHETHER

711

00:49:49,520 --> 00:49:53,430

THERE'S LIFE ON MARS IS TO BE
ABLE TO BRING A SAMPLE BACK TO

712

00:49:53,430 --> 00:49:58,329

LOOK AT IT THOROUGHLY TO
UNDERSTAND WHAT IS THERE AND

713

00:49:58,329 --> 00:50:01,079

WHAT THE POSSIBILITIES ARE.

714

00:50:01,079 --> 00:50:07,410

YES THERE ARE SOME EARTH ANALOGS
AND THEY SEE STREAKS FORMING

715

00:50:07,410 --> 00:50:12,180

THAT LOOK SIMILAR IN PLACES LIKE
ANTARTICA.

716

00:50:12,180 --> 00:50:18,170

THE DIFFICULTY IS THAT SOMETHING
THAT LOOKS THE SAME IS THE SAME

717

00:50:18,170 --> 00:50:21,089

AND WE DON'T KNOW IF IT'S THE

SAME MECHANISM SO WE HAVE

718

00:50:21,089 --> 00:50:26,380

SOMETHING THAT LOOKS SIMILAR AND
THAT'S BEING STUDIED.

719

00:50:26,380 --> 00:50:29,350

THE IDEA OF THROWING STUFF IN
THE FREEZER AND SEEING IT IF

720

00:50:29,350 --> 00:50:35,609

GROWS, THE FOOD INDUSTRY DOES
THAT ALL THE TIME AND THAT HELPS

721

00:50:35,609 --> 00:50:38,050

SET THE TEMPERATURE OF YOUR
FREEZER.

722

00:50:38,050 --> 00:50:44,060

IT'S MINUS 20 AND YOU DON'T GET
THINGS GROWING IN THEM.

723

00:50:44,060 --> 00:50:48,710

>> THE OTHER THING IS THE
SCIENTIFIC PROCESS AND HOW WE

724

00:50:48,710 --> 00:50:51,839

DECIDE WHAT MISSIONS TO SEND
THAT ARE OUR LARGE STRATEGIC

725

00:50:51,839 --> 00:51:00,470

MISSIONS IS BASED ON A RATHER
LARGE SCIENTIFIC COMMUNITY

726

00:51:00,470 --> 00:51:02,950

HEAVILY INFLUENCED BY SCIENTIFIC
DISCOVERY.

727

00:51:02,950 --> 00:51:07,390

THAT'S THE SCIENTIFIC PROCESS

AND IN JUST ABOUT FIVE YEARS

728

00:51:07,390 --> 00:51:12,319

WE'LL START UP THE NEXT MAJOR
REVIEW OF PLANETARY SCIENCE AND

729

00:51:12,319 --> 00:51:20,559

I CAN ANTICIPATE THAT THE
INSTRUMENT THAT SHOWS ORGANIC

730

00:51:20,559 --> 00:51:26,359

MATERIALS AND WE STILL DON'T
KNOW WHAT IT'S FROM, FROM THESE

731

00:51:26,359 --> 00:51:30,840

RESULTS AND ALL THE REST I CAN'T
IMAGINE IT WON'T BE A HIGH

732

00:51:30,840 --> 00:51:34,230

PRIORITY WITH THE SCIENTIFIC
COMMUNITY TO SEND SOMETHING THAT

733

00:51:34,230 --> 00:51:37,270

HAS THE RIGHT PLANETARY
PROTECTION TO GO TO THESE AREAS

734

00:51:37,270 --> 00:51:41,700

AND MAY HAVE A LIFE DETECTION
CAPABILITY TO SEE IF THERE'S

735

00:51:41,700 --> 00:51:44,619

LIFE THERE THAT IS SIMILAR TO
EARTH AND THAT IS ALWAYS RISKY

736

00:51:44,619 --> 00:51:46,160

BECAUSE WHAT IF YOU DON'T SEE
IT?

737

00:51:46,160 --> 00:51:47,160

THAT DOESN'T RULE OUT LIFE.

738

00:51:47,160 --> 00:51:50,710

IT JUST MEANS IT'S NOT JUST LIKE
US AND FROM AN EVOLUTION

739

00:51:50,710 --> 00:51:52,510

STANDPOINT YOU WOULDN'T EXPECT
THAT.

740

00:51:52,510 --> 00:51:55,089

>> SO LET ME CLOSE THIS OUT.

741

00:51:55,089 --> 00:51:56,089

>> NOT YET.

742

00:51:56,089 --> 00:51:59,910

>> WE HAVE A FEW MORE MINUTES
BUT THEN WE'LL LET YOU CLOSE IT

743

00:51:59,910 --> 00:52:00,910

OUT.

744

00:52:00,910 --> 00:52:01,910

>> LET'S GO TO SOCIAL MEDIA.

745

00:52:01,910 --> 00:52:04,230

I KNOW WE HAVE A LOT OF
QUESTIONS BUT LET'S TAKE TWO

746

00:52:04,230 --> 00:52:07,690

QUICK ONES AND THEN I'M GOING TO
GIVE ASSOCIATED PRESS ON THE

747

00:52:07,690 --> 00:52:14,329

PHONE ONE QUESTION AND THEN I'LL
TURN IT OVER TO THE BOSS.

748

00:52:14,329 --> 00:52:17,839

>> FIRST QUESTION IS FROM

MELISSA ON TWITTER AND SHE SAID

749

00:52:17,839 --> 00:52:19,089

SO YOU FOUND WATER?

750

00:52:19,089 --> 00:52:20,140

WHAT ARE THE NEXT STEPS?

751

00:52:20,140 --> 00:52:24,000

WHAT DO YOU PLAN TO DO WITH THIS
INFORMATION?

752

00:52:24,000 --> 00:52:25,170

>> DRINK IT.

753

00:52:25,170 --> 00:52:31,450

>> ONE OF THE BIG THINGS IS NOW
WE FOUND WATER AND WE SEE IT

754

00:52:31,450 --> 00:52:34,329

PARTICIPATE IN FORMING THESE
STREAKS BUT WE DON'T KNOW WHERE

755

00:52:34,329 --> 00:52:36,940

THE WATER ACTUALLY COMES FROM.

756

00:52:36,940 --> 00:52:41,160

SO IT COULD BE HIDING A MAJOR
SOURCE OF WATER IN THE SUB

757

00:52:41,160 --> 00:52:43,780

SURFACE BUT WE DON'T HAVE ANY
IDEA.

758

00:52:43,780 --> 00:52:47,819

SO THIS IS SORT OF THE NEXT
PUZZLE TO THIS RECENT DISCOVERY.

759

00:52:47,819 --> 00:52:52,290

>> A CRITICAL PART OF THAT IS TO
FIND OUT OTHER PLACES ON MARS

760
00:52:52,290 --> 00:52:53,400
THAT WE SEE THIS.

761
00:52:53,400 --> 00:52:58,390
WE ONLY IMAGED ABOUT 3 TO 4%
TOTAL AT THIS HIGH RESOLUTION AT

762
00:52:58,390 --> 00:53:00,619
DIFFERENT TIMES OF THE YEAR.

763
00:53:00,619 --> 00:53:01,730
>> WE NEED THAT HIGH RESOLUTION.

764
00:53:01,730 --> 00:53:04,750
THESE STREAKS ARE MAYBE 4 OR 5
METERS IN WIDTH.

765
00:53:04,750 --> 00:53:11,089
THEY MAY BE A COUPLE OF FOOTBALL
FIELDS LONG BUT YOU KNOW, A

766
00:53:11,089 --> 00:53:16,960
NORMAL IMAGEER THAT MEASURE HALF
A KILOMETER BY HALF A KILOMETER,

767
00:53:16,960 --> 00:53:19,410
THEY'RE TOTALLY LOSS.

768
00:53:19,410 --> 00:53:24,250
WE NEED THAT ABILITY TO SEE THIS
TABLE AND SEVERAL PIXELS FROM

769
00:53:24,250 --> 00:53:26,709
ORBIT AND WE HAVE THAT WITH
HIGH-RISE RIGHT NOW.

770

00:53:26,709 --> 00:53:28,710

>> ONE MORE QUESTION.

771

00:53:28,710 --> 00:53:30,190

>> THIS IS FROM MEREDITH.

772

00:53:30,190 --> 00:53:32,550

SHE SAID DOES THIS MEAN THAT IT
RAINS ON MARS?

773

00:53:32,550 --> 00:53:37,059

IS THERE A FULL WATER LIKEL LIKE
ON EARTH?

774

00:53:37,059 --> 00:53:40,069

>> WE HAVEN'T SEEN RAIN ON MARS
BECAUSE SURFACE LEVEL IS WAY TOO

775

00:53:40,069 --> 00:53:42,480

LOW BUT WE HAVE SEEN SNOW.

776

00:53:42,480 --> 00:53:46,920

SO WE KNOW FROM THE HUMIDITY T
FACT THAT WHEN THE SUN GOES DOWN

777

00:53:46,920 --> 00:53:51,230

IT COOLS, THE HUMIDITY
PRECIPITATES OUT AS ICE CRYSTALS

778

00:53:51,230 --> 00:53:55,230

ON THE SURFACE OF ROVERS AND ON
ROCKS SO WE KNOW THAT THERE IS A

779

00:53:55,230 --> 00:53:59,540

WATER CYCLE AND WE KNOW FROM THE
EVIDENCE OF CURIOSITY ROVING ON

780

00:53:59,540 --> 00:54:03,240

THE SURFACE THAT 4 BILLION YEARS
AGO THERE WAS AN ACTIVE WATER

781

00:54:03,240 --> 00:54:07,390

CYCLE BECAUSE WE'RE DRIVING OVER
RIVER DELTAS SO AT THAT TIME IT

782

00:54:07,390 --> 00:54:08,410

CERTAINLY DID RAIN.

783

00:54:08,410 --> 00:54:13,480

>> IN FACT, THE PHOENIX LANDER
THAT LANDED CLOSE TO THE NORTH

784

00:54:13,480 --> 00:54:19,440

POLE UP IN THE ARCTIC ZONE
REGION OF MARS ACTUALLY MADE

785

00:54:19,440 --> 00:54:23,640

SOME GREAT OBSERVATIONS WITH A
CANADIAN INSTRUMENT FROM THE

786

00:54:23,640 --> 00:54:26,849

CANADIAN SPACE AGENCY WATCHING
THE SNOW COME IN.

787

00:54:26,849 --> 00:54:31,730

THERE'S GREAT DATA FROM PHOENIX
ALONE THAT SHOWS US THAT.

788

00:54:31,730 --> 00:54:36,680

>> BEFORE WE GO TO THE PHONE ONE
LAST TIME, SOCIAL MEDIA, KEEP

789

00:54:36,680 --> 00:54:40,950

SENDING THOSE QUESTIONS IN AND
WE'LL HAVE FOLKS RESPONDING AS

790

00:54:40,950 --> 00:54:45,810

QUICKLY AS POSSIBLE TO ALL OF
YOUR QUESTIONS ON SOCIAL MEDIA.

791
00:54:45,810 --> 00:54:47,550
SO MARSHA, ASSOCIATED PRESS.

792
00:54:47,550 --> 00:54:50,200
>> YES, CAN YOU HEAR ME?

793
00:54:50,200 --> 00:54:51,790
>> LOUD AND CLEAR.

794
00:54:51,790 --> 00:54:54,940
>> YES, MY QUESTION ABOUT THE
RSLs.

795
00:54:54,940 --> 00:55:00,030
WOULD YOU ANTICIPATE THE WATER
BEING AS SALTY AS THE EARTH'S

796
00:55:00,030 --> 00:55:01,030
OCEANS?

797
00:55:01,030 --> 00:55:05,329
I'M JUST WONDERING AND CAN YOU
EVEN ESTIMATE OR GUESS HOW MUCH

798
00:55:05,329 --> 00:55:07,580
WATER WE'RE TALKING ABOUT
FLOWING?

799
00:55:07,580 --> 00:55:12,410
I DON'T KNOW IF I'M INVISONING
STREAMS, RIVERS, A TRICKLE, IS

800
00:55:12,410 --> 00:55:13,839
THERE A DROUGHT?

801
00:55:13,839 --> 00:55:18,190
GIVE ME A PICTURE OF WHAT YOU
THINK, HOW MUCH WATER THERE

802

00:55:18,190 --> 00:55:25,309

MIGHT BE.

803

00:55:25,309 --> 00:55:26,460

>> DID YOU COPY THAT QUESTION?

804

00:55:26,460 --> 00:55:27,460

>> YEAH.

805

00:55:27,460 --> 00:55:30,450

HE'S GOING TO ANSWER THAT
QUESTION.

806

00:55:30,450 --> 00:55:36,859

>> I'LL SAY WHAT I THINK AND HE
CAN CLIMB IN AS WELL BUT EARTH'S

807

00:55:36,859 --> 00:55:40,099

OCEANS SEEM PRETTY SALTY TO US
BUT WATER CAN GET MUCH, MUCH

808

00:55:40,099 --> 00:55:43,320

SALTIER THAN THAT AND IF THE
PROCESS OCCURS IF THAT'S HOW THE

809

00:55:43,320 --> 00:55:47,450

WATER IS BEING MADE IT WILL BE
MUCH, MUCH SALTIER THAN EARTH'S

810

00:55:47,450 --> 00:55:55,310

OCEANS WE MADE AN ATTEMPT TO
ESTIMATE HOW MUCH WATER MIGHT BE

811

00:55:55,310 --> 00:55:59,289

THE MINIMUM AMOUNT TO EXPLAIN
THE DARKENING ASSUMING ONLY 5%

812

00:55:59,289 --> 00:56:03,930

WATER WHICH IS SUFFICIENT AND

ONLY 10 MILLIMETERS THICKNESS

813

00:56:03,930 --> 00:56:08,020

WHICH IS MUST HAVE FOR IT TO
ACTUALLY FLOW DOWN THE SLOPES.

814

00:56:08,020 --> 00:56:16,760

>> THE MINIMUM WAS†-- I DON'T
KNOW HOW MANY OLYMPIC SWIMMING

815

00:56:16,760 --> 00:56:22,869

POOLS THAT IS SO WHAT WE'RE
DEALING WITH IS WET SOIL, THIN

816

00:56:22,869 --> 00:56:24,770

LAYERS OF WET SOIL.

817

00:56:24,770 --> 00:56:30,160

NOT STANDING WATER MARS HAS A
LOT OF SURFACE AREA SO IF YOU

818

00:56:30,160 --> 00:56:35,160

ADD IT ALL UP IT COULD BE A
SIGNIFICANT VOLUME.

819

00:56:35,160 --> 00:56:36,339

>> OKAY?

820

00:56:36,339 --> 00:56:38,700

ALL RIGHT.

821

00:56:38,700 --> 00:56:41,000

WHAT I'D LIKE TO DO NOW IS TURN
IT OVER TO DR.

822

00:56:41,000 --> 00:56:45,089

JOHN GRUNSFELD
AND THE MARS MISSION AND MARS

823

00:56:45,089 --> 00:56:49,829
PROGRAM IS IN HIS PORTFOLIO BUT
HE HAS NEARLY 100 MISSIONS IN

824
00:56:49,829 --> 00:56:50,859
THE PORTFOLIO.

825
00:56:50,859 --> 00:56:52,650
SO SIR, WRAP UP.

826
00:56:52,650 --> 00:56:53,650
>> THANKS.

827
00:56:53,650 --> 00:56:55,010
WELL, AGAIN, THANK YOU FOR
COMING.

828
00:56:55,010 --> 00:56:57,789
I KNOW THIS IS AN EXCITING AND
INTERESTING RESULT.

829
00:56:57,789 --> 00:56:59,390
I KNOW YOU'LL HAVE LOTS MORE
QUESTIONS.

830
00:56:59,390 --> 00:57:02,340
WE'LL TRY TO ANSWER THE
QUESTIONS FROM SOCIAL MEDIA.

831
00:57:02,340 --> 00:57:06,710
WE ENCOURAGE YOU TO TALK TO OUR
SCIENTISTS AFTER THIS WE ARE ON

832
00:57:06,710 --> 00:57:11,049
A JOURNEY TO MARS AND SCIENCE IS
LEADING THE WAY AND EACH TIME WE

833
00:57:11,049 --> 00:57:14,549
LEARN ABOUT SOMETHING NEW IT
BECOMES MORE AND MORE

834

00:57:14,549 --> 00:57:20,579

INTERESTING AND IT'S JUST GOING
TO PROVIDE US WITH A GREAT SENSE

835

00:57:20,579 --> 00:57:25,220

OF OUR PLACE IN THE UNIVERSE AND
OUR SOLAR SYSTEM IN PARTICULAR.

836

00:57:25,220 --> 00:57:27,750

AS HE SAYS WE HAVE A LOT OF
OTHER MISSIONS WE JUST STARTED

837

00:57:27,750 --> 00:57:29,650

THIS YEAR.

838

00:57:29,650 --> 00:57:32,630

WE KNOW THEY HAVE AN UNDERSEA
OCEAN AND WE'LL BE EXPLORING

839

00:57:32,630 --> 00:57:35,920

THAT IN THE NEXT DECADE SO
PLEASE STAY TUNED TO SCIENCE

840

00:57:35,920 --> 00:57:38,940

BECAUSE, YOU KNOW, BASICALLY,
SCIENCE NEVER SLEEPS.

841

00:57:38,940 --> 00:57:42,119

WE HAVE LOTS OF DISCOVERIES AND
WE APPRECIATE YOUR INTEREST.

842

00:57:42,119 --> 00:57:48,539

THANK YOU VERY MUCH.

843

00:57:48,539 --> 00:57:56,300

[APPLAUSE]

>> SO WITH THAT, THANK YOU FOR

844

00:57:56,300 --> 00:57:58,010
JOINING US FROM WASHINGTON D.C.

845
00:57:58,010 --> 00:58:00,760
AGAIN, GO TO NASA.GOV/MARS AND
NASA.GOV/JOURNEY TO MARS.

846
00:58:00,760 --> 00:58:04,130
FOLLOW US ON SOCIAL MEDIA.